

*Smithsonian
Entom.*

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

VOLUME 7.

1894-1896.

CAMBRIDGE, MASS., U. S. A.
CAMBRIDGE ENTOMOLOGICAL CLUB.
1896.



CONTENTS.

ALDRICH, J. M. The Tipulid genera <i>Bittacomorpha</i> and <i>Pedicia</i> . <i>Illustrated</i>	200-202
ASHMEAD, WILLIAM HARRIS. The habits of the aculeate Hymenoptera	19-
	26: 39-46: 59-66: 75-79
BANKS, NATHAN. The Nemostomatidae and Trogulidae of the United States	11-12: 51-52
The genus <i>Oxyptila</i>	241-244
BEAN, THOMAS E. A comparison of <i>Colias hecla</i> with <i>Colias meadii</i> and <i>Colias</i> <i>elis</i>	219-229
BLATCHLEY, W. S. Notes on the winter insect-fauna of Vigo County, Indiana	247-
	250: 267-270: 279-281: 336-340: 379-381: 399-401: 434-437: 455-458
BOWDITCH, FREDERICK C. <i>Chrysobothris femorata</i> and <i>Clerus 4-guttatus</i>	387-388
<i>See also</i> Supplement II.	
C., T. L. Wilhelm Jülich	36
COCKERELL, THEODORE D. A. A check-list of African Coccidae	179
<i>Phthiria sulphurea</i> Loew	188-188
Two new western Coccidae. <i>Illustrated</i>	254-255
The new catalogue of bees	386-387
Some additional species of <i>Prosapis</i>	437-439
<i>See also</i> Supplement I.	
COQUILLET, D. W. On the validity of the Tachinid genus <i>Celatoria</i>	251-252
On the Tachinid genus <i>Acroglossa</i> Williston	261-262
The Bombylid genus <i>Acreotrichus</i> in America	273
COOLEY, R. A. A new structural character in insects. <i>Plate 9.</i>	395-398
DAVIDSON, A. Habits and parasites of <i>Stigmus inordinatus</i> Fox	271-272
On the nest and parasites of <i>Prosopis varifrons</i> Cresson	315-316
Habits and parasites of a new Californian wasp	335-339
DENTON, SHELLEY W. Local butterfly notes	263
DYAR, HARRISON G. Preparatory stages of <i>Pseudohazis shastaensis</i> Behrens	91-92
Notes on Bombycid larvae	135-138
Preparatory stages of <i>Sphinx vashti</i> Strecker	177
Life-history of <i>Clisiocampa fragilis</i> Stretch	189-191
The larva of <i>Butalis basillaris</i> Zell.: the relations of its setae. <i>Illustrated</i>	252-253
Life-history of <i>Clisiocampa pluvialis</i> Dyar. <i>Illustrated</i>	259-260
The larva of <i>Harrisina coracina</i> Clemens	306-307
The number of stages in <i>Apatelodes torrefacta</i> . <i>Illustrated</i>	316-317
The arctic Lymantriid larva from Mt. Washington, N. H., <i>Dasychira rossii</i> Curt.	328-329
Final notes on <i>Orgyia</i>	340-342
The larva of <i>Cautethia grotei</i> Hy. Edw.	385-386
Preparatory stages of <i>Cosmosoma auge</i> Linn.	414-415
Note on <i>Dionychopus</i>	415-416
Life-history of <i>Ichthyura strigosa</i> Grote	424-425
Partial life-history of <i>Halisidota cinctipes</i> Grote	450-451

ELLIOT, IDA M. Polygamy of Moths	155
FOLSOM, JUSTUS WATSON. New species of <i>Papirius</i>	344-345
Oviposition and hatching of <i>Thanaos juvenalis</i>	362-363
Notes on the types of <i>Papirius texensis</i> Pack., and description of a new <i>Smynthurus</i>	384-385
<i>Neelus murinus</i> , representing a new Thysanuran family. <i>Plate 8</i>	391-392
Notes on the oviposition of <i>Thanaos icelus</i> (?)	403
New <i>Smynthuri</i> , including myrmecophilous and aquatic species. <i>Plate 10</i>	446-450
GARMAN, H. Two cave beetles not before recorded. <i>Illustrated</i>	81-82
GIARD, ALFRED. Convergence and poecilogony among insects (Translated by Herbert Osborn)	171-175
GROTE, AUGUSTUS RADCLIFFE. The condition of <i>Apatela</i>	411-414
HARVEY, F. L. The American species of the Thysanouran genus <i>Seira</i> . <i>Illustrated</i>	159-162
Two new species of <i>Entomobrya</i> . <i>Illustrated</i>	196-196
Eggs of the long-nosed ox-louse, <i>Haematopinus vitula</i> L. <i>Illustrated</i>	250-251
Notes on <i>Smerinthus cerysii</i> Kirby	331-332
A Thysanuran of the genus <i>Anoura</i> . <i>Illustrated</i>	422-423
HENSHAW, SAMUEL. Bibliographical Notes, V—Minor entomological publications: Garden and Forest, vols. 3, 4	5-6
VI— <i>Biologia Centrali-Americana</i> : Hemiptera Heteroptera	134-135
VII—Minor entomological publications: Garden and Forest, vols. 5-8	425-426
HOLLAND, WILLIAM JOSEPH. New and undescribed genera and species of West African Noctuidae. <i>Plates 1-5, and figures in text</i>	7-10: 27-34: 36: 47-50: 67-70: 83-90: 109-128: 141-144
HUSTON, KATHERINE W. Notes on the rearing of <i>Platysamia cecropia</i>	131-133
KELLOGG, VERNON L. The Ephemeraidae and venation nomenclature. <i>Illustrated</i> . The Mallophaga	311-315 375-379
KING, GEORGE B. Some habits of <i>Formica obscuripes</i> Forel, with notes on some insects found associated with it	281-283
MORSE, ALBERT PITTS. Wing-length in some New England Acrididae	13-14: 53-55
A preliminary list of the Acrididae of New England	102-108
Notes on the Acrididae of New England, I. Tettiginae, <i>Plate 6</i>	147-154: 163-167
Notes on the Orthoptera of Penikese and Cuttyhunk	179-180
New North American Odonata	207-211: 274-275
Revision of the species of <i>Spharagemon</i> . <i>Illustrated</i>	287-299
<i>Enallagma pictum</i> Morse.	307
Notes on the Acrididae of New England, II. Tryxalinae <i>Plate 7</i>	323-327: 342-344: 382-384: 402-403: 407-411: 419-422: 443-445
OSBORN, HERBERT. <i>See</i> Giard, Alfred.	
OSTEN SACKEN, CHARLES ROBERT VON. Western Pedicidae. Bittacomorphae and Trichocerae	229-231

PACKARD, ALPHEUS SPRING. On a rational nomenclature of the veins of insects, especially those of Lepidoptera. <i>Illustrated</i>	235-241
PATTON, WILLIAM HAMPTON. Notes upon <i>Toxoneuron</i>	178-179
PECKHAM, GEORGE W. AND ELIZABETH G. Notes on the habits of <i>Trypoxylon rubrocinctum</i> and <i>Trypoxylon albobilosum</i>	303-306
SCUDDER, SAMUEL HUBBARD. Biological notes on American Gryllidae	3-5
Rehabilitation of <i>Podisma</i> Latreille	195-196
The New England <i>Melanopli</i>	367-370
The species of <i>Nemobius</i> found in North America	431-434
SKINNER, HENRY. <i>Colias hecla</i>	244
SMYTHE, ELLISON A., JR. <i>Calephelis borealis</i>	403
SOULE, CAROLINE G. Early stages of <i>Spilosoma latipennis</i>	71-72
Polygamy of moths	155
<i>Papilio philenor</i> at Nonquitt	155
Polygamy of <i>Actias luna</i> and <i>Callosamia promethea</i>	167
Uncertainty of the duration of any stage in the life-history of moths	191
<i>Limenitis arthemis</i> in August	203
Description of some of the larval stages of <i>Amphion nesus</i>	212-213
Failure to emerge of <i>Actias luna</i>	235
Notes on moths	271
<i>Deidamia inscripta</i>	317-318
Notes on butterflies	398
Notes on Lepidoptera	451
Life-history of <i>Deilephila lineata</i>	458-460
SRAGUE, FRANK H. <i>Schistocerca americana</i> in New England	318
TOWNSEND, CHARLES HENRY TYLER. Notes on some Meloids, or blister-beetles of New Mexico and Arizona	100-102
A cone-like Cecidomyiid gall on <i>Bigelovia</i>	179
A Psyllid leaf-gall on <i>Celtis</i> , probably <i>Pachypsylla celtidis-pubescentis</i> Riley	187-188
Gall of <i>Eurytoma</i> sp. on the cat's-claw thorn	202-203
Woolly leaf-gall made by a species of <i>Callirhytis</i> on scrub-oak	262-263
Prickly leaf-gall of <i>Rhodites tumidus</i> on <i>Rosa fendleri</i>	272-273
<i>Rhodites tumidus</i>	307
Notes on the species of <i>Exorista</i> of temperate North America	329-331
WARD, HENRY B. On the pigeon mite, <i>Hypodectes filippi</i>	95-100
WEED, CLARENCE MOORES. The hibernation of Aphides. <i>Illustrated</i>	351-363
WEED, HOWARD EVARTS. A preliminary list of the butterflies of northeastern Mississippi	129-131
WICKHAM, HENRY FREDERICK. Further notes on Coleoptera found with ants	79-81
On Coleoptera found with ants: third paper	370-372
WILLISTON, SAMUEL WENDELL. On the Rhopalomeridae	183-187
<i>Rhopalomera xanthops</i> sp. nov.	213

UNSIGNED ARTICLES.

EDWARDS' BUTTERFLIES OF NORTH AMERICA	15-307
ENTOMOLOGICAL NOTES (Pascoe's collection of Coleoptera; Smith's Catalogue of the Noctuidae; recent papers of interest, 15. The New England species of Spharagemon, <i>illustrated</i> ; death of Edward Norton; Kolbe's Entomology; the species of Crambus about Ithaca, 138. Recent papers on N. A. Orthoptera; effect of elevation on eclosion of Osmia; Edward's Butterflies of N. A.; black female of Euphoeades glaucus in New England, 155. Insect Life; Moore's Lepidoptera Indica; Canadian spiders; Californian Collembola, 180. Dr. McCook's American spiders; Peckham on senses of spiders; the Entomologist's Daily Post Card; Packard on the fleas; new light on Hemimerus, 203-204. A Permian caddis fly; Janet on structure of Myrmica; Elwes on geographical distribution of butterflies; Bertkau's annual review of entomology; the chair of entomology at the Jardin des Plantes; losses through fire by entomologists; change of address, 213-214. A promised work on N. A. Diptera; Lemnicki on pleistocene insects of Galicia, 231. A Japanese entomological journal; list of N. A. Asilidae, 363. The nest of Vespa; Moore's Lepidoptera Indica; Lake Superior Coleoptera; the death of Juan Gundlach, 388).	
HERMANN AUGUST HAGEN	35
PROCEEDINGS OF THE CAMBRIDGE ENTOMOLOGICAL CLUB (Crambid injurious to cranberry vines; book-worms; protective guise of a Limacodes; various Orthoptera, 55. Comstock's Evolution and taxonomy; abundance of Calosoma; Pelecinus polycerator; the species of Bembidium; election of officers; death of Dr. Hagen; New England Acrididae, 139. Ceuthophili of N. A.; Coleoptera of Lower California, 168. Officers for 1895; Scapteriscus in the U. S.; Podisma vs. Pezotettix; derivation of pigments in Lepidoptera; the ape's face in chrysalis of Spalgis; northern captures of Panchlora viridis; Danais archippus at sea, 214-215. Election; Colias hecla; winter collecting; Lycaena xerces, 275. Habits of certain Coleoptera; colors of Papilio, 299. Butterflies and Orthoptera of Labrador; a hybrid Basilarchia; development of color in wings; butterfly captures in New England, 319. Elections; officers for 1896; the apterous species of Podisma in Europe and America; tobacco improved by attacks of Epitrix; butterfly captures; development of the scales in Lepidoptera; parallel markings in Bembidium, 346-347. Pigment of the scales of Lepidoptera; a Japanese journal of entomology; Bermuda insects; eggs of Neophasia, 426-427).	
A NEW FAMILY OF FOSSIL BEETLES.	162
THE BUTTERFLY HUNTERS IN THE CARRIBEES.	175
THE ANATOMY OF LEPIDOPTERA IN THE KANSAS UNIVERSITY QUARTERLY.	176
COMSTOCK'S MANUAL FOR THE STUDY OF INSECTS.	256
COMSTOCK'S INSECT ANATOMY.	299
CHARLES VALENTINE RILEY.	308
THE INSECT COLLECTIONS OF THE U. S. NATIONAL MUSEUM.	318-319
HART'S AQUATIC INSECTS OF ILLINOIS.	332
THE CAMBRIDGE NATURAL HISTORY—INSECTS.	346
INSECT-VISION: PLATEAU'S EXPERIMENTS.	372

TUTT'S BRITISH MOTHS.	388
RECENT PUBLICATIONS (Packard's Notodontidae; Reuter on palpi of butterflies; the Gypsy Moth report; Fernald's Crambidae; Felt's scorpion flies; Cockerell on Perdita; Kellogg on Mallophaga, 416).	
CAPTURES OF ORTHOPTERA.	439
TUTT'S BRITISH BUTTERFLIES.	452
<i>For Notes, see Entomological Notes.</i>	

SUPPLEMENT TO PSYCHE I.

BAKER, CARL F. New Homoptera received from the New Mexico Agricultural experiment station. <i>Illustrated</i>	12-14; 24-26
<i>See also Cockerell T. D. A. and Baker C. F.</i>	
COCKERELL, THEODORE A. D. New North American Coccidae	1-4
New North American Bees	4-6
A Mutillid which resembles thistle-down	6-7
New species of Coccidae	7-8
New species of bees	9-11
Doryphora (Mycocoryna) lineolata Stal	11
Some new insects	15-17
Preliminary diagnoses of new Coccidae	18-21
New species of Prosapis	26-32
Proposed biological station	32
COCKERELL, THEODORE A. D. AND BAKER, CARL F. Some species of Oxybelus found in New Mexico	21-23
COCKERELL, THEODORE A. D. AND GILLETTE C. P. The grape-vine Typhlocybrids of the Mesilla Valley, New Mexico. <i>Illustrated</i>	14-15
COCKERELL, THEODORE A. D. AND HOWARD, LELAND O. A Ceroplastes and its parasite	17-18
GILLETTE, C. P. <i>See Cockerell T. D. A. and Gillette, C. P.</i>	
HOWARD, LELAND O. <i>See Cockerell, T. D. A. and Howard, L. O.</i>	

SUPPLEMENT TO PSYCHE II.

BOWDITCH, FREDERICK C. List of Mt. Washington Coleoptera	1-11
--	------

A NEW VOLUME OF PSYCHE

Begins in January, 1897, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. Numbers are issued on the first day of each month. Libraries and individuals generally ordering through subscription agencies (*which only take annual subscriptions*) will please notice that it is cheaper to subscribe for the entire volume at once directly of us.— Any early volume can be had for \$5.00, unbound. Address Psyche, Cambridge, Mass.

Vols. 1-7, Complete, Unbound = = = = = = **\$33.00.**

Vols 1-7, and Subscription to Volume 8 = = = = = = **\$37.00.**

Vol. 7 contains over 500 pp. and 10 plates, besides other illustrations.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 213.

JANUARY, 1894.

CONTENTS:

BIOLOGICAL NOTES ON AMERICAN GRYLLIDAE.— <i>Samuel H. Scudder.</i>	3
BIBLIOGRAPHICAL NOTES.—V.—MINOR ENTOMOLOGICAL PUBLICATIONS.—GARDEN AND FOREST, VOLS. III AND IV.— <i>Samuel Henshaw.</i>	5
NEW AND UNDESCRIBED GENERA AND SPECIES OF WEST AFRICAN NOCTUIDAE.—I.— <i>W. F. Holland.</i>	7
THE NEMASTOMATIDAE AND TROGULIDAE OF THE UNITED STATES.—I.— <i>Nathan Banks.</i>	11
WING-LENGTH IN SOME NEW ENGLAND ACRIDIDAE.—I.— <i>Albert P. Morse.</i>	13
PROCEEDINGS OF THE CAMBRIDGE ENTOMOLOGICAL CLUB (Exhibition of specimens; paper read).	14
EDWARDS'S BUTTERFLIES OF NORTH AMERICA.	15
ENTOMOLOGICAL NOTES (Pascoe's collection of Coleoptera; Smith's Catalogue of the Noctuidae; recent papers of interest).	15

PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS 20c.

[Entered as second class mail matter.]

5.70513

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5.00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE,

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion, . . .	\$0.10	\$0.08
Eighth page, first insertion, . . .	.75	.60
Quarter " " " " " . . .	1.25	1.00
Half " " " " " . . .	2.25	1.75
One " " " " " . . .	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE, Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN, Caristrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$20.

SAMUEL HENSHAW, Treas., Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, Danais archipus. Boston, 1880. 16 p., 2 plates. 1.00

Hitchcock, Edward. Ichnology of New England. Boston, 1858. 1.50

Illinois. Trans. Dept. Agric. for 1876 (containing first report of Thomas, State Entomologist). Springfield Ill., 1878. 1.00

Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate. .50

Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875. 1.00

Scudder, S. H. The pine-moth of Nantucket, Retinia frustrana. col. pl. Boston, 1883. .25

Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889. 1.00

Stettiner entomologische Zeitung. Jahrg. 42-46. Stettin, 1881-1885. 5.00

U. S. Entomological Commission.—Fourth Report, Washington, 1885. 2.00

SAMUEL HENSHAW, Treas., Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM, Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN., Ryhope, near Sunderland, England.

DULAN & CO., FOREIGN BOOKSELLERS.

37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues. Parts 23-30.

387270

PSYCHE.

BIOLOGICAL NOTES ON AMERICAN GRYLLIDÆ.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

GRYLLOTALPA BOREALIS.

The burrows of this mole cricket are in the main very superficial, lying just beneath the surface of the soil and running in entirely irregular directions. The insects seem to push their way where the soil yields most readily and take advantage of natural furrows and crevices. The burrows are generally so near the surface that the earth is pushed up above them into ridges which can be easily traced, and when the soil dries after a rain portions of the ridges fall in and expose the burrows. They frequently fork and occasionally turn abruptly downward into blind passages, in which I have failed to find anything. Apparently one insect, or at most a pair, ♂ and ♀, occupy a single burrow, and males are rarely found nearer together than thirty feet, never apparently nearer than ten or fifteen feet. Rathvon, however, says (Rep. dep. agric., 1862, 378) that in a meadow near Lancaster, Penn., over a hundred specimens were once taken in a piece of ground about six feet square. Usually the burrows are just large enough for the crickets to move in (and these insects move backward as readily

as forward); but they occasionally enlarge into lateral chambers seldom larger than a pigeon's egg, which enables them to turn around; and in such chambers the eggs are laid in masses of a hundred or thereabouts adhering to the rootlets of *Potentilla* and other plants. The eggs are spherical, white or almost colorless, and have a diameter of 0.7 mm. The newly hatched larva can leap like a *Tridactylus*.

TRIDACTYLUS TERMINALIS.

Messrs. Sanborn and Thaxter once found mature specimens in burrows of *Gryllotalpa borealis* on the shores of Winter Pond, in Winchester, Mass. I found on visiting the spot that their own burrows were made in gravelly, sandy soil and were very superficial, not more than an inch below the surface. I saw one come out of its burrow, which it did rather slowly, but as soon as its body was three-fourths in sight, it leaped away. They leap in a lively manner to the distance of one or two yards; and when disturbed move either backward or forward with sudden starts after the manner of *Gryllotalpa*. The

burrow from which the specimen was seen to emerge was 1.5 mm. in diameter and at first vertical. Early in October more young than mature were found, but the young were mostly pupae though scarcely half the size of the adult; the two sexes seemed to be equally common.

The testes of the male are so situated that the upper rounded tips lie at the base of the fore-legs, *i. e.*, they just extend into the prothorax; they are approximated, the smaller front lobe whitish, the posterior brownish and those of opposite sides are separated by about half their transverse diameter.

GRYLLODES SP.

What appears to be an undescribed species of *Grylloides*, allied to *G. abortivus*, was found by Mr. C. J. Maynard in Florida in an interesting position. As I have only a single specimen, a female pupa, it is not possible to determine the species more definitely. Mr. Maynard writes me that when at Jacksonville in January, 1869, he observed small heaps of freshly moved sand about an inch and a half high, removing which with care he came to a small hole; this he followed to an oblong chamber near by, near the surface of the ground, about two inches long, one wide and three-quarters of an inch deep, on the floor of which were scattered bits of leaves and grass. At each extremity of this chamber (the first discovered) was found a vertical burrow about three inches in depth, one of them empty and at the bottom of the other

“a large blue black beetle with immense jaws.” In other similar chambers only one vertical burrow was found, from three to six inches in depth, and this inhabited at the very bottom by this cricket. The chamber was made in the close vicinity of a plant closely resembling our common dandelion and the burrows penetrated between the roots of the same; the bits of leaf found in the chambers were also of the same plant.

It is to be hoped that future observers in the south will follow out this clew and obtain the perfect insect for closer determination. At some future time I hope to publish a sketch of the burrow and surroundings made by Mr. Maynard.

OECANTHUS NIVEUS.

In preparing for oviposition, the female, standing head upward, first removes or scrapes the bark of a raspberry or other shoot with its jaws at the point where she wishes to insert an egg. Then, bringing both hind tarsi forward to their utmost so as to approach the head, the body, without moving the hind tarsi, is extended forward until hind femora and tibiae are at right angles, the ovipositor is placed at the angle the eggs will subsequently have in the stem and its point is then exactly at the centre of the bitten portion. While the legs now clasp the stem tightly, the ovipositor is worked with a slight upward and downward movement and the body at the same time swayed gently from side to side. The hole drilled, the egg is laid without previously withdrawing the

ovipositor, and during this latter movement the anal cerci tremble slightly. Two operations, including both drilling and oviposition, which were timed, took six and a half and five and a half minutes respectively. As soon as one egg is laid, the female proceeds to attack the bark again in a new place at a very short remove from and above the other, and uses the bits of bark torn off to conceal the opening of the hole below, fastening them in place by the aid of its "molasses," so that when it hardens it presents the rough appearance one always sees at the entrance; but if these are removed the opening of the hole will be found clean and splinterless. The insect bores but two or three holes at a time and after a delay returns to the same spot to renew operations, meanwhile leaving the uppermost hole unplugged, although those below are often revisited in the pauses of oviposition to spread more fluid on the other completed drills. This explains why the uppermost drill of a series is often found unclosed at the opening, the insect having perhaps been frightened away altogether before the entire completion of her task.

The egg-holes are drilled at an average

of 1.1 mm. apart and are 0.4 mm. in diameter at the entrance. The harder outer portion of the stem of the raspberry is first bored through almost vertically but a little downward, while in the pith the drills incline downward in a slight curve (just that of the egg), the general trend of the deeper portion being at angles varying from 135° to 170° but averaging about 145° to the trend of the initial portion.

The eggs are nearly cylindrical, tapering slightly and well rounded at the ends, both ends alike in this respect, 2.65 mm. long and 0.55 mm. broad, the top end, occupying a length of two-fifteenths of the whole, covered with little crowded papillae which diminish in size away from the tip, and where they fade the surface becomes studded with lozenge shaped depressions 0.017 mm. long and half as wide. When first laid the eggs are of a uniform very pale green, but later become brownish amber or pale brassy, but with a pale brownish yellow layer at the lower end. The eggs are extruded cap-end hindmost.

This insect seems to prefer to eat the harder parts, the ribs and veins, of leaves.

BIBLIOGRAPHICAL NOTES.—V.*

BY SAMUEL HENSHAW.

MINOR ENTOMOLOGICAL PUBLICATIONS.—GARDEN AND FOREST, Vol. III (1890), contains the following notes and articles:—

- Smith, J. B. A new elm insect. *Zeuzera pyrina*. p. 30-31, f. 6.
 Pearson, A. W. and Editor. The rose beetle [*Macrodactylus subspinosus*]. p. 44-45.
 Lintner, J. A. Late experience with insects injurious to orchard and garden. p. 70-71.
 Smith, J. B. An enemy [*Botis nelumbialis*] to the Egyptian lotus. p. 88, f. 18-19.

* For Nos. I-IV, see Vol. 6.

- Goff, E. S. Protection against the striped cucumber beetle. [*Diabrotica vittata*]. p. 90, 92, f. 21.
- Massey, W. F. The striped cucumber beetle. [*Diabrotica vittata*]. p. 129
- Editorial. Legislation against the gypsy moth [*Onceria dispar*]. p. 150.
- Jack, J. G. A newly imported rose saw-fly [*Empfytus cinctus*, L.]. p. 151-152.
- Jack, J. G. The comparative liability of trees to disease. p. 176-178.
- Smith, J. B. Insecticides for window plants. p. 192.
- Jack, J. G. State control of the gypsy moth. [*Onceria dispar*]. p. 277-278.
- Veitch, A. and Smith, J. B. The chrysanthemum fly. [*Eristalis tenax*]. p. 326.
- Smith, J. B. An experience with rose-bugs. [*Macrodactylus subspinosus*]. p. 343-344.
- Jack, J. G. Diseases of chrysanthemums caused by insects. [*Cicadula quadrilincata*, *Lygus lineolaris*, *Lygacus* (= *Poecilocapsus*) *lineatus*, *Triphleps insidiosus*, *Plagiognathus obscurus*, *Phytomyza chrysanthemi*, *Eristalis tenax*]. p. 439-440, f. 55.
- Smith, J. B. A new enemy [*Cryptorhynchus lapathi*] of willows. p. 451.
- A. and Editor. Insect enemies [*Alypia octomaculata*] of Ampelopsis. p. 471.
- Weed, C. M. The white pine louse. [*Lachnus strobi*]. p. 488, f. 60-62.
- Phono. Enemies of the grape vine. p. 547.
- Smith, J. B. The black peach Aphis. [*Aphis persicæ niger*]. p. 548, f. 70-72.
- Smith, J. B. Notes on the plum Curculio. [*Conotrachelus nenuphar*]. p. 560.
- Weed, C. M. The spotted willow-twig Aphis. [*Melanoxanthus salicis*]. p. 632, f. 83-85.
- Treat, Mary. The pines at Christmas-time. [Notes on *Lophyrus abbotii* and *Resinia frustrana*]. p. 14.
- Smith, J. B. A winter campaign against insects. p. 42.
- Treat, Mary. Insect enemies [*Tomiscus caligraphus*, *Chalcophora virginienis*, *C. liberta*, *Mouohammus confusor*] of the pitch pine. p. 62-63.
- Jack, J. G. An insect pest [*Isosoma orchidearum*] of Cattleyas. p. 99-100, f. 21.
- Jack, J. G. Can the gypsy moth [*Onceria dispar*] be exterminated? p. 111-112.
- Fernow, B. E. Insect lime for the gypsy moth. [*Onceria dispar*]. p. 142-143.
- Smith, J. B. Insect lime. p. 153.
- Jack, J. G. Notes on some insects [*Gossyparia ulmi*, *Orgyia leucostigma*, *Hyphantria cunea*, *Thyridopteryx ephemeraeformis*, *Onceria dispar*] and insect remedies. p. 184, 186.
- Fernow, B. E. Insect lime, nevertheless. p. 202-203.
- Smith, J. B. An oak scale [*Asterodiaspis quercicola*]. p. 243, f. 43.
- Hoskins, T. N. The abuse of insecticides. p. 247.
- Anon. [*Diplosis pyrivora*]. p. 276.
- Jack, J. G. Weevils [*Bruchidae*] in leguminous tree-seeds. p. 280-281, f. 49.
- Robbins, M. C. A struggle with the web-worm [*Hyphantria cunea*]. p. 291-292.
- Anon. [*Macrodactylus subspinosus*]. p. 312.
- Anon. [*Phorodon humuli*]. p. 312.
- Robbins, M. C. The rose-chaffer. [*Macrodactylus subspinosus*]. p. 338-340.
- Pearson, A. W. Experience with the rose-bug [*Macrodactylus subspinosus*] in 1891. p. 415-416.
- Taplin, W. H. Insecticides for greenhouse plants. p. 452.
- Jack, J. G. A clematis borer [*Acalthoe caudata*]. p. 496, f. 77.
- Riley, C. V. A new herbarium pest. [*Carphoxera ptelearia*]. 543-544, f. 84-85.

Vol. IV (1891) contains the following:—

NEW AND UNDESCRIBED GENERA AND SPECIES OF WEST AFRICAN NOCTUIDAE.

BY W. J. HOLLAND, PH.D., PITTSBURGH, PENN.

METHORASA, MOORE.

1. *M. complicata*, sp. nov. ♂. Front olivaceous-brown; collar olivaceous margined with pale green internally. Upper side of thorax and abdomen fuscous; lower side of thorax, abdomen, and legs dark cinereous. The primaries are dark brown traversed with exceedingly complicated lines of pale silvery-green, the most conspicuous markings being a silvery dot at the origin of the radial nervule, two small subapical silvery marks upon the costa, below which is a <-shaped silvery band, pointing inwardly toward the base. There are narrow zigzag and irregularly curved transverse basal, sub-basal, median, limbal, and submarginal light lines. The secondaries are dark fuscous except on the costa near the base, where they are whitish, shining. On the under side, the primaries are fuliginous with the inner margin near the base whitish, shining. Upon the costa beyond the middle and before the apex are transverse white linear dots, and a short whitish linear streak about the middle of the outer margin conformed to the course of the third median nervule. The secondaries on the under side are cinereous, profusely sprinkled with blackish scales, with a well defined discal dot, a curved and dentate transverse median line and three or four blackish dots on the outer margin near the apex. Expanse, 33 mm.

2. *M. cornus-copiae*, sp. nov. ♂. Front, collar, upper side of thorax and abdomen dark chocolate-brown. Anal tuft of hairs grayish. Lower side of thorax and abdomen dark brown. Legs concolorous with the tarsi grayish, indistinctly ringed with darker brown. The fore wings are dark blackish-

brown with an obscure series of submarginal paler markings; on the median area just below the costa there is a narrow silvery line describing a semi-circle, and below it still another similar line uniting with the upper line at its outer end by a narrow silvery straight line, the whole roughly forming the outline of a horn of plenty. The secondaries on the upper side are uniformly dark fuscous. On the lower side the primaries are fuliginous, slightly paler on the outer margin, marked with a whitish dot at the end of the cell, and a narrow whitish transverse linear streak on the costa before the apex. The secondaries are gray, with the costa and an incomplete submarginal band dark brown. These wings are also ornamented by a well defined sub-oval discal dot. Expanse, 23 mm.

3. *M. eximia*, sp. nov. ♂. Palpi on the lower side pale cinereous. Front dark brown. Collar and patagia dark brown, margined externally by paler brown; upper side of thorax blackish-brown; upper side of abdomen fuscous. Lower side of thorax gray. Legs dark gray with the ends of the tibiae and the ends of the joints of the tarsi whitish. Lower side of abdomen fuliginous. The upper side of the primaries is dark brown along the costa and from the base as far as the middle of the wing. The outer margin is paler brown. The dark area toward the base is separated from the lighter marginal area by an oblique irregularly curved narrow silvery-white line, and the inner dark area is broken up into spots by narrow silvery sub-basal and median lines, which coalesce with narrow silvery lines running along the nervules, and descending from the costa. The most conspicuous of

the dark spots thus included by narrow silvery lines are a subtriangular spot on the costa before the apex, and a subrhomboid spot beyond the end of the cell. The secondaries are dark fuscous on the upper side. On the under side, the wings are pale fuscous traversed by broad submarginal bands of dark fuscous. The primaries have a dark fuscous subquadrate spot beyond the end of the cell. The secondaries are marked on the cell by a black basal ray, widening outwardly, terminating abruptly, and followed by a well defined blackish dot, beyond which is a zigzag incomplete transverse limbal line of dark brown below the enlarged end of the discal ray. There is an incomplete median band of dark brown running parallel to the outer margin, but terminating before it reaches the inner margin. Expanse, 50 mm.

PLUSIA, Fabr.

4. *P. mafongua*, sp. nov. ♂. Palpi sooty-gray. Head cinereous; collar brown margined internally with pale cinereous-Patagia, thorax, and abdomen above and below grayish-ochraceous; the abdominal tufts dark gray. Legs dark gray with the tarsi ringed with whitish. The primaries are dark vandyke brown on the middle area with the outer and inner margins paler, reflecting in certain lights a pale golden-green lustre. There are two silvery dots at the base, one on the costa, and one near the middle of the wing, followed by a narrow irregularly curved transverse basal line of pale flesh color, margined on both sides by dark brown. Beyond this on the median area are two broad silvery spots, the innermost the larger, subovoid, the outermost smaller and circular. At the point where these two silvery spots almost touch, there is a dark brown elongated elliptical spot, which extends upward beyond the end of the cell. At its upper extremity lying on the costa before the apex is a pale flesh colored spot, shading within and without into pale vandyke brown, and margined on the lower side by a semi-circular black dash. There

is a narrow waved transverse limbal and a similar angulated transverse marginal line. The fringes are whitish, spotted with black at the apex and about the middle of the outer margin, and checked with narrow lines of blackish at the tips of the nervules. The secondaries are fuscous with an obscure discal spot just beyond the end of the cell. The fringes are concolorous, slightly lighter at the apex and the anal angle. On the under side the primaries are dark fuscous with the inner margin and a subtriangular spot below the cell whitish. There are a few small white dots on the costa before the apex, and an obscure incomplete transverse limbal band of darker fuscous extending from beyond the middle of the costa toward the middle of the inner margin. The secondaries have the outer half broadly bordered with dark fuscous, shading into cinereous near the anal angle. There is a distinctly defined discal spot at the end of the cell. Expanse, 27 mm.

5. *P. sicilifera*, sp. nov. ♂. Front, upper side of thorax and abdomen obscure brown; lower side of abdomen and legs paler brown. The primaries have the middle area clouded with dark blackish brown, which is produced outwardly about the middle of the wing to the margin as a broad blackish ray. This dark tract of color in certain side lights gives a brilliant golden reflection. From the inner margin at the base there extends upwardly a band of silvery tinged with flesh color, which reaches the costa and about the middle sends forth a branch, which extends outwardly and then abruptly downwardly toward the outer angle, terminating about the middle of the wing. This band is sickle-shaped. In addition there are some silvery basal markings, an elongated transverse subapical band on the costa, and some spots along the outer margins. The secondaries are uniformly dark fuscous with the fringes paler. On the under side, both wings are dark fuscous with the basal half of the secondaries paler. Expanse, 24 mm.

6. *P. Ogozana*, sp. nov. ♂. Front, thorax, and abdomen above and below brownish-fuscous. The primaries are dark wood-brown, in certain lights reflecting a cupreous sheen. They are covered with a multitude of dark brown minute reticulations and are marked by zigzag sub-basal and limbal transverse line. The latter line which is faint and dark brown, is bordered on either side by parallel pale lavender lines, and at the upper extremity near the costa on the inner side is a large triangular dark brown spot, and on the outer margin a broad similarly colored sub-marginal band. Both the large brown spot and the broad brown band in certain lights display a brilliant coppery lustre. There are some light spots on the margin most conspicuous about the middle. The fringes are pale brown checkered with darker brown, and between the first and second median nervules about the middle of the wing is a minute silvery V-shaped spot. The secondaries on the upper side are dark fuscous, paler at the base, with the margins lighter. On the under side, both wings are pale fuscous with the outer margins broadly blackish. The fringes are pale; there are a few light spots on the costa before the apex, and a distinct discal spot at the end of the cell in the secondaries. Expanse, 30 mm.

7. *P. gorilla*, sp. nov. ♂. Head and thorax dark brown; abdomen above slightly paler brown; lower side of thorax and abdomen fuscous. The primaries are dark sooty-brown, with a coppery reflection beyond the cell on the middle of the outer third of the wing. There are some obscure transverse basal, median, and limbal bands. The secondaries are uniformly dark fuscous. On the under side, both wings are dark fuscous with the outer half fuliginous, shading into cinereous upon the outer margin. Expanse, 26 mm.

This is one of the most obscurely colored species of the genus.

PLUSIOPALPA, gen. nov.

Allied to *Plusia*, from which it may be at once distinguished by the palpi, which are long, produced, curving upwardly, and heavily clothed with long scales; the last joint is very little shorter than the second joint, flattened laterally, and produced at the apex upon its anterior margin as a minute point, or spur. The abdomen on the upper side is conspicuously tufted. The third pair of legs is relatively longer than in *Plusia*. The primaries are rounded at the apex and are not produced at the outer angle, as in a large majority of the species contained in the genus *Plusia*. Type *Plusiopalsa dichora*, Holland.

There is a specimen of this insect unnamed in the British Museum, from Java.

8. *P. dichora*, sp. nov. ♂. Front and collar wood-brown; upper side of thorax dark brown; abdomen mouse color with two large dark brown tufts of raised hair on the dorsal line just behind the thorax and a smaller similar tuft of mouse colored hair on the middle of the abdomen. The lower side of the body and legs is slightly paler than the upper side. The primaries are brown with a broad triangular patch on the outer margin reflecting a coppery lustre. There are three or four dark brown, or blackish, basal dashes followed by a pale curved sub-basal line, succeeded by a broad dark brown shade covering the middle of the wing, defined externally and internally by irregular transverse median and transverse limbal lines of pale chocolate-brown. The middle of this shade is marked by a broad longitudinal black ray running from the middle of the wing toward the middle of the outer margin and ornamented near its inner extremity by a fine U-shaped silvery mark, which is succeeded externally by a minute silvery dot. The marginal tract which reflects most distinctly the coppery lustre is defined inwardly by a narrow curved blackish line, curved once just below the apex and then describing a semi-circle, the lower end

of which terminates a little before the outer angle. The fringes are pale brown minutely checkered with dark brown. The secondaries are pale fuscous, marked by an obscure incomplete transverse median band. On the under side both wings are fuscous; the primaries have the costa pale ochraceous sprinkled with minute brown dots; both wings have the outer margins pale cinereous; both are crossed by a broad submarginal blackish band, irregularly angulated externally, defined internally by a broad and almost straight dark brown line; both wings have a discal dot at the end of the cell. Expanse, 37 mm.

PLUSIOTRICHA, gen. nov.

Allied to *Plusia*. The palpi are slightly more prominent than in *Plusia*; the third joint stouter. The antennae are filiform, nearly as long as the costa of the primaries. The abdomen has enormously developed hairy brushes located laterally upon the posterior segments extending backwardly and outwardly and appressed at their extremities to the very long widely divergent brushes of hair-like scales which clothe the outer margins of the claspers. The legs have the tibiae of the third pair armed with long and delicate spurs as in *Plusia* and densely clothed with hair-like scales. The primaries have the costa nearly straight, the apex produced, slightly rounded; the exterior margin and outer angle evenly rounded and the inner margin straight. The secondaries are subpyriform with the outer margin evenly rounded; the inner margin straight. Type *Plusiotricha livida*, Holland.

9. *P. livida*, sp. nov. ♂. The fore wings are obscure vandyke brown with a cupreous reflection on the outer margin. There are some black markings at the base. Beyond these is a very faint and somewhat obscure transverse basal line bordered externally near the inner margin with black, coalescing on the cell with an oblique transverse line running from the costa one-third of the distance from

the base toward the outer angle, which it does not, however, reach. This line at its termination before the outer angle coalesces with a slightly curved limbal transverse line which runs from the costa two-thirds of the distance from the base to the inner margin before the outer angle, and is traversed throughout its extent by a narrow darker line widest on the costa. The basal portion of the triangular space included between this oblique line and the transverse limbal line is clouded with blackish brown, accentuated on its inner margin by a minute silvery dot, and near the costa by two or three black dots. Beyond the transverse limbal line the margin is broadly clouded with dark brown, followed by a fine pale submarginal curved line, which is succeeded on the middle of the margin by a triangular black spot, its apex pointing outwardly. The fringes are pale and obscurely checkered with dark brown. The secondaries are uniformly fuscous with the fringes paler, shading into whitish at the anal angle. On the under side, both wings are obscure fuscous; both are crossed by very broad blackish submarginal bands; both have the margins pale cinereous. There are a few minute ochraceous spots on the costa before the apex. The lateral tufts on the abdomen are tipped with pale ochraceous. The anal tufts are black. Expanse, 30 mm.

DEVA, Walk.*

10. *D. Africana*, sp. nov. ♂. Allied to *D. auripicta*, Moore, from India. Front, collar, patagia, and the upper side of the thorax maroon, with the posterior edge of the collar, and the tips and edges of the patagia marked with purplish gray scales. The upper side of the abdomen is plumbeous. The palpi are ochraceous. The lower side of the thorax and abdomen is whitish. The

*Mr. Butler refers to this genus upon structural grounds all the species in the eastern hemisphere which have hitherto been referred by authors to the genus *Plusiodonta*, which he restricts to the American forms.

THE NEMASTOMATIDÆ AND TROGULIDÆ OF THE UNITED STATES.—I.

BY NATHAN BANKS, SEA CLIFF, N. Y.

These two families are readily separated from the other family (Phalangidae) of the Phalangida Plagiostethi by the absence of a claw to the end of the palpus. The last joint of the palpus is shorter than the preceding one; this character is also found in the male of one genus of Phalangidae (Protolophus) but not to such a marked degree. The Nemastomatidæ are separated from the Trogulidæ by having the coxæ free, while in the latter family the coxæ are united. The size of the palpus also serves to distinguish them; in the Trogulidæ the palpi are very short and concealed by the projection of the eye-tubercle, in the Nemastomatidæ the palpi are very long and prominent, usually longer than the body.

I consider the Trogulidæ the highest family of Phalangida. In the groups of arachnids below the Phalangida it is normal to have two claws to the tarsi. With the Phalangida Mecostethi (Cosmetidae, Gonglyptidae, etc.) the two hind pairs of tarsi bear two claws, the anterior pairs have but one; the palpi have a claw or curved spine at end. In the Phalangida Plagiostethi all the tarsi have but one claw, thus showing an advance. The Phalangidæ still retain the palpal claw, but the Nemastomatidæ and Trogulidæ have lost it. The Trogulidæ show their superiority

to the Nemastomatidæ in their more compact form, and more complicated structure. A few Nemastomatidæ have been described from the United States by Packard and Simon.*

TROGULIDÆ.

The Trogulidæ have not previously been recorded from the United States. Two forms are known to me which appear to belong to two genera, both new. They have more tarsal joints than is common in the European forms, in this resembling more the genus *Dicranolasma*; the eye-tubercle is modified on a quite different plan from that of the European forms. The two genera may be separated as follows:—

Eye tubercle projecting in the form of a spoon, two spines at each side on the anterior margin. *Ortholasma*.

Eye tubercle tree-shaped, a single club at each side on the anterior margin.

Dendrolasma.

ORTHOLASMA gen. nov.

Cephalothorax with a pair of spines at each side on the anterior margin, the eye tubercle projecting in front in the form of an

* Packard—On a new cave-fauna in Utah—Bull. Hayden's U. S. Geol. and Geog. Survey, 1877.

Packard—New cave Arachnida.—Am. Nat. 1884.

Packard—Cave memoir—Nat. Acad. Sci. 1887 (?).

Simon—Descriptions d'Opiliones nouveaux—C. R. Soc. Ent. Belg. 1879.

almost flat, gradually widening plate, the tip rounded, with a more dense central rib and some side ribs connected by a membrane. Body short, one half longer than wide. Eyes but partially seen from above. Tarsi with five to seven joints. The palpi not half so long as the width of body. The sternum is united to the venter.

Ortholasma rugosa. n. sp. Length, 3.6 mm.; width, 3 mm.; femur II, 3 mm.; femur I, 1.6 mm. Color black, young specimens brownish, the projection of the eye tubercle brown; legs pale toward the tips. The entire dorsal shield is roughened by the presence of ridges, somewhat regularly but complexly arranged; where the ridges intersect they form tubercles, which in young specimens are furnished with short clubs or spines; the arrangement of the ridges is more easily seen in young than in adult specimens. The posterior margin of the dorsal shield is furnished with a row of spines, those near the middle being the largest. The portion of the abdomen below the end of the dorsal shield is furnished with rows of tubercles. The venter and coxae have numerous rounded tubercles or large granules, more prominent in young specimens; the spiracles are more distinct in young than old specimens. The trochanters are roughened with tubercles, the other joints of the legs smoother and with short hairs; second pair of legs longest, fourth next; tibia II almost as long as femur II. Palpi furnished with short hairs, fifth joint about one-half as long as the fourth.

Southern California.

DENDROLASMA gen. nov.

Cephalothorax with a club at each side on the anterior margin. Eye tubercle projecting forward in the form of a central support, with lateral branches somewhat connected at the tips, the whole forming an oval figure. Eyes distinct from above. In this as well as *Ortholasma* the eyes are situated at the base

of the tubercle, and not carried forward on the projection as in some European forms. The form of the body is like *Ortholasma*; the sternum is united to the venter; leg II is proportionately longer than in *Ortholasma* and there are eight or ten joints in the tarsus II; tarsus I has but four joints.

Dendrolasma mirabilis n. sp. Length, 3 mm.; width, 2.1 mm.; femur II, 3 mm.; femur I, 1.5 mm. Color brown or black, venter paler; projection of eye tubercle and the club at each side whitish, legs paler toward the tips. Suture between cephalothorax and abdomen and one at base of abdomen distinct. Sides and hind margin of cephalothorax with a row of tubercles more or less connected. A square just behind the eye tubercle of similar tubercles. The dorsum of the abdomen has many series of these tubercles, regularly but very complexly arranged. There are five pairs of larger tubercles on the dorsum, each bearing small clubs or spines; the anterior pairs are closer together than the posterior pairs. The hind margin of the dorsal shield is furnished with a series of clubs having lateral projections, those each side of the middle being the largest. The segments of the abdomen below the end of the dorsal shield are somewhat roughened with tubercles. The ventral segments and coxae have many rounded granules. The second joint of the mandibles has a projection above. The trochanters are very rough; the tips of the anterior coxae have partial circles of connected tubercles; on the second coxae one of these tubercles is greatly enlarged and swollen at the tip; and on the fourth there is a straight row of similar tubercles along the outer side. The legs are quite long, the second longest, and the fourth next; they are but little roughened and with short hairs. In one specimen one of the clubs on the anterior margin is cleft at the tip. The peculiar tubercles on the body are quite similar to those found in *Nemastoma modesta*.

Washington State (Trevor Kincaid).

WING-LENGTH IN SOME NEW ENGLAND ACRIDIDAE.—I.

BY ALBERT P. MORSE, WELLESLEY, MASS.

The title in full of this paper may be stated as "Length of wings as an evidence of specific distinctness and its value as a diagnostic character in reference to some New England Acrididae." In using the term length of wing the length of the wing-covers or tegmina is in many instances included.

It was formerly the custom among writers on this family to base specific distinctness more or less largely on a difference in the length of wing presented by some closely allied forms, and to give keys for the determination of species in which this was used as a diagnostic character.*

My experience with New England forms has led me to conclude that this character of wing-length as found in some of these is extremely unreliable, and that the description of a new species founded wholly or largely on this character should be received with great caution.

As an instance of specific variability on this point let me cite the case of *Opomala brachyptera* Scudd. This locust, a well-known and widely-distributed species, possesses ordinarily

wing-covers extending on the hind femora in the male to about one-half the distance to the tip, in the female to about one-fourth or one-third the distance to the tip, the wings in both sexes being nearly or quite aborted. In July, 1892. I had the good fortune to capture a female similar in all respects to the ordinary form but having the tegmina extending to the end of the femora and the wings fully developed. Could it be another species? Further search soon resulted in the capture of a normal male *brachyptera* and left little doubt in my mind that here was a case of reversion to the earlier long-winged form of female. Search in another locality several miles distant resulted in the capture of over fifty specimens among which were four long-winged females and two long-winged males. I have since obtained another long-winged male from a neighboring town and Mr. Scudder has one in his collection from Iowa.

Turning to the genus *Chlocaltis*.— or as it is also known, *Chrysochraon*.— we find three forms described as occurring in New England. In one of these, *C. conspersa*, the female possesses abortive wings and the tegmina rarely reach half-way to end of femora. Both wings and tegmina are somewhat more developed in the male but not enough to serve as organs of flight. 1

*A still more unsatisfactory practice was that of comparing the wing-length to the abdomen, thus: "Tip of wings passing abdomen." The abdomen of the female locust is so variable in length, owing to size and number of eggs, and extension due to oviposition, that it seems strange that any one should have used this relation when one of equal practical value not subject to variation exists, viz: comparison with the hind femora,

have never seen any long-winged specimens in New England but Mr. W. S. Blatchley states (Can. ent., 1891, 76) that he has taken a female in Indiana.

C. conspersa is quite uniform in coloring, being invariably brown or straw-color, never green, while the other two forms or so-called species present an interesting case of dimorphism in color, specimens of both sexes being partly or wholly either brown or green; most commonly, the females are wholly green or brown and the males green above with brown sides, and mating with females of either color.

Ordinarily the wings and tegmina are of about equal length, reaching, in the male, about half-way down the femora, and in the female rather less, in the form called *C. viridis*, and in the other form, *C. punctulata*, reaching to the end of femora. Specimens occur having wings and tegmina of an intermediate length, and short-winged males mate freely with long-winged females of either color; long-winged males appear to be extremely scarce, but all the other forms are common, the long-winged much less so than the short-winged.

No other characters of more than individual importance are presented by

these two forms to indicate them as distinct. The two are found associated in time and place, and mated, whence I conclude that without a doubt the long-winged, less common form, is the ancestral form which is giving place to the other.

Continuing in another genus of the Tryxalinae,—*Stenobothrus*,—we meet two forms, quite variably colored and presenting a marked contrast in length of tegmina and wings, which have long been considered to belong to one species, *S. curtipennis* and *S. longipennis*. These are about equally plentiful. The long-winged form frequently makes use of its wings in locomotion while the other is obliged to resort to a more prosaic mode of progression.

Take next the two species *S. aequalis* and *S. maculipennis*. Here structural differences in the vertex and pronotum are usually, but not always, accompanied by a difference in length of wing serving to distinguish the two species. Owing to the fact that long-winged individuals occur in the short-winged species and to the wide variation in color presented by both species they have been much confused and misunderstood by various authors.

PROCEEDINGS OF THE CLUB.

9 June, 1893. The 179th meeting was held at 156 Brattle St., Mr. S. H. Scudder in the chair.

Mr. H. G. Dyar exhibited specimens of *Kodiosoma cavesii* collected by Mr. L. B.

Lembert of Yosemite, Cal., and remarked upon the scarcity of the species of *Kodiosoma* in collections.

Mr. A. P. Morse read a paper on Wing-length in some New England Acrididae and exhibited specimens in illustration.

Mr. S. H. Scudder exhibited a folding net sent to the club from Switzerland.

EDWARDS'S BUTTERFLIES OF NORTH AMERICA.—If we do not become tolerably familiar with the transformations and histories of our Satyrids it will not be for lack of any effort or skill on the part of Mr. W. H. Edwards, for he again devotes an entire part of his *Butterflies of North America* to their elucidation. Four species of *Chionobas* and one of *Neominois*, the latter genus for the first time, are depicted in Part xiv. The egg of *C. crambis* is shown and all the stages of *C. macounii*, except the chrysalis (never yet reared), besides numerous details of their structure, with the precision and copiousness we are accustomed to in this work. Every stage of *N. vidingsii* is shown, no less than twenty-seven figures being devoted to them, besides separate drawings for the early and late forms of the butterfly. Besides all this two other species or varieties of *Chionobas* (*C. oeno* and *C. assimilis*, the latter regarded as a variety of the former) are figured in their perfect stage.

The text for all the species (excepting *C. crambis*) is unusually full and rich in interest and contains extended quotations from his correspondents who have seen the insects in life; but of the greatest importance are all the details of breeding experiments in this extremely difficult group of Satyrids, whose behavior is so contrary and variable.

As series III approaches completion, every naturalist must hope that some way may be found for the continuation of this incomparable work, as far into a fourth series as life and health permit the indefatigable author. He has been able to carry on the present series for six years or more only by considerable grants in aid from funds for the support of scientific research. They should be forthcoming as long as he can make such excellent use of them.

ENTOMOLOGICAL NOTES.—The entomological collections of the late Francis Polkinghorne Pascoe, who died last June in his eightieth year, have been acquired by

the trustees of the British museum. Mr. Pascoe's monographs of the Australian and Malayan *Longicornia*, describing the collections brought together by Dr. A. R. Wallace are among the most important of his writings.

Though the Noctuidae of North America have been frequently listed no comprehensive catalogue has been issued since 1874 when Grote's "List of the Noctuidae of North America" appeared in the *Bulletin of the Buffalo academy of natural sciences*, v. 2, p. 1-77. Since 1874 very many new species have been described and the literature has increased enormously. Prof. John B. Smith's "Catalogue of the lepidopterous superfamily Noctuidae found in Boreal America," recently issued as *Bulletin No. 44 U. S. National museum* (424 pp.) will, therefore, be especially useful. In the preface Professor Smith reviews at length the character and condition of the principal collections, American and European, containing typical noctuid material; to Professor Smith all the specimens studied when the original description is written are types and the plan of placing types in several collections is commended.

The catalogue enumerates nearly 1,700 species, and is both synonymical and bibliographical; the habitat and present location of the types are noted; critical and descriptive notes are frequent, an index to authors and works cited is given together with a full index to every name used in the body of the work.

To the *Bihang to the Swedish academy's Handlingar* for 1892, Schött contributes a paper on Californian *Collembola*, with four excellent plates; eighteen species of eleven genera are recorded.

Wickham describes and figures the early stages of nine species of our *Coleoptera* in the *Iowa State university's bulletin*.

"The sclerites of the head of *Danaïs archippus*" are discussed by V. L. Kellogg in the *Kansas university quarterly* for October last, in which the author dissents from some of Burgess's views.

THE SEVENTH VOLUME OF PSYCHE

Begins in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume, but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

Vols. 1-6, Complete, Unbound, - Now sold for \$29.00.
 Vols. 1-6, and Subscription to Volume 7, - - \$33.00.

JUST PUBLISHED.

Scudder's Brief Guide to the Commoner Butterflies.

By SAMUEL H. SCUDDER, author of "Butterflies of the Eastern United States and Canada," etc. xi + 206 pp. 12mo. \$1.25.

An introduction, for the young student, to the names and something of the relationship and lives of our commoner butterflies. The author has selected for treatment the butterflies, less than one hundred in number, which would be almost surely met with by an industrious collector in a course of a year's or two year's work in our Northern States east of the Great Plains, and in Canada. While all the apparatus necessary to identify these butterflies, in their earlier as well as perfect stage, is supplied, it is far from the author's purpose to treat them as if they were so many mere postage-stamps to be classified and arranged in a cabinet. He has accordingly added to the descriptions of the different species, their most obvious stages, some of the curious facts concerning their periodicity and their habits of life. A short introduction to the study of butterflies in general is prefixed to the work, and is followed by a brief account of the principal literature of the subject.

Scudder's The Life of a Butterfly. A Chapter in Natural History for the General Reader.

By SAMUEL H. SCUDDER. 186 pp. 16mo. \$1.00.

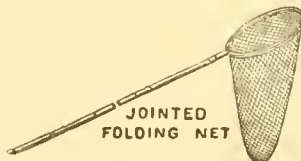
In this book the author has tried to present in untechnical language the story of the life of one of our most conspicuous American butterflies. At the same time, by introducing into the account of its anatomy, development, distribution, enemies, and seasonal changes some comparisons with the more or less dissimilar structure and life of other butterflies, and particularly of our native forms, he has endeavored to give, in some fashion and in brief space, a general account of the lives of the whole tribe. By using a single butterfly as a special text, one may discourse at pleasure of many; and in the limited field which our native butterflies cover, this method has a certain advantage from its simplicity and directness.

HENRY HOLT & CO.,
 Publishers,
 NEW YORK.

A. SMITH & SONS, 121 NASSAU STREET, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,
 Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.



NATIONAL

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 214.

FEBRUARY, 1894.

CONTENTS:

THE HABITS OF THE ACULEATE HYMENOPTERA.—I.— <i>William H. Ashmead.</i>	19
NEW AND UNDESCRIBED GENERA AND SPECIES OF WEST AFRICAN NOCTUIDAE.— II (Plate 1).— <i>W. J. Holland.</i>	27
HERMANN AUGUST HAGEN.	35
WILHELM JÜLICH.— <i>T. L. C.</i>	36
EXPLANATION OF PLATE I.	36

PUBLISHED BY THE
 CAMBRIDGE ENTOMOLOGICAL CLUB,
 CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS 20c.

[Entered as second class mail matter.]

5.70573

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

PS Subscriptions not discontinued are considered renewed.

PS Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 10.
Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE,

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

PS Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " " "	1.25	1.00
Half " " " "	2.25	1.75
One " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, *Danais archippus*. Boston, 1880. 16 p., 2 plates. 1.00

Hitchcock, Edward. Ichnology of New England. Boston, 1858 1.50

Illinois. Trans. Dept. Agric. for 1876 (containing first report of Thomas, State Entomologist). Springfield Ill., 1878 1.00

Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate .50

Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875. 1.00

Scudder, S. H. The pine-moth of Nantucket, *Retinia frustrana*. col. pl. Boston. 1833. .25

Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889 1.00

Stettiner entomologische Zeitung, Jahrg. 42-46. Stettin, 1881-1885. 5.00

U. S. Entomological Commission.—Fourth Report, Washington, 1885 2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

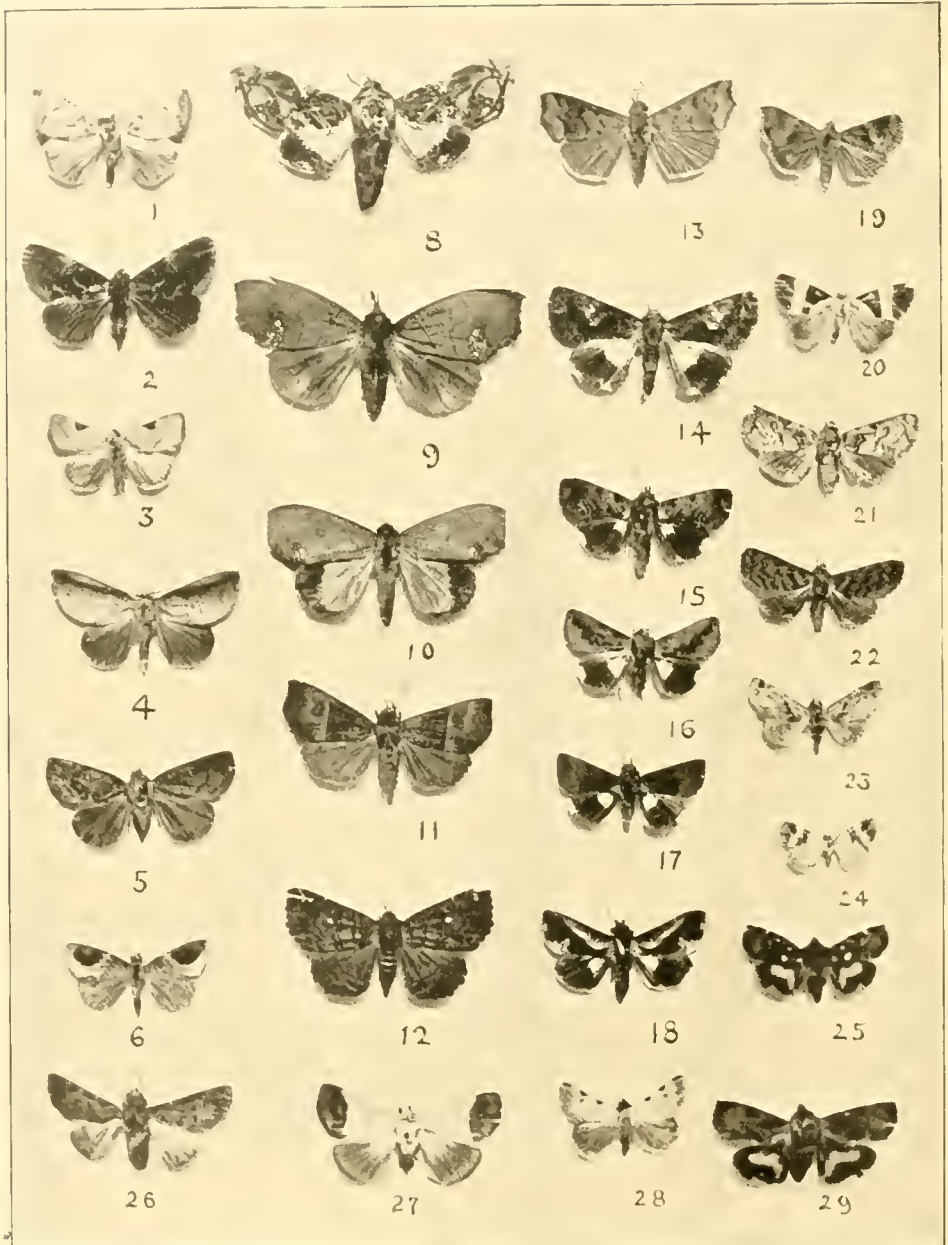
FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,

37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.



AFRICAN NOCTUÆ, (HOLLAND.)

(REDUCED ONE-FIFTH)

PSYCHE.

THE HABITS OF THE ACULEATE HYMENOPTERA.—I.

BY WILLIAM H. ASHMEAD, WASHINGTON, D. C.

[Annual address of the retiring president of the Cambridge Entomological Club, 12 January, 1894.]

The subject of my address is one that has been rarely touched by American entomologists, although offering one of the most attractive and richest fields for research and discovery, as connected with it are many problems of biologic and philosophical importance, which if solved, would throw much light upon many of the mooted questions of the day—evolution of species, development of sexes, specialization of organs, transmission of acquired characters, adaptability to environment, etc.

The first American to publish anything on the subject was John Bartram, who published several articles: the first entitled "An account of some curious wasp-nests made of clay," was published as early as 1745 (Phil. trans., vol. 43, pp. 363-368); the second, "A description of the great black wasp of Penn." (l. c., vol. 46, 1750, pp. 278-280); the third, "On the Yellow wasp of Penn." (l. c., vol. 53, 1763, pp. 57-39).

This last paper is of the deepest interest as it evidently refers to the habits of a Bembecid, and the accounts of which, now after over a century and a quarter, have only recently been confirmed, in Europe, by the observations of Fabre and Wesenberg on a similar fossorial wasp, *Bembex rostrata* Fabr.

From John Bartram to our next writer, Benjamin Henry Latrobe, who wrote a paper entitled "Two species of the SpheX or wasp found in Virginia and Penn." (Phil. soc., vol. 6, 1809, p. 73) is an unbroken period of nearly half a century. Then we have a period of longer or shorter intervals, with contributions from Thomas Say, Dr. T. W. Harris, F. W. Putnam, Dr. Lincecum, Dr. A. S. Packard, Wm. Couper, Benjamin D. Walsh, Prof. C. V. Riley, E. Baynes Reed, L. O. Howard, Frederick V. Coville, Charles Robertson, C. L. Marlatt, and Dr. A. Davidson.

It is now, I believe, almost universally conceded by all students, who have given any study at all to the aculeate Hymenoptera, that among them are to be found the most specialized, highly developed and intelligent insects. In fact, the marvellous intelligence exhibited by many of the species in this order, in their social habits, the structure of their nests, care of their young, etc., has from time immemorial attracted the attention of man, and in both ancient and modern literature many allusions to them may be found.

It is surprising, therefore, that so many centuries have past and so little

comparatively is known of the vast majority of the most common forms.

It is hoped that a few new facts respecting the habits of some of our species will be found in this address, but it is intended more as a review of the subject, the principal object in view being to bring together what is known of the habits of these insects to show the uniformity of habits in genera and species of the same genus the world over, and, moreover, to point out just how little real knowledge we possess of our own species, with the hope that it may awaken more interest in these insects and kindle a desire in some of our entomologists to make some effort toward unravelling the life history of at least a few of the common species of his neighborhood.

If every entomologist in the United States and Canada would, during the year 1894, make up his mind to at least make known the habits, development and parasites of one or two species it surely could be done, and then what a vast amount of new and interesting reading we should have next winter. How refreshing it would be to take up one of our entomological journals, or an experiment station bulletin, and see some such article in place of the old, old story, "the canker-worm, the codling moth, the chinch-bug, or the plum Curculio."

The subject merits attention also from an economic standpoint, as, with but few exceptions, all the aculeate Hymenoptera are of the greatest economic importance, either as fertilizers of plants, shrubs and trees, by transport-

ing pollen from blossom to blossom, or as destroyers of injurious insects.

In order to bring out more thoroughly the points to which I have called attention, I propose to take up *seriatim* the different families, give a *resumé* of what is known and at the same time incorporate any new facts that may have come under my observation.

Family I. APIDAE. As the most specialized we may begin, therefore, with this family. Excluding *Apis mellifica* as not indigenous and the Melliponae as not extending into our fauna, we have no less than 35 genera and 520 species belonging to this family. Of these, the genus *Bombus* in structure, social habits, and in the honey-producing qualities of its members, is probably more closely allied to the true honey-bee than any other of our bees and it may, therefore, be considered the forerunner of the honey-bee.

Mr. F. W. Putnam, in "Notes on the habits of some species of humble-bees" (Proc. Essex inst., vol. 4, 1864, pp. 98-104) was one of the first of our writers to treat of some of our species. In this paper he briefly treats of the nesting habits of *Bombus ternarius* Kirby, *B. fervidus* Fabr., *B. vagans* Smith, *B. virginicus* Oliv., *B. separatus* Cr. and *B. pennsylvanicus* De Geer.

The habits of our species agree fairly well with the observations made upon the European species and are briefly as follows: the female bumble- or humble-bee, which has hibernated in some crevice or other secure place during the winter, appears in early spring with the first blossoms from which it can

obtain pollen and almost immediately selects a place in which to nidificate, forming its nest of dry grass or leaves in some hollow in the open field; or more frequently appropriating the deserted nests of field mice, either in the open field or under old stumps or boards. Here the female constructs her receptacles of a waxy or plastic material, into which she deposits her gatherings of pollen and honey—the food-supply for the future offspring of her colony, laying her eggs directly in or upon the pollen.

The eggs first laid produce larvae, which spin tough cocoons wherein to undergo their transformations and all transform into neuters or workers, which subsequently form the greater part of the community and become of the greatest importance in assisting and performing the necessary economics of the now rapidly increasing family. These are followed later, according to Shuckard, by males and other productive females which are, however, smaller than the normal sized individuals; the normal sized males and females not appearing again until the fall, when they mate and the cycle of their life history is completed, the impregnated females of this last brood wandering off and hibernating and forming the *nuclei* of colonies the following spring.

The number of individuals in a nest is variable; from a dozen or more to over two hundred individuals have been found in a single nest. Mr. Putnam states that a nest of *B. ternarius* contained sixty-five cells, also a number of bunches of pollen in which there

were no eggs, thirty-five contained young and thirty were filled with honey, having their tops covered with wax and that this was the only instance of his finding *the honey cells closed over*.

Dr. A. S. Packard in "The humble-bees of New England and their parasites, etc." (Proc. Essex inst., vol. 4, pp. 107-140) has given some interesting and valuable observations on the species found in New England, and considerable new information concerning their parasites.

Mr. Charles Robertson in "Notes on *Bombus*" (Ent. news, vol. 1 (1890), p. 39) and Mr. Frederick V. Coville in "Notes on bumble-bees (Proc. ent. soc. Wash., vol. 1 (1890), p. 197) from personal observations carried on independently, both reached the conclusion that *Apathus elatus*, a supposed inquiline of *Bombus fervidus*, was in reality the ♂ of *Bombus americanorum* Fabr. or *B. borealis* Kirby, a species that was long confounded with *B. fervidus*.

Mr. Robertson further remarks that Walsh in discussing the effect of mimicry (Proc. ent. soc. Phil., vol. 3, p. 247) mentions having once found *B. fervidus* ♀, surmounted by *Apathus elatus* ♂, and cited this as a case in which a *Bombus* mistook an *Apathus* for one of its own species, but remarks "that the mistake here was on the part of the entomologist and not on the *Bombus*, as he had no doubt taken the true sexes of *B. fervidus*."

In some particulars, Mr. Coville's observations on *Bombus borealis* as indicating a slight divergence in habits

and thus more closely resembling the hive-bee, warrants me in quoting somewhat largely from his very readable paper. He says:—

The nest, originally that of a mouse, was made of dead grass and lined with wax. It contained when captured the queen and a large number of workers of various sizes, as well as eggs, and larvae in various stages of development. The precise functions of the different sized workers were not evident, but in general the larger ones attended to the mending of the grass covering of the nest and to the bringing in of honey, while the smaller ones for the most part did the inside "house-work," the wax-patching and the nursing, described below. The nursing, indeed, was never done so far as was observed, by a large or even a medium-sized bee.

The eggs are laid, several together, in cavities in a mass of wax. This is in direct opposition to the statement of Putnam (l. c.) and of various English writers consulted by me, they stating that the eggs are laid in a mass of pollen, upon which the larvae, when hatched, feed. The substance was tested first by the application of heat, when it melted precisely like bees-wax. It would not dissolve in water, while pollen and an artificial mixture of pollen and honey readily did so. A microscopic examination of the wax showed, however, that it contained a great number of pollen grains; but this would be expected when it is considered how much pollen is used about the nest. The larvae, after hatching, remained incased in a shell of wax, and soon became separated by a wall of the same substance each from its neighbor.

Their method of obtaining nourishment—instead of by eating away the pollen walls, in which they are supposed to be incased, the workers constantly adding more to the outside—is strikingly different. They are fed by a mixture of pollen and honey supplied to them by a worker. The operation will be described later.

The larvae, when grown, spin a silken cocoon, and at the end of the nymphal stage, the duration of which was unfortunately not noted, emerge by gnawing about the apex of the cocoon so as to form a lid. When the adults first come out their subsequently yellow hairs are pale, almost white. As soon as the bee has left its nymphal quarters the other workers cut away about the upper half of the cell and remove the *débris*. The part which is left furnishes a receptacle for the raw honey and pollen as it is brought into the nest.

When returning from the field the bees settled down upon the alighting-block at the entrance of the box, when full laden, with a low, abruptly ceasing hum, always distinguishable from that of a bee without honey or pollen. The bees went directly, in a most business-like way, to the pots, deposited their loads, and went away again or busied themselves about the nest. If honey-laden, the bee perched herself on the margin of a honey-pot, lowered her head into it, and then drew her abdomen far in, thus forcing the honey from her mouth. If pollen-laden, the bee balanced herself, with her middle and cephalic pairs of legs, on the edge of a pollen-pot, head outward, spread her wings, and then scraped the pollen-masses from her corbiculæ by rubbing the posterior legs together.

The mode of feeding the larvae is as follows: One of the smaller workers, which may be called a nurse-bee, goes to a honey-pot, from which she presumably draws a small amount of honey, and proceeds next to a pollen-pot. She remains here, with her head in the pot, undoubtedly preparing a mixture of pollen and honey, for ordinarily about ten minutes. Then going to one of the larvae, which lie in circular form in their chambers, she injects into the cell, through a small opening previously made, usually by another worker, a brownish fluid of the consistency of honey. This is greedily eaten by the larva. Whether the larvae of both females and workers are fed in the same manner and

with the same mixture could not be decided, but from the analogous case of the honey-bee, it is to be expected that the kind of food does influence the size and function of the bee. The males, it may be added, are commonly supposed to have come from eggs laid by the sterile females (workers).

In early August females (queens) and males began to emerge. Both left the nest within a few days, and did not return, nor were they seen to copulate.

In the first chilly afternoon of autumn the workers become stiffened with cold, and do not return; and after a few freezing days the old queen, too, succumbs. The males also perish, and only the young queens survive the winter.

This genus is parasitized by Diptera belonging to the genera *Volucella*, *Conops*, *Tachina*, *Coleoptera* belonging to the genera *Melœ* and *Stylops*, while *Anobium paniceum* and *Antherophagus ochraceus* Say, prey upon the pollen stored up in their cells. A Lepidopterous larva *Nephoptyx edmandsii* is also supposed to be parasitic, and it itself is preyed upon by *Apanteles nephoptygis* Pack.

The genus *Apathus* structurally closely resembles *Bombus* and the species are found living in the nests of the latter. The species are stated to be inquiline or guest-flies, and not true parasites, and this is apparently the sum total of our knowledge. In all the literature at my command, I can find no direct observation respecting the rearing and development of a single species. Shuckard makes this general statement:—

Both sexes appear to have free in and egress to the nests of those *Bombi* which they infest, without any let or hindrance on the part of the latter, with whom they seem

to dwell in perfect amity. In the times of their appearance they closely resemble the *Halicti* and the neighboring *Bombi*. Thus the females, after impregnation in the autumn, having hibernated during the winter in selected receptacles, come out with the first gleams of spring conjunctively with the large maternal *Bombi*, in whose nests they have taken their long repose in perfect torpidity; and as soon as these begin to accumulate the masses of conglomerated honey and pollen whereon to deposit their eggs, the parasite takes advantage of it, lays her eggs too, and thus secures food for her offspring.

The genus *Xylocopa* comprises some of the largest bees known, many of which closely resemble the bumble-bees. The species are not rare and from their method of boring into posts and rafters, in which they construct their nests, they are known as carpenter-bees. About a dozen species are found in the United States.

Our most common species in the eastern, southern and middle States is *Xylocopa virginica* Drury, and its nest is readily found in the rafters or frame work of any old house, barn or out-house built of soft white pine.

I have frequently found their nests made in the railings of a porch, in posts, in rafters, in doors, in palings of fences in door frames, in window sills, etc.

Dr. Packard in his Guide, p. 132, has given an excellent account of the nesting habits of this species, as observed by Mr. James Angus, of West Farms, N. Y.

The species bores a cylindrical hole, about half an inch in diameter until the depth of ten, twelve or more inches

is attained. At the bottom of this long tunnel or gallery, the female now deposits a ball of pollen-paste in which she lays a single egg. This is then carefully covered over with a thin partition formed of sawdust and a glutinous substance or secretion and this constitutes the first cell. Upon this another ball of pollen-paste and an egg is laid and again enclosed by a partition and so on until a series of cells, one above another, is formed and the tunnel is filled. The imagos hatch out in July and August and hibernate in the middle States during the winter months.

Mr. L. O. Howard, in "Notes on the hibernation of carpenter bees" (Proc. ent. soc. Wash., vol. 2, 1892, p. 331), records having received in February a pine branch burrowed by this species containing living bees.

Mr. H. G. Hubbard in same publication also records some interesting observations made on carpenter bees in Florida, which agreed with the writer's own observations.

He had found in February the eggs and the young, in various stages of development, in burrows, and in March the adult bees ready to issue from the burrows. By April most of these had escaped and another generation developed during the summer. He described the egg as the largest, finest and most beautiful of any insect egg he had ever seen: a quarter of an inch in length and perfectly transparent, revealing the embryonic larva with great clearness.

He also stated "that on his place at Crescent City they will construct their burrows in a kind of 'hard-pan' or soft sandstone" This species is probably

Xylocopa texana Cr., a species also common at Jacksonville, Florida.

The nest and parasites of *Xylocopa orpifex* Smith, a California species, has been described recently in Ent. news., vol. 4, p. 151, by Dr. Anstruther Davidson. The nests were discovered on Wilson's Peak, a mountain of 5000 feet altitude, in June and August, 1892. Mr. Davidson says:—

I picked up one piece of wood four inches in diameter and about three feet long, and as there was but one external opening it is presumable all the cells contained therein were those of one bee. From a diagonal entrance the tunnels were driven longitudinally a distance of three or four inches on each side. Parallel to this was another of a similar length, and a third very much shorter, the cells in all numbering twenty. The tunnel is not all of one uniform width but is dilated in the centre of each cell so that the tunnel measures three-eighths of an inch in diameter at the extremities, and half an inch at the centre of each cell.

The partitions are constructed in a manner apparently identical with those of *X. virginica*, but the ribbon-like coil has five complete whorls and is one-eighth of an inch wide. After the partition is completed its angles are filled up with saw-dust and smoothed with a waxy secretion so as to make the bottom of the next cell oval or rounded. These cells have a uniform depth five-eighths of an inch. Here I would like to ask if all the *Xylocopae* make their tunnels wider in the centre of each cell than elsewhere?

On opening many of the tunnels filled early in the season one or two of the external cells may be found empty, the bees having already made their escape. In the lower cells the bees, though perfect and active, remain until the following spring, when they break through the partitions and escape. In those built late in the summer all seemingly remain until the next spring. How it happens that

the bee resulting from the egg last deposited is the first to escape, when there must of necessity be weeks of difference in their time of deposition, is something I cannot satisfactorily account for. I am led to infer, by the fact of the external cells always containing males and the lower ones only females, that the explanation in part lies therein.

Mr. Davidson found this species was preyed upon by two parasites—a Dipteron, *Agyramoeba simsen* Fabr. and a Chalcid, *Monodontomerus montivagus* Ashm., the latter depositing from 10 to 20 eggs in each cell.

The genus *Anthophora* comprise rather large solitary bees, clothed with a thick covering of hairs, especially in the thorax and hind legs. Almost nothing is known of the nesting habits of our species. All those observed by European authors provision their cells with a supply of pollen and honey, upon which an egg is laid and then the cell is closed up.

Mr. Benj. D. Walsh, in *Am. ent.*, vol. 1 (1868), p. 9, has figured and described the habits of *Anthophora abrupta* Say (= *A. sponsa* Sm.) "which had excavated its burrow in the mortar between the bricks composing a vast system of underground flues erected for raising early vegetables, building an entrance to its burrow of tempered clay two inches long and three quarters of an inch in diameter." No mention is made of the eggs, duration of larval stage, etc.

The habits of *Entechnia* (*Anthophora*) *taurea* was briefly and incompletely described by Say at the time of

its specific description, *Bost. journ. nat. hist.*, vol. 1 (1837), p. 411. He says:—

The manners and habits of this species may be likened to those of *A. parietina* Latr. It digs a cylindrical hole in compact clay or adhesive earth on the side of a bank, or in earth retained amongst the roots of an upturned tree. The hole is two or three inches in depth; the sides and bottom of a dark brown color, quite smooth and somewhat polished, containing a quantity of white pollen, considerably larger than the artificer itself. The entrance consists of a cylinder extending downwards from the mouth of the hole more than an inch in length and consisting of small pellets of earth compacted together, very rough on the exterior and smooth within.

The genus *Melissodes* has apparently the same habits as *Anthophora*, as I once detected *Melissodes bimaculata* entering its burrow, formed in an open field, the entrance to which was directly under a small, flat stone. Unlike *Anthophora*, however, it had neglected to build the tubular entrance so characteristic of this as well as other solitary bees. On turning the stone over I found the burrow after extending about an inch and a half directly under it curved downward and became perpendicular, the cell formed of clay being at the bottom at the depth of about eight inches.

The genus *Ceratina* is represented in our fauna by four species, the habits of only one of which is known, *i. e.*, *Ceratina dupla* Say. This species hollows out the stems of almost any pithy plant in which to nidificate, the elder, blackberry, raspberry, and syringa being the most favorite plants. I have most frequently found its nests in the

second years' growth of raspberry stems. The nest usually consists of several cells, separated from each other by partitions at regular intervals and filled with a kind of honey-paste upon which the larvae feed. The larvae transform into imagos the last of July or during August.

From this bee, the Rev. J. L. Zabriskie has bred two interesting parasites, *Diamorus zabriskii* Cr. and *Axima zabriskii* How.; while Dr. Packard also records a species of *Melittobia* (= *Anthophorabia*) from this bee.

The genus *Megachile* represents the leaf-cutting bees, so called from the peculiar habit of the female in cutting small, more or less circular, pieces out of the tender leaves of various plants wherewith to line its cells. These cells are placed in burrows made in the ground or in wood.

Mr. F. W. Putnam in "Notes on the leaf-cutting bee" (Proc. Essex inst., vol. 4, 1864. pp. 105-107) has published some interesting observations made on *Megachile centuncularis* Linn., a species common to Europe and the northern parts of North America. He says:—

My attention was first called, on the 26th of June, to a female busily engaged in bringing pieces of leaf to her cells which she was building under a board on the roof of the piazza, directly under my window. Nearly the whole morning was occupied by the bee in bringing pieces of a leaf from a rose-bush growing about ten yards from her cells, returning at intervals of a half minute to a minute, with the pieces which she carried in such a manner as not to impede her walking when

she alighted near her hole. About noon she had probably completed the cell upon which she had been engaged, as during the afternoon, she was occupied in bringing pollen, preparatory to laying her single egg in the cell. For about twenty days the bee continued at work, building new cells and supplying them with pollen. At the end of this time she had probably completed her allotted task, as she was not seen again.

On the 28th of July, upon removing the board, it was found that the bee had made thirty cells, arranged in nine rows of unequal length, some being slightly curved to adapt them to the space under the board. The longest row contained six cells, and was two and three quarters inches in length. The cells averaged about one half an inch in length; the whole leaf structure being equal to a length of fifteen inches. Upon making an estimate of the pieces of leaf in this structure, it was ascertained that there must have been at least a thousand pieces used. In addition to the labor of making the cells, this bee, unassisted in her duties, had to collect the requisite amount of pollen (and honey?) for each cell and lay her egg therein, when completed.

Mr. Putnam found the cells internally to be hard and smooth owing to the movements of the larvae; they measured .35 inch in length by .15 inch in diameter. The full grown larvae spin slight silken cocoons within which to pupate. Imagos began emerging July 31 and continued during the first week in August.

This species is parasitized by *Melittobia megachilis* Packard, and the eggs of this parasite are supposed to harbor the smallest Hymenopteron known, *Pteratomus Putnamii* Pack.

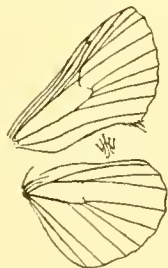
(Continued from page 10.)

legs are concolorous. The primaries on the upper side have a large, irregularly triangular, sub-basal spot of dark brown on the costa its base resting on the costa, and its apex on the submedian vein. This spot is marked with a golden dot on the costa and is edged externally by geminate parallel lines of pale purple, each of which is defined outwardly by equally narrow darker lines. On the inner margin this spot is defined by an irregular silvery line. The middle area of the wing is purplish grey, clouded with darker brown toward the outer margin. There is a well-defined reniform spot at the end of the cell. Running obliquely from the apex to about the middle of the inner margin is a broken series of golden lines beyond which the outer third is heavily shaded with dark maroon spots, separated by a purplish grey area near the middle of the margin and by a golden subquadrate spot at the outer angle. There is a narrow whitish marginal line below the apex to about the middle of the margin. The fringes are brown, minutely checked with whitish at the tips of the nervules. The secondaries on the upper side are uniformly plumbeous.

♀. The female does not differ from the male except in having the abdomen one-fourth shorter than the male and much stouter. Expanse, ♂, 31 mm.; ♀, 33 mm.

HYPODEVA, gen. nov.

Allied to *Deva*, Walk., from which it may



Neuration of *H. barbata*, Holl., 1½.

readily be distinguished by the greater breadth of the wings, by the scalloped form of the external margin, and by the fact that the posteriors are provided with triple frenula, whereas in *Deva* the frenulum is simple. The males are further characterized by having the length of the abdomen relatively much shorter and stouter than is the case in the genus *Deva*. Type *H. barbata*, Holl.

11. *H. barbata*, sp. nov. ♂. Upper side of thorax dark brown, upper side of abdomen fuscous. The lower side of the thorax and abdomen are whitish. The legs are concolorous. The primaries upon the upper side have the costa at the base yellowish olivaceous. The remainder of the wing is brownish heavily marked with darker brown on the inner half of the wing and at the apex. There is a well-marked reniform spot at the end of the cell, and beyond it touching the costa a subtriangular grayish spot. The dark inner area of the wing is traversed by a short basal ray of pale gray, terminating where it meets an irregularly curved median line, which runs from the end of the cell to the inner margin one third of its distance from the base. This line is succeeded outwardly by a similar narrow curved line the direction of the undulations in which is the reverse of the inner line. There is a series of interrupted waved submarginal lines. The fringes are paler than the rest of the wing, and shaded with ashen. The secondaries are uniformly fuscous with the fringes pale gray. Upon the under side both wings are prevalently fuscous. The primaries are narrowly margined at the apex upon the costa with ochraceous, and more broadly margined with the same color upon the inner margin. Besides there is a conspicuous spot of the same color on the costa just above the end of the cell. The secondaries are laved with pale ashen gray near the base, and have a pale ochraceous spot on the costa beyond the cell, and a narrow ray of the same color running inwardly to the base from this spot, parallel to the costal margin. In some specimens there is a trace of a dark

lunulate discal mark at the end of the cell. Expanse, 30-34 mm.

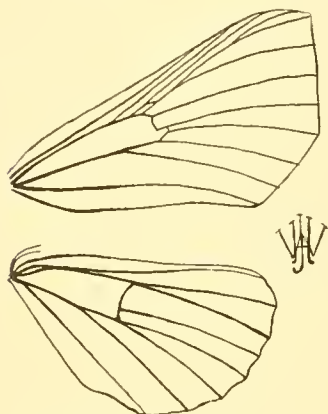
SYMPUSIA, gen. nov.

Allied to *Deva*, Walk. Palpi as in *Deva*. The antennae of the male are slightly setose on the basal two-thirds; the antennae of the female are simple. The abdomen is one-third longer than the posterior margin of the hind-wing in the male and slightly tufted with hairs. The abdomen of the female is stouter and somewhat shorter. The primaries are subtriangular with the outer margin slightly produced at the end of vein 4; the posterior margin is shorter than the costal margin. The secondaries are subovate with the costal margin nearly straight, and but

cell a cup-shaped depression as the wing is viewed from the under side. Vein 7 is emitted from the upper angle of the cell; veins 8 and 9 arise from a common stalk, which is emitted from 7 one-third of the distance from the end of the cell. A short bar joins veins 7 and 10 just beyond the upper angle of the cell. In the secondaries vein 5 is nearer vein 4 than vein 6, which with vein 7 springs from the upper angle of the cell. The tibiae are armed with double median and double terminal spurs. Type *S. frequens*, Holland.

12. *S. frequens*, sp. nov. ♂. Palpi, front and collar luteous; the upper side of the abdomen and thorax fuscous; lower side of abdomen and thorax paler. Tibiae reddish-ochraceous; the remaining portions of the legs pale fuscous. The primaries are fuscous, crossed diagonally about the middle with a dark shade bordered externally by a pale lilacine shade, which is followed on the outer one-third by a darker brownish shade, which is most pronounced about the middle of the outer margin. At the middle of the outer margin there is a lustrous coppery spot. There are some obscure and very narrow basal and submarginal lines. The fringes are pale. At the apex and just before the apex are a few minute white dots. The secondaries on the upper side are uniformly fuscous with the fringes lighter and slightly checkered with the ground color of the wing. On the under side the costa of the primaries and the entire surface of the secondaries are reddish-ochraceous; the inner two-thirds of the primaries are fuscous; both wings have a small discal spot; both are crossed by incomplete transverse limb and transverse marginal lines. The white spots on the costa of the primaries reappear on the under side. ♀. The female is very much like the male in markings. Expanse, ♂, 20 to 22 mm.; ♀, 21 to 25 mm.

This species appears to be very common, some twenty-five specimens being represented



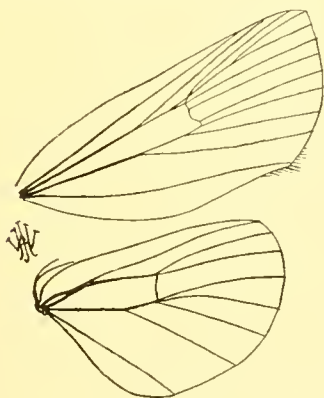
Neuration of *S. frequens*, Holl. ♂, ♀.

slightly bowed above the cell, with the outer margin rounded, very lightly scalloped between the tips of the nervules, and the inner margin slightly curved and somewhat deeply excavated at the anal angle. In the primaries the discocellulars form an irregular zigzag with three points from the two outermost of which veins 5 and 6 are given forth. On the under side the discocellulars are thickened downwardly and form with the slightly raised parenchyma at the end of the

in my collection. In worn specimens the metallic spot on the margin of the primaries does not appear.

PLUSIOCALPE, gen. nov.

Allied to *Plusia*, but having the posterior margin of the primaries fashioned somewhat after the outline of the genus *Calpe*, being strongly produced about the middle, and with a greatly produced tuft of long hairs at the outer angle. The palpi are as in *Plusia*. The antennae of the male are provided with exceedingly minute setae at the base, visible only under the microscope. The antennae of the female are simple. The male abdomen is produced beyond the inner margin for about one-third of its length. The abdomen of the female is shorter and scarcely projects. The characteristics of the neuriation are accurately given in the accompanying cut. The legs are much shorter than in the preceding genus, *Symphylia*, and the last pair are armed as in that genus with double median and double terminal spurs on the tibiae. Type *P. pallida*, Holland.



Neuriation of *P. pallida*, Holl., ♂, ♀.

13. *P. pallida*, sp. nov. ♂. Antennae testaceous; palpi pale ochraceous; collar fuscous, edged with whitish; upper side of

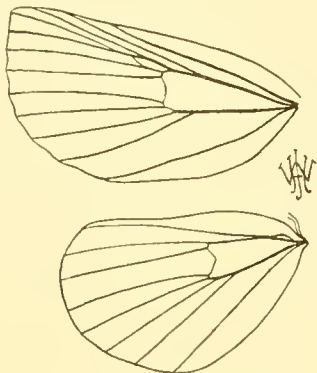
thorax and abdomen pale gray; lower side slightly tinged with ochraceous. Primaries on the upper side whitish, shining, clouded with gray on the outer margin, and with a dark gray subquadrate mark on the inner margin about its middle. There are also obscure transverse median and transverse limbal lines and a few dark scales sprinkled upon the wing. In flown specimens all the darker markings of the wing are pretty nearly obliterated. The secondaries on the upper side are pale fuscous, with the costa whitish, shining. The fringes are concolorous. On the under side the primaries are fuscous, except on the costa, which from a little before the base to the apex is margined with pale ochraceous, the color band widening uniformly to the apex. The inner margin is whitish, shining. The fuscous ground tint is deepest near the costa at the end of the cell. The secondaries are uniformly very pale gray, or whitish. ♀. The female is marked like the male, and is simply distinguished by having a shorter abdomen. Expanse, ♂, 20 to 25 mm.; ♀, 23 to 25 mm.

14. *P. prosticta*, sp. nov. ♂. Palpi dark rufous; eyes black; head, collar and upper side of thorax and abdomen pale gray; lower side of thorax and abdomen whitish. Primaries on the upper side pale gray traversed by a diagonal line running from the costa before the apex outwardly, and then turning sharply and running diagonally inwardly to the middle of the hind margin, becoming darker and more distinct as it approaches the inner margin. There is also a conspicuous subtriangular dark spot on the costa above the end of the cell. The secondaries are uniformly pale fuscous on the upper side with the fringes paler. On the under side the wings are marked very much as in the preceding species.

♀. The female differs from the male merely in the possession of a shorter and more robust abdomen. Expanse, ♂, from 25 to 28 mm.; ♀, 28 to 30 mm.

PERIPLUSIA, gen. nov.

Allied to the preceding genus. Palpi short, porrect, ascending; antennae simple. Costa of primaries straight, or very slightly curved. Apex acute. Outer margin evenly rounded, as also the inner margin. The outer angle very obtuse, rounded. The secondaries are suboval, with the outer and inner margins evenly rounded. The extremity of the abdomen does not project beyond the outer margin of the secondaries. The neuration is depicted in the accompanying cut. Type *P. nubilicosta* Holland.



Neuration of *P. nubilicosta*, Holl., ♂, ♀.

15. *P. nubilicosta*, sp. nov. ♂. Palpi pale ochraceous; front whitish; collar dark brown, edged with pale cinereous. Upper and under side of thorax and abdomen pale gray. Legs gray with the anterior margin of the tibiae of the first pair marked with dark brown. The primaries on the upper side are pale gray marked just below the costal margin, which is lilacine-gray, with a broad diffuse dark brown, or blackish ray running from the base to beyond the cell, and then sweeping upwardly to the apex. The secondaries on the upper side are uniformly fuscous. On the under side the wings are marked as on the upper side, but

all the markings are paler and more diffuse. Expanse, 32 mm.

16. *P. cinerascens*, sp. nov. ♂. Body and appendages much as in the preceding species, save that the collar instead of being brown, as in that species, is uniformly dark gray. The primaries on the upper side are obscure cinereous, in fresh specimens suffused with a light plumbeous tint. There is an obscure minute whitish dot at the end of the cell and the wings are crossed by irregular obscure dark transverse sub-basal, median, limbal, and submarginal lines. The upper side of the secondaries is uniformly fuscous. The under side of primaries is fuscous with the apical extremity of the costa, the inner margin, and a linear mark at the end of the cell whitish. The under side of the secondaries is pale fuscous with the outer margins darker. There is a pale spot at the end of the cell, and beyond it running from the middle of the costa an incomplete transverse median dark line.

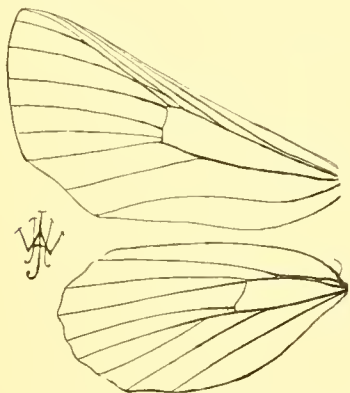
♀. The female is like the male, but with a more robust abdomen, and somewhat darker. Expanse, ♂, 30 to 33 mm.; ♀, 33 mm. Habitat, Kangwé and Benita.

17. *P. eclipsis*, sp. nov. ♂. Palpi whitish. Upper side of thorax and abdomen pale gray; lower side of thorax, abdomen, and legs whitish. Primaries on the upper side gray, slightly paler on the outer margin, with a very large dark brown, semi-lunate spot on the costa from its middle to just before the apex. The lower edge of this spot touches the second median nervule. It is cut at its outer extremity just before the apex by a very narrow pale line. There is a very narrow marginal line of brown and a small brown dot near the outer angle. The secondaries are fuscous on the upper side. On the under side both wings are pale fuscous and both have a very obscure and incomplete transverse limbal line. Expanse, 25 mm.

EURHIPIDAE.

TARGALLODES, gen. nov.

Allied to the genus *Targalla*, Walk., and intermediate between it and *Marasmalus*, Grote. Antennae simple. Palpi compressed, erect, the third joint slender, naked, or very slightly clothed with scales; as long as the second joint: first and second joints heavily clothed with scales. The primaries are relatively narrow, subtriangular, the costa nearly straight, the outer margin slightly rounded, the inner margin curved at the base, straight for one-third of its length from the base to the outer angle. The outer margin is somewhat deeply excavated at the outer angle. The secondaries are subovate. The venuration is given in the accompanying cut. The legs are relatively short and armed on the tibiae with well developed terminal spurs. The abdomen is robust. Type *Targallodes rufula*, Holland.



Neuration of *Targallodes rufula*, Holl. ♀, ♂.

18. *T. rufula*, sp. nov. ♀. Palpi pale brown; front whitish; upper side of head pale gray; upper side of thorax and abdomen pale rufous; under side of thorax and abdomen together with the legs whitish. The tarsi are tinged with pale rufous. The primaries on the upper side are pale ferruginous

with a lilacine lustre in certain lights. They are traversed by very obscure darker sub-basal, median, and limbal lines. Before the apex extending from the costa to the end of the second median nervule there is a curved brownish line margined externally by bright ferruginous. There is a very obscure reniform spot at the end of the cell. The secondaries are whitish with the costa stramineous, shining, and the outer margins marked with obscure rusty spots. In certain lights the wings reflect an iridescent lustre. On the under side the primaries are rufous with the costa and the inner margin paler, traversed before the apex by geminate incomplete limbal and submarginal lines. The secondaries on the under side are uniformly whitish with the costa slightly tinged with ochraceous. **Expanse, 33 mm.**

There is an unnamed specimen of this insect in the British Museum.

EUTELIA, Hübn.

19. *E. (?) strigula*, sp. nov. ♂. The body is cinereous. The primaries are gray, shaded about the middle with pale olive-green and traversed by a number of darker lines of dark olive-brown as follows: a transverse basal line, an irregularly angulated and geminate sub-basal line, an exceedingly irregular transverse median line, which makes two loops at the end of the cell, in the innermost of which loops is a gray reniform spot pupiled with a black point. Beyond this line is an irregularly curved and geminate transverse limbal line, which is succeeded near the apex by a zigzag and irregularly curved submarginal line. There is a very faint dark marginal line. The fringes are concolorous, obscurely checkered with darker brown. The secondaries on the upper side are fuscous with some obscure dark lines at the anal angle, between which there are paler lines. On the under side the primaries are fuscous with the costa margined with rufous at the base. There is a pale discal spot at the end

of the cell and some obscure and incomplete limbal and submarginal dark lines before the apex. The secondaries are paler, and there is a black dot on the cell followed by a very clearly defined dark transverse median line, which is succeeded by two equally dark irregularly curved parallel transverse limbal lines. Expanse, 32 mm.

Without having material enough to make a dissection I cannot be absolutely certain of the generic reference in this instance.

PENICILLARIA, Guen.

20. *P. morosa*, sp. nov. ♂. The palpi, front, and upper side of the thorax are dark chocolate brown, the upper side of the abdomen and the lower side of the thorax and the abdomen are pale chocolate. The legs are concolorous. The primaries are bright chocolate brown, traversed by darker irregularly curved and parallel basal, sub-basal, median, limbal, and submarginal lines, of which the limbal line is geminate, and the sub-basal and apical portion of the submarginal line and the costal end of the geminate limbal line are very dark and conspicuous. The secondaries are fuscous with the costa lighter testaceous. The fringes are reddish chocolate. The under side of the wings is fuscous with the costa and outer margin of the primaries and the base and inner margin of the secondaries reddish chocolate. Both wings have a small linear mark at the end of the cell; both are traversed by limbal and submarginal lines and the secondaries have in addition a transverse median line. Expanse, 29 mm.

21. *P. solitaria*, sp. nov. ♂. The palpi and front are whitish. The upper side of the thorax and abdomen is light brown. The under side of the thorax and abdomen are paler. The legs are concolorous. The primaries are pale reddish fawn. There is a small dark brown spot in the cell and a pale reniform spot at its end. A dark line

runs from the middle of the costa to the reniform and then sweeps inwardly to the inner margin which it reaches a little beyond the base. A similar line, but much finer and paler traverses the wing beyond the cell. The portion of the wing between these two lines is somewhat darker than the rest of the wing, especially near the inner margin. On the costa before the apex is a large triangular brown spot and below it a smaller triangular spot of the same color. The secondaries are fuscous, darkest on the outer margin, and pale gray on the inner margin. On the under side, both wings are pale fulvous, lighter toward the base. The primaries have a few obscure dark marks below the apex, and the secondaries at the anal angle are marked by three or four narrow incomplete dark lines. Expanse, 24 mm.

CALPIDAE.

RHESCIPIA, Walk.

22. *R. siderosticta*, sp. nov. ♀. The palpi are brown, as also the head, collar, and upper side of thorax and abdomen. The lower side of the thorax and abdomen are whitish. The primaries on the upper side are of the same color as the thorax, pale chestnut-brown, traversed by a darker oblique sub-basal line margined externally by paler, with an obscure discal line at the end of the cell, followed by a curved limbal line, defined internally with paler brown and clouded towards the margins with a darker fuliginous shade, which is accentuated at the outer angle by some rusty red spots pupilled with whitish, forming together a suboval aggregation of lighter colored markings. The secondaries are pale fuscous with an ill-defined whitish spot about the middle of the outer margin. The fringes are paler. On the under side the primaries are pale fuscous, clouded with fuliginous just above the inner margin on the line of the median nerve and

with the inner margin and a broad spot at the outer angle white. The secondaries are colored like the primaries, but are clouded on the inner margin with pale fuliginous. Expanse, 48 mm.

This species is represented in my collection by two specimens only, both of which are females.

23. *R. hypocaloides*, sp. nov. ♂. Head and collar bright ferruginous; patagia dark brown; upper side of abdomen ochraceous. The middle of the thorax and the extremity of the abdomen are marked with dark brown. The lower side of the thorax and abdomen are pale whitish-ochraceous. The upper side of the primaries is light brown with a few ill defined basal, median, and submarginal lines. A well defined reniform spot appears at the end of the cell. At the outer angle there are some dark markings accentuated by three or four chalky-white marks on the side of the base. The secondaries are bright orange-yellow with the outer margin broadly banded with black, the black band extending inwardly around the margin to the anal angle, gradually diminishing in width. On the under side, both wings are pale yellow, the primaries being crossed by a very broad blackish subapical band, extending from the costa to the outer angle. The secondaries have a dark border as on the upper side, but paler. Expanse, 40 mm.

HYBLAEIDAE.

HYBLAEA, Fabr.

24. *H. occidentaliun*, sp. nov. ♂. Head, collar, and upper side of thorax dark olive-brown. Abdomen blackish with the outer edges of the segments narrowly margined with pale rufous. The under side of the thorax pale yellow. The first two pairs of legs are pale yellow with the tarsi blackish; the third pair of legs are yellow with the tibiae crimson, marked at the upper end with black, and with the tarsi blackish. The prim-

aries on the upper side are dark olive-brown with obscurely defined blackish marks on the costa, and the median area accentuated on the costa by conspicuous whitish spots, and near the base by two bright yellow spots, of which the lower one is the larger and the upper one is quite small. The secondaries are black marked by a broad mesial fascia of bright yellow. The fringes from the middle of the outer margin to the middle of the inner margin are bright orange-yellow. On the under side, the primaries are bright yellow, tinged on the costa with crimson, and having the inner margin white, shining. Along the upper edge of this white shining area there is a narrow black line fusing with a broad black U-shaped mark, which is located on the outer third of the wing. The fringes are blackish. The secondaries on the under side are pale yellow laved on the outer angle with crimson, traversed by a broad submarginal black band and a median band of interrupted black spots, of which the one nearest to the costa is subquadrate in form and the others linear. There are also a number of blackish dots sprinkled over the lighter surface of the wing.

♀. The female is like the male, except that the ground color of the primaries is generally paler and the white and yellow markings on the upper side of the primaries are wanting. Expanse, ♂, 25-30 mm; ♀, 30-33 mm.

GONOPTERIDAE.

GONITIS, Guen.

25. *G. marginata*, ♂. Palpi, head, and thorax obscure fawn. Upper side of thorax and abdomen whitish with the abdominal extremity rusty. The primaries on the upper side are reddish-fawn, except on the outer margin, which is uniformly pale cinereous, except just below the apex on the outer margin, where it is lightly touched with dark brown. The darker area within the paler band is profusely sprinkled with brown spots. There is a small annular spot in the middle of the cell, an oval blackish spot at the end

pupiled with pale gray, and there are obscure, transverse basal, sub-basal, median, limbal, and submarginal lines. The secondaries on the upper side are pale fuscous with the venation slightly darker. The fringes are pale reddish-fawn. The primaries on the under side are pale fuscous with the costa narrowly and the outer margin broadly tinged with pale rufous-pink and profusely spotted with minute dark scales. There are one or two small whitish spots on the costa before the apex. The inner margin is pale whitish. The secondaries are pale gray with a small round discal dot and the costa and outer margins tinged with reddish and profusely irrorated with small blackish scales. Expanse, 35-37 mm.

26. *G. benitensis*, sp. nov. ♂. Head and thorax rich chestnut brown on the upper side. Upper side of abdomen fuscous; lower side of thorax and abdomen pale rufous-gray; legs concolorous. Upper side of primaries rich chestnut with a small obscure light dot in the cell. An obscure basal and geminate sub-basal line, both irregularly curved, traverse the wing. From the upper angle of the cell, a fine brown line runs at right angles to the inner margin and is bordered externally by a somewhat wide cinereous shade. A similar fine brown line, margined externally by a pale cinereous shade starts on the costa before the apex and runs with a slight curve at either end and at the middle as far as the second median nervule, and then sweeping inwardly coalesces with the straight line running from the end of the cell. In addition, there is a fine pale submarginal line. The secondaries are uniformly fuscous on the upper side. On the lower side, the primaries are fuscous with the costa and the outer margin laved with pinkish. There is an indistinct transverse limbal line running from the costa toward the inner margin, which it does not quite touch, and the submarginal line faintly reappears upon this side. The secondaries are broadly pinkish, except on the inner margin and at the

anal angle, where they incline to ochraceous. They are traversed by a regularly curved narrow dark limbal line parallel to the outer margin. Expanse, 35 mm.

There are some specimens which are strictly referable to this species, in which the ground color is darker and in which the chestnut-red, which is the prevalent tint in typical specimen, only appears as light spots upon the darker fuscous ground.

27. *G. punctulata*, sp. nov. ♂. Head and upper side of thorax chestnut. Upper side of abdomen fuscous; lower side of thorax and abdomen paler, pinkish. The upper side of the primaries is rich chestnut-brown. At the end of the cell is a darker reniform spot and there is also a small dark spot in the middle of the cell. Below the reniform spot a very fine and obscure angulated line runs to the inner margin. Beyond the cell, there is an irregularly curved series of small brownish dots, which run from the costa almost to the inner margin, and are succeeded outwardly by a waved submarginal shade, which is darkest just before the apex. The apex is paler than the rest of the wing and is slightly tinged with cinereous. The fringe is narrowly grayish. The secondaries are uniformly fuscous with the fringes lightly margined with pale gray and slightly checkered with the same color on the interspaces. On the under side the primaries are marked very much as in the preceding species, save that the median space on the primaries and the inner margin of the secondaries are dark fuscous and the fringe of the secondaries between the submedian and the first median nervule is broadly whitish. Expanse, 35 mm.

ANOMIS, Hübn.

28. *A. finipunctula*, sp. nov. ♂. The palpi, head, and upper side of the thorax are pale fawn. The upper side of the abdomen is fuscous; the anal tuft is pale fawn; the lower side of the thorax and abdomen are

HERMANN AUGUST HAGEN.

After three years of complete prostration, Dr. Hagen died at his home in Cambridge on November 9, 1893. He was born at Königsberg May 30, 1817 and in the course of his long life became one of the most distinguished entomologists of the century. He lived in Königsberg as a practising physician until 1867 when he removed to Cambridge to take charge of the entomological department of the Museum of comparative zoology. In 1876 he declined a pressing and tempting offer to return to his native country, to take charge of the entomological collections of the University Museum at Berlin. His first essay and his inaugural dissertation on attaining the doctorate were upon Odonata, and this group with other Neuroptera formed afterward the chief subject of his researches, though every order of insects has received treatment in the more than four hundred papers issued by him.

Undoubtedly the work by which he is most widely known is his *Bibliotheca entomologica*, probably the best topical scientific bibliography ever published. Not only is it remarkably complete and free from errors, but in addition to an alphabetical arrangement by authors, in which the entries are chronological, it contains an admirably conceived classified index in a narrow compass which adds vastly to its usefulness. Would that the literature of the generation since its publication might receive similar treatment.

American entomologists will especially recognize the value of his contributions to a knowledge of our own Neuroptera, and notably of the general work prepared by him for the Smithsonian Institution, which gave a precision and a stimulus to later studies in this field. Had the definitions of the higher groups equalled those of the species a really model work would have been produced; as it was, it filled well a decided gap in our literature and has been the basis of all that has since appeared. Our

information is now so much more extended and varied that a new work brought up to date is much needed.

His great skill and erudition were equally shown in the synonymical synopses of many families of Neuroptera which he published from time to time and in his monograph of the white ants, one of the the most difficult of studies—a real monument of learning.

Another field of investigation followed by Hagen with great success was that of extinct Neuroptera. He has probably written more upon them, particularly upon the mesozoic European species, than any other author, and his contributions are among the very best that have enriched the study of fossil insects. The exactitude of his figures and the carefulness of his descriptions give them a particular merit.

During his twenty-five years' residence in this country, Dr. Hagen was remarkably generous in the aid given by him to entomologists of all classes. He replied with great fulness and promptness to all enquiries, and being himself a mine of information in every department of entomology, his readiness was of immense service to his correspondents. Through him the entomological library and collections of the museum were put to their fullest use and his personal work in the arrangement and especially in the biological division of his special charge was something extraordinary. Almost single handed he brought the vast collections into systematic order and kept them so, expending the greatest pains in their proper disposition and careful labelling. The evidence of his painstaking and faithful work is permanently fixed. His death removes one of the beacon lights of our science.

[The delay in the appearance of this notice is due to the fact that, owing to special circumstances, both the December and January numbers of *Psyche* were printed and even prepared for the mail before Dr. Hagen's death.]

WILHELM JÜLICH.

In the death of Wilhelm Jülich on the 8th of Nov., after an illness of only three days, entomological science has lost an ardent admirer and supporter. Jülich was born in the Rhine Provinces three or four years more than half a century ago, and, at the age of about seventeen, came to the United States. During the War of the Rebellion he was actively engaged as a private in the cause of the North, being singularly enough arrayed in those trying times against his father and a brother, who had enlisted with the fortunes of the South. Soon after the war he settled in New York, where he resided until his sad and unexpected death, quietly pursuing the study of our local Coleoptera during the very few hours vouchsafed him for such work in the busy struggle for existence. He was an excellent collector, and succeeded in bringing together a cabinet of decided value. He was generous in the disposition of material, especially to those whom he considered likely

to use it for the benefit of his fellow man. A gentle companion and an honest friend has left us, never to return. T. L. C.

EXPLANATION OF PLATE I.

Illustrating Dr. Holland's article on African Noctuidæ.

1. Plusiocalpe pallida. 2. Hypodeva barbata. 3. Plusiocalpe prostricta. 4. Periplusia nubilicosta. 5. P. cinerascens. 6. P. ecclipsis. 8. Caligatus Angasii, Wing, = Pacidara venustissima, Walk. 9. Rhescipha siderostieta. 10. R. hypocaloides. 11. Gonitis Benitensis. 12. Homoptera pulcherrima. 13. Gonitis marginata. 14. Catephia discistriga, Walk. 15. Aedia costimacula. 16. A. apicata. 17. A. eremita. 18. A. scotosa. 19. Symplusia frequens. 20. Acontia zelia, Druce. 21. Eutelia strigula. 22. Penicillaria morosa. 23. P. solitaria. 24. Tarache signifera, Walk. 25. Hyblaea occidentalis, ♂. 26. Targalodes rufula. 27. Xanthodes cannella, Druce. 28. Panilla sexmaculata. 29. Hyblaea occidentalis, ♀.

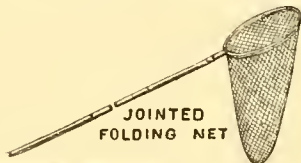
THE SEVENTH VOLUME OF PSYCHE

Begins in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume, but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

A. SMITH & SONS, 121 NASSAU STREET, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,
Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.



JOINTED
FOLDING NET

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 215.

MARCH, 1894.

CONTENTS:

THE HABITS OF THE ACULEATE HYMENOPTERA.—II.— <i>William H. Ashmead.</i>	39
NEW AND UNDESCRIBED GENERA AND SPECIES OF WEST AFRICAN NOCTUIDAE.— II (Illustrated).— <i>W. F. Holland.</i>	47
THE NEMASTOMATIDAE AND TROGULIDAE OF THE UNITED STATES.—II (Concluded).— <i>Nathan Banks.</i>	51
WING-LENGTH IN SOME NEW ENGLAND ACRIDIDAE.—II (Concluded).— <i>Albert P. Morse.</i>	53
PROCEEDINGS OF THE CAMBRIDGE ENTOMOLOGICAL CLUB (Crambid injurious to cranberry vines; book worms; protective guise of a Limacodes; various Orthoptera).	55

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS 20c.

[Entered as second class mail matter.]

9570513

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5 00
Subscription to Vol. 6, clubs of 3, postpaid,	13 00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE,

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH — STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " " "	1.25	1.00
Half " " " "	2.25	1.75
One " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$20.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danaïa archippus</i> . Boston, 1880, 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate .50	
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> . col. pl. Boston, 1883. .25	
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

TACHINIDAE WANTED.

Named or unnamed Tachinidae wanted in exchange, or by purchase, from any part of North America including Mexico, Central America and the West Indies. Will not promise to name or return specimens sent.

C. H. TYLER TOWNSEND,
Kingston, Jamaica.

PSYCHE.

THE HABITS OF THE ACULEATE HYMENOPTERA.—11.

BY WILLIAM H. ASHMEAD, WASHINGTON, D. C.

Mr. E. Baynes Reed, in "Notes on *Megachile brevis* Say" (Can. ent. v. 3, 1871, p. 210) has figured this species and records the following respecting it.

While inspecting during the past summer, the fruit orchard of a friend residing in this neighborhood, my attention was attracted by the peculiar appearance of the leaves of a young plum tree. At the first glance, I thought it might be affected by Aphides, but, on closer examination, I found unmistakable evidence of the work of a leaf-cutting bee, in the circular holes in many of the leaves, and on opening one of the coils of leaves, of which there were four or five, I discovered the curious chambers of the bee, each containing a half grown grub comfortably ensconced, with its modicum of food. I took some of the coils home, but only succeeded in rearing two perfect insects.

The genus *Osmia*, structurally, is closely allied to *Megachile*, but the species composing it construct nests entirely different. They have received the name of "mason-bees," from the way they construct small earthen cells under stones, in burrows excavated in decaying wood, rotten posts and twigs, in deserted snail-shells, in cynipidous galls, or elsewhere.

Very little seems to be known respecting the habits of the North American species, Dr. Packard, in his Guide, being apparently the only author who has written anything about them. From his observations and those published abroad, the species exhibit great diver-

sity of habits and should be more carefully studied, as this diversity of habits will no doubt be found correlated with structural differences that will justify sub-generic divisions of this large genus.

The cells are constructed of sand, earth, or clay, agglutinated and mixed with pebbles or the raspings of wood, held together by a glutinous substance secreted by the female; internally the cells are always smooth, but externally they are rough in conformity with the material used in their construction. These cells vary in number in each nest, usually from 10 to 20 being found together. Each cell contains a deposit of honey-paste for the subsistence of the larva, only a single larva or egg being found in each cell. Curtis found the enormous number of 230 cells of the European *Osmia parietina* attached to the under side of a large flat stone. Mr. L. O. Howard, in his article in the Standard Natural History, calls attention to a remarkable case of retarded development in this species observed by Mr. Frederick Smith. "From a quantity of cells collected in Scotland in 1849, about one-third only had given forth the adult bees. Some of the remainder issued the following year, while about thirty-five remained in the larva state until May, 1851, when they transformed and issued a month later."

One of our largest species, *Osmia lignivora* Pack., according to Dr. Packard,

industriously tunnels out an elaborate burrow in maple several inches from the bark, wherein it forms its cells.

The tunnel was over three inches long and about three-tenths of an inch wide. It contracted a little in width between the cells, showing that the bee worked intelligently, and wasted no more of her energies than was absolutely necessary. The burrow contained five cells each half an inch long, being rather short and broad, with the hinder end rounded while the opposite and next to the one adjoining, is cut off squarely. The cell is somewhat jug-shaped, owing to a slight constriction just behind the mouth. The material of which the cell is composed is stout, silken, parchment-like, and very smooth within. The interstices between the cells are filled with rather coarse chippings made by the bee.

The bee cut its way out of the cells in March, and lived for a month afterwards on a diet of honey and water. It eagerly lapped up the drops of water supplied by its keeper, to whom it soon grew accustomed, and whom it seemed to recognize."

Osmia lignaria and *O. pacifica* Say, on the contrary, build their cells under stones, while *O. simillima* Smith, one of the smallest of our species, constructs its cells in the deserted oak-galls made by *Amphibolips confluens* Harris, thus agreeing with *Osmia gallarum* of Europe. I have also observed another species in a deserted oak-gall in Florida.

Species in the genus *Anthidium*, according to Westwood, "frequent various woolly-leaved flowers, stripping off the down with their toothed jaws for the purpose of forming their nests"

The Anthidii, as with certain Odyneri, although said to nidificate usually in holes in trees, will sometimes choose

odd situations for their nests, the British species *Anthidium manicatum* having been twice observed to nidificate in the key-hole of a garden gate. Prof. Westwood thus describes one found in a similar position.

There were twelve or fifteen cells or cases consisting externally of a loose covering of white down within which was another covering more compact and smooth on the inside and within this was contained an oval cell, of a strong coriaceous texture, and of a chestnut color. This latter I consider to be the cocoon formed by the larva itself, because some of my woolly cases contained a mass of matter apparently consisting of dried pollen-paste and the egg deposited with it which had probably on some account proved abortive; and in these there was no oval chestnut-colored cocoon. It was in February that this nest was discovered, at which period some of the cells were empty, the inhabitants having forced off a circular cap from the top of the cocoon and escaped; others, however, contained full-sized grubs.

No observation seems to have even been published on any of our numerous species, although many of the species are so plentiful.

The genera *Coelioxys* Latr. and *Stelis* Panzer are parasitic bees, both having been bred in Europe; the former from the cells of Megachile, Anthophora and Anthidium, the latter from *Osmia*. No observations on any of the American species have ever been recorded.

Although the parasitic habits of *Stelis* was so long known it was not until last year that the true inward history was given in the publication of Mr. C. Veshoeff's observations on

Stelis minuta Nyl. (Zool. anzeiger, vol. xv, 1892, pp. 41-43).

This species was found to be parasitic in the nests of *Osmia leucomelaena* Kirby which constructs its cells in hollow twigs. Dr. Riley's summary of this species is as follows:—

At the bottom of the cell the female *Osmia* first puts a layer of pollen which is to serve as food for the nearly full grown larva. Above this pollen, the bee commences to store the cell with prepared bee-bread. At this moment the female *Stelis* watches her opportunity to lay an egg in the *Osmia* cell, the egg thus being always near the bottom (posterior end) of the food mass. Unaware of the presence of the parasite egg, the *Osmia* female continues her work, and, after nearly filling the cell, deposits her own egg on the top (anterior end) of the food mass. The cell is then closed with a layer of macerated particles of plants and a second cell prepared above the first. The *Stelis* larva hatches but little earlier than that of the *Osmia*, and both larva feed on the food-mass, the parasite larva at the bottom, the host larva at the top. The latter remains stationary at the top and grows very slowly; the parasite larva grows more rapidly, and gradually works its way upward through the food-mass, thus gradually approaching the *Osmia* larva. The crisis finally comes; the *Stelis* larva encounters the *Osmia* larva—a short but deadly combat ensues—the *Osmia* larva is easily overpowered and killed by the much larger and stronger parasite, and its body is devoured by the latter within one or two days.

The genus *Epeolus* is stated by our American authorities to be parasitic in the cells of *Colletes*, evidently based upon an observation of an English authority, Shuckard, who claims to have bred *Epeolus variegatus* from the cells of one of these bees.

This statement must, however, be erroneous, as it does not agree with observations of mine made on a common American species. It was evidently based upon insufficient data, just as was found to be the case respecting St. Fargeau's statement about *Sphecodes* being parasitic in the cells of *Halictus*.

The past summer, while in Mississippi, I was fortunate enough to stumble upon several specimens of *Epeolus donatus* Smith making their burrows, and I am thus enabled to assert that this species is not parasitic but builds cells and deposits honey-paste for its offspring, just as many other solitary bees. My observations throw grave doubts upon the reliability of Shuckard's statement and lead me to believe that he had cells of both *Epeolus* and *Colletes* mixed together in his breeding jars, when his specimens were reared.

On the plantation where I was staying, near Utica, Miss., *Epeolus donatus* was observed making its burrow in hard clay, beneath a cotton-gin shed, into which I had run to escape a passing rain storm which came on suddenly, while I was investigating cotton-insects in a cotton-field near by.

My attention was first attracted by the buzzing of the bees; for, as they returned from the field to enter their burrows, before alighting they invariably made several circles above the mouth of their burrow, all the time making a very loud humming or buzzing noise, very noticeable and which ceases only as they reach the ground.

I thus easily discovered several burrows and afterwards saw females in the act of digging them.

All except three or four had the peculiar tubular entrance formed of cemented clay at their mouth, similar to those made by Anthophora and other solitary bees. Burrows that had not the tubular entrance at their mouth, evidently had it originally, but it had become destroyed by persons or cattle walking over the ground where the burrows occurred.

The clay was very hard and dry, and the burrows extended in it obliquely downward to the depth of two or three inches and then became horizontal, terminating after reaching a depth of eight or ten inches. At the bottom the female builds her cell, composed of cemented clay, 15 mm. long by 10 mm. in diameter at widest part, the cell being slightly constricted towards the top, where its diameter is only 8 mm.; interiorly it is perfectly smooth and glistening from some thin secretion that covers its surface, while exteriorly it is rough from the small particles of clay of which it is composed. Some of the cells dug up were only partially finished; others were completely finished, either empty or contained the egg or the larva.

The egg was always enclosed in a ball of honey-paste that was perfectly white and consisted of numerous white granules mixed with honey. Only one egg was found in each cell. The egg is much elongated and slightly thicker toward one end, perfectly white, with its surface feebly shagreened. One

taken from its cell August 15, measured 4 mm. long, by 0.8 mm. in diameter, at its thickest part.

A larva, taken August 16, doubled up in its cell, measured 12 mm. long, while the broadest abdominal segment measured only 5 mm. It tapered very much toward the head, was of a white color, with the derma finely, irregularly transversely shagreened, the segments being well defined; the head was small, rounded, measuring transversely 1.5 mm.; the eyes were not apparent except by a slight elevation, which was scarcely separable from the cranium; the mandibles were well defined, black or piceous at the tips, the tips being truncate and roundedly emarginate but not sufficiently emarginate to form distinct teeth; the clypeus was trapezoidal, the anterior edge with a medial emargination; while the other parts of the mouth were not developed, appearing as three lobes, a lobe beneath each mandible, with the third placed beneath and more or less covering the other two.

Although still incomplete, these observations prove this bee is not parasitic and will serve to stimulate further study on the habits of our species.

It may be well to record here that while studying this species, I observed a Mutillid moving cautiously into one of the burrows, which on capturing proved to be *Sphaerophthalma similima* Smith. It is probably parasitic on this bee.

The species belonging to the genera *Nomada* Fabr. and *Melecta* Latr. are stated to be parasitic on different soli-

tary bees, although additional evidence is needed to establish the sort of parasitism it is.

Dr. Packard has reared *Nomada imbricata* Smith and *N. vineta* Say (= *pulchella* Sm.) from the nests of *Andrena vicina* Smith; and the former also from the cells of *Halictus parallelus* Say and found:

Both full-grown larvae and pupae of different ages, up to the adult *Nomada*, ready to take leave of its host. It seems, therefore, that the newly hatched young of *Nomada* must feed on the pollen mass destined for the *Andrena*. But there seems to be enough for *both* genera to feed upon, as the young of both host and parasite were found living harmoniously together, and the host and their parasites are disclosed both at the same time.

Is it not just possible that this sociability of the two larvae is fictitious and lasts only just so long as the food supply is sufficient for both? When the food supply gives out, will they not also attack each other just as in the case of *Stelis*?

It seems to me that here we have an admirable illustration of the origin of parasitism. We have (1) commensalism, (2) parasitism, induced by hunger, and (3) genuine parasitism, which is induced or acquired by the two former conditions, until finally it becomes permanently acquired through heredity. The same thing is strikingly exhibited in the family Cynipidae where we find (1) gall-makers, (2) commensals or inquilines and (3) true parasites, again in the family Chalcididae, in the Eurytomides where

we have (1) gall-makers or plant-feeders (*Isosoma* and allies), (2) commensals or inquilines (*Eurytoma* and allied genera) and (3) true parasites (*Bruchophagnus*, *Eurytoma*, etc.). The same state of affairs occurs also in the fig-insects (Blastophaginae), and in the gall-inhabiting Toryminae.

Family II. ANDRENIDAE. In habits and structure this family is in all respects very closely allied to the preceding. About 150 species, distributed in 14 genera, are already known from boreal North America.

All of the genera, except the genus *Prosapis* Fabr., which like *Ceratina*, in the preceding family, excavates the stems of brambles, etc., burrow galleries in the ground in which they place their cells. At one time two or three of the genera, *Sphecodes*, *Augochlora* and *Prosapis*, were considered to be parasitic or inquiline in the cells of some of the others, but have since been shown to be honey-producers like the rest.

The nests of comparatively few of our genera have been studied in detail. *Andrena vicina* Smith, as observed by Mr. J. H. Emerton and others, excavates a perpendicular gallery in the ground to the depth of several inches or more, branching off from which it then excavates short oblique galleries in which the cells which are lined with a muscous-like secretion are placed.

The nests are built in the latter part of April and during May. The cells are then filled with a ball of pollen and

honey, those nearest the surface being provisioned first, those at the bottom last. The period of development from egg to imago is about five weeks, so that imagos issue all through July and August.

The genera *Cilissa* Leach, *Nomia* Latr. and *Halictus* Latr. have similar habits.

The nests of *Auglochloa pura*, as recorded by Say (Bost. Journ., v. 1, 1837, p. 397) were found in the soft, decomposing sap-wood of the oak and hickory, between the bark and the solid wood.

The cells are oval, horizontal, not symmetrically disposed though many are parallel. These cells are composed of particles of the decayed wood agglutinated together. Each cell contains one individual subsisting on a yellow-pollen. In the same assemblage are the young of all ages to the perfect insect.

The habits of none of our species of *Prosopis* and *Colletes* have been observed.

A Dipteron *MiltoGRAMMA punctata* has been reared from *Colletes* in Europe.

Family III. CRABRONIDÆ. This family is represented in our fauna by over one hundred species, unequally distributed in seven genera. The species, according to the "records," exhibit the greatest diversity in their habits. Westwood says, "Those whose economy has been clearly traced make their cells in wood, boring into palings, posts, willows, stumps, etc."

No observations have been made on our species belonging to the genus *Oxybelus*, but in Europe they are found to burrow in sand and to provision their nests with dipterous insects. Verhoeff states that the species in this genus do not paralyze their prey by stinging like most other fossorial wasps as they are unable to do so on account of the rigidity of the abdomen, but instead they crush the thorax with the mandibles just beneath the wings, the centre of the nervous ganglia. He found in one nest a dozen flies (*Hydrotaea*) and all had their thorax crushed and were dead. According to Fabre *Oxybelus* makes no use of its mandibles and legs in carrying its prey, but instead carries it home on its sting! The genus in Europe is parasitized by *MiltoGRAMMA conica*.

Shuckard tells us that *Crabro cephalotes* "employs its mandibles in forming a cylindrical cell in decaying trees passing the particles of wood beneath them and ejecting them behind by means of the spines on the posterior tibiae"; Latreille that *Crabro cribarius* provisions its nest with the larva of *Tortrix chlorana*, which feeds upon the oak. This last differs, however, from Shuckard's observations, who found this species, as well as *C. patellatus* and other species, storing their nests with Diptera. *Crabro leucostoma* was observed by Westwood making its burrow in rotten wood and provisioning with *Anthomyia pluvialis*; he also relates that a Crabronid nest given to him by Mr. Pickering,

found in rotten wood was provisioned with blue-bottle flies and from which he reared *Crabro vagus*.

Our native species of *Crabro* are numerous but very little is recorded respecting their habits. Packard states that *Crabro sex-maculatus* Say, according to Dr. T. W. Harris' ms. notes, was seen June 10 by Mr. Leonard of Dublin, N. H., burrowing in decaying wood, while *Crabro singularis* Smith was discovered by Mr. C. A. Shurtleff boring in a post.

Mr. Wm. Couper in an article entitled "Nest of *Crabro sex-maculatus* Say" published in *Can. ent.*, i (1869), p. 77, figures and describes the nest of a bee that was identified for him by Dr. Packard as this species, but which clearly must be a mistake, due undoubtedly to Mr. Couper sending the Doctor the wrong insect as the maker of the nest.

The nest was made in tops of raspberry canes, the pith having been extracted by the bee and the interior then utilized for the reception of the cells, which were filled (according to Mr. Couper) with pollen. Mr. Couper found the eggs and the larvae in various stages of development, but tells us nothing about their further development, or whether he succeeded in rearing the imago.

Altogether the article is very unsatisfactory and I do not believe it to be, what it is represented, the nest of *Crabro sex-maculatus* Say, which is a fossorial wasp and not a bee.

Species in the genus *Rhopalum*

Kirby are said to bore into the stems of pithy plants and to prey upon spiders and Aphides.

The genus *Trypoxylon*, which probably represents a distinct family, has similar habits, although most of the species are "lazy fellows" seldom taking the trouble to build a nest for themselves, preferring to "crib" one from some other wasp, or then to utilize an old deserted cell or then any hole or crevice they can find, which is suitable for them to build their cells for their supplies. This peculiarity caused them at one time to be considered parasitic.

Walsh was the first to record the habits of *Trypoxylon albitarse* which usually selects the deserted cells of a mud-dauber (*Pelopaeus*) in which to nidificate, provisioning its cells with spiders. I can confirm this statement of Walsh's from personal observations as I have not only obtained them from the old cells of *Pelopaeus* but also from those of *Chalybion caeruleum*. I have also bred *T. clavatum* Say from the same mud-dauber's cell.

Trypoxylon carinifrons Fox, *T. collinum* Smith, and *T. albopilosum* Fox, on the contrary, carry off Aphides with which to provision their cells. The first, which is the smallest species, takes up its abode in the round holes made by Scolytids in pine-timber, into which I have seen them going carrying *Chaitophorus salicicola* Monell, obtained from a willow close by. This species is parasitized by an equally small Chrysid, *Chrysis verticalis* Pattn. The second I have seen carry-

ing *Chaitophorus lonicera* Monell into a burrow made in hard or compacted sand, probably containing cells made by some other insect; while the third I have seen capturing and carrying off a maple aphid, *Chaitophorus* sp.

Family IV. PEMPHREDONIDAE. According to Mr. Fox's recent Synopsis, this family is represented in our fauna by 6 genera and 27 species.

Shuckard considered the genus *Passaloecus* to be parasitic in its habits, based upon a superficial observation on *P. insignis*, and this opinion seems to be supported by Kirchner, who records *P. turionum* Dahlb. as a parasite of *Tortrix resinanae*. Westwood, however, states that *P. gracilis* Curt. and *P. corniger* Shuck., as observed by Mr. Kennedy, provide Aphides for the food of their progeny, carrying them in the mouth into cells placed in holes in posts.

This agrees with an observation of mine on a common American species, *Passaloecus annulatus* Say, several of which I have taken as they went in and came out of their burrows in the bark of an old pine tree, and from which I afterwards dug out their cells, which were made of clay. I believe, therefore, that Shuckard and Kirchner are wrong in calling these insects parasites. In fact, all the species in this family, except those belonging to the genus *Diodontus*, are typical wood-wasps, forming their nests or cells in rotten wood, decaying bark of trees or in hollow stems of plants, and provisioning the same with Aphides or other small insects.

Diodontus minutus Fabr. and *D. tristis* Dahlb., two European species, have been observed to burrow in sand; and this agrees with what I have observed of the American species *Diodontus americanus* Pack., two specimens of which I have captured while in the act of burrowing in hard clay, while other specimens were observed going in their burrows near by. An effort was made to investigate two or three of these burrows, but the holes were so exceedingly small as to baffle me in my efforts, filling up rapidly as I attempted to dig them out with my pocket knife and leaving no trace to follow. The burrows evidently extended to a considerable depth.

Westwood says *Pemphredon lugubris* Fabr. burrows in decayed wood and provisions its nest with Aphides. In Florida, I have observed *Pemphredon angularis* Fox carrying off pine Aphides but never succeeded in finding its nest.

Cemonus westmaeli Morowitz, is reported to form its nest in the stems of *Rubus*, *Sambucus*, the deserted oak-gall *Cynips kollari*, or even in the empty cocoon of *Lipara lucens*.

Mr. Kennedy, according to Westwood, discovered that *Stigmus troglodytes* formed its cells in hollow straws of a thatch, which it filled with minute insects apparently the larvae of a Thrips, as many as fifty being found in one cell.

Stigmus argentifrons Ashm. ms. provisions its cells with immature Aphides from the honey-suckle.

(Continued from page 34.)

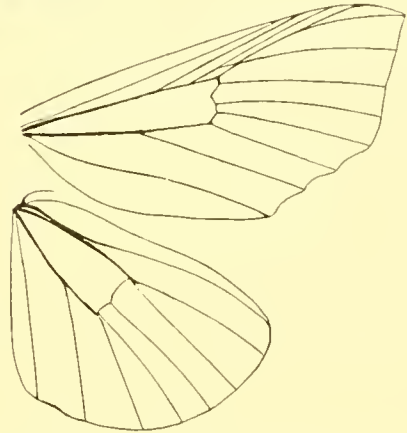
very pale fawn. The primaries on the upper side are fawn color, darker on the costa and cell. There is a basal brown shade, and a dark transverse median shade defined inwardly by a pale curved line. There are two small blackish dots, one above the other, beyond the end of the cell, succeeded by a fine pale curved submarginal line, which is clouded internally on the costa beyond the cell and above the inner margin by dark shades. On the margin upon the interspaces there are small narrow blackish lines of raised scales. The fringes are pale fawn like the body of the wing with their extremities tipped with dark brown. The secondaries are uniformly dark fuscous, except on the costal margin where they are lighter. On the under side, both wings are pale pinkish-gray, the middle area of the primaries being clouded with fuscous. There are no markings on the under side. Expanse, 27 mm.

DEINOPALPUS, gen. nov.

Allied to *Anomis*, but readily distinguished from it by the enormous development of the palpi, which are compressed; the first joint long, the second a trifle shorter, erect, ascending in front of the head, the third joint very long, laid back over the middle of the thorax and abundantly clothed with long hairs erected as a fan-like plume over the head. The third pair of legs have the tibiae armed with long double median and terminal spurs. The antennae are simple. The neuration and outline of the palpi are given in the accompanying cuts. Type *D. Africana*, Holland.

29. *D. Africana*, sp. nov. ♂. Palpi, thorax, and upper side of abdomen pale chestnut. Anal extremity of abdomen white. Lower side of thorax and abdomen pinkish-gray. First pair of legs dark brown, heavily clothed with hair; second and third pair of legs paler, the tarsi ringed with whitish. The primaries on the upper side are pale

chestnut, clouded with fuscous from the end of the cell to the outer margin, and laved with cinereous on the costa before the apex. The wings are crossed by irregularly curved



Neuration and palpi of *D. Africana*, Holl., ♂, ♀.

and somewhat indistinct transverse basal, sub-basal, median, limbal, and submarginal brown lines. There is a dark annular spot in the middle of the cell, and a larger similarly colored reniform spot at the end of the cell. The fringes are dark brown marked narrowly with white on the interspaces. The secondaries are dark fuscous, except on the costa near the base, where they are white, shining. The fringes are paler than on the primaries, and are marked with fuscous at the tips of the nervules. On the under side, the primaries are broadly dark fuscous on the middle area with the inner margin white, shining; the costa and the outer margin are bordered with pinkish-rufous. There is a small subtriangular fuscous spot on the costa just before the

apex. The secondaries are pinkish, irrorated with minute darker scales, traversed by a fine regularly curved limbal line parallel to the outer margin, with a pale discal spot at the end of the cell, and a pale fuscous ray running from the base to the outer margin before the anal angle. The inner margin is slightly paler than the rest of the wing. Expanse, 37 mm.

HOMOPTERIDAE.

HOMOPTERA, Boisd.

30. *H. pulcherrima*, sp. nov. ♂. Palpi gray, margined below with black. Front and upper side of thorax dark fuscous. Upper side of abdomen fuscous, slightly paler on the dorsal line of the three segments nearest the thorax, which are banded on their lower edges with blackish. On the lower side, the thorax and abdomen are obscure fuscous. The primaries are fuscous, in certain lights reflecting a brilliant purple sheen. At the end of the cell are two silvery white dots, one above the other, the lower one which is the larger is subtriangular in form. These spots are located just beyond the upper and lower extremities of the dark reniform spot, which closes the cell. There are four silvery white short transverse lines on the costa before the apex, of which the outermost and the innermost are the longest and most conspicuous. There is a small black spot in the middle of the cell. The wings are traversed by fine irregularly curved basal and sub-basal lines. There is a geminate transverse median line running from the inner edge of the reniform spot to the inner margin of the wing. A looped limbal line runs from the innermost subapical white linear spot on the costa toward the inner margin as far as the first median, where it turns abruptly upward, and coalesces with the geminate median line near the large white spot at the end of the cell. A waved dark submarginal line runs from the outermost of the subapical white spots to the inner margin. It is margined externally

with pale brown and lost in a dark blackish cloud upon the middle of the outer margin. There is a fine black marginal line accentuated externally on the interspaces by narrow pale brown lines. The fringes are dark brown scalloped at the tips of the nervules. The secondaries on the under side are dark fuscous, paler on the costa. There are three parallel incomplete transverse lines at the anal extremity of the inner margin. These lines are margined externally by pale brown, or ochraceous. On the under side, both wings are grayish-fuscous; both have obscure discal spots at the end of the cell. The primaries are crossed by a curved transverse limbal line margined externally by pale gray. There is a pale zigzag submarginal line and a fine evenly crenulate black marginal line marked at the middle of the interspaces by minute white dots. The fringes are as on the upper side, but paler. The secondaries are traversed by an irregularly curved transverse median band very sharply defined and evenly crenulate, a black transverse limbal line, and by an equally sharply defined submarginal white line composed of minute hastate markings located upon the interspaces. On the margin there is a black hastate spot on each of the interspaces, each spot enclosing between the barbs a minute white spot. The fringes are as on the upper side.

♀. The female is considerably larger than the male and more obscurely marked. Expanse, ♂, 35 mm.; ♀, 42 mm.

PANILLA.

PANILLA, Moore.

31. *P. obscurissima*, sp. nov. ♂. Palpi brown. Front grayish. Anterior margin of the collar pale gray; posterior margin darker gray. Upper side of thorax dark gray. Upper side of abdomen fuscous. Lower side of thorax and abdomen pale fuscous. The first pair of legs have the tibiae dark brown. The second and third pair of legs are pale fuscous. The primaries on the upper side

are cinereous with a conspicuous velvety-black triangular spot at the end of the cell. The wings are clouded by dark brown basal, sub-basal, median, and transverse limbal lines, or bands. There is a pale zigzag submarginal line. On the margin at the interspaces there are minute blackish subtriangular spots. The fringes are fuscous, having the cilia at the ends of the nervules slightly paler. The secondaries on the upper side are colored like the primaries and the dark lines and bands of the primaries are produced upon them. There is a dark velvety linear patch of raised scales at the end of the cell. Both wings on the under side are paler than on the upper side, the primaries being darker on the costa and the middle area of the wing. The markings of the upper side reappear upon the under side, but far less diffuse and more sharply defined. Expanse, 25 mm.

32. *P. sex-maculata*, sp. nov. ♂. The palpi, front, and collar are black. The patagia and upper side of the thorax are pale argillaceous. The upper side of the abdomen is pale fuscous. The lower side of the thorax and abdomen is fuscous. The legs are pale gray, or whitish, margined externally with dark brown. The primaries on the upper side are pale argillaceous with three black subtriangular spots on the costa, and a small annulus at the end of the cell. There are a few obscure and very fine linear marks on the outer margin, and on the inner margin before the outer angle there is a very fine dark brown line. The secondaries on the upper side are uniformly pale fuscous. On the lower side, the primaries are very pale fuscous, narrowly edged with ochraceous on the costa above the end of the cell. The secondaries are pale ochraceous clouded with fuscous on the outer margin, with a well defined discal dot at the end of the cell, and an irregularly curved transverse limbal line quite narrow and sharply defined. The margin is marked by a very fine dark marginal line. The fringes are concolorous. Expanse, 22 mm.

33. *P. quadrimaculata*, sp. nov. ♂. The palpi and front are pale reddish; the collar is pale chestnut. The upper side of the thorax and abdomen is fuscous; the lower side of the thorax and abdomen is paler. The legs are concolorous with the anterior margins of the tibiae slightly darker. The primaries on the upper side are uniformly pale argillaceous with two large subtriangular black spots on the costa, one above the middle of the cell, and the other, which is the larger of the two, above the end of the cell, which it partially covers. The secondaries are uniformly pale argillaceous like the primaries. On the under side, both wings are uniformly very pale fuscous with the costa of the primaries very lightly marked near the apex with pale ochraceous. Expanse, 24 mm.

34. *P. octomaculata*, sp. nov. ♂. Palpi, front, and collar dark brown; upper side of thorax and abdomen argillaceous-gray; lower side of thorax and abdomen very pale ochraceous. Legs slightly darker. Upper side of primaries grayish-argillaceous. Costa marked with three small black subtriangular spots, one just at the base, one over the middle of the cell, and one at the end of the cell. A similar conspicuous black spot is located at the end of the cell on the middle of the wing. The costa before the apex is edged by a fine brown line interrupted by three minute white spots. The outer margin is marked by a series of narrow linear brown lines. There is an obscure waved submarginal line bordered outwardly by a paler line and an obscure parallel discal line. The fringes are pale fuscous. The secondaries on the upper side are pale fuscous. On the under side the primaries are dark fuscous with an obscure dark mark at the end of the cell. The outermost of the black spots which appear upon the costa on the upper side, reappears faintly on the lower side as also the whitish subapical dots. The secondaries are very pale ochraceous with a dark lunular discal spot, and are crossed by

obscure curved transverse discal, and transverse submarginal bands of dark fuscous. There is a faint dark marginal line. The fringes are concolorous. Expanse, 35 mm.

35. *P. major*, sp. nov. ♂. Palpi, front, and collar dark brown. Upper side of thorax pale argillaceous. Upper side of abdomen pale fuscous. Lower side of abdomen very pale fuscous. The primaries have the basal half pale lilacine, the outer half pale argillaceous. There is a dark lunulate mark at the end of the cell and three obscure dark spots on the costa, one above the middle of the cell, the other above the end, and the third just before the apex. Below this last spot there is a similar obscure spot. There is a dark ray at the base of the submedian nerve and a very obscure and narrow waved transverse limbal and transverse submarginal line. There is a dark spot on the margin on the middle of each of the interspaces. The fringes are concolorous. The secondaries are uniformly pale fuscous, lighter on the outer margin. On the under side both wings are very pale fuscous, inclining to ochraceous. The secondaries have a minute discal dot and an obscure transverse limbal line. Expanse, 32 mm.

The type was taken at Benita in the month of February.

HYPOGRAMMIDAE.

EUDRAPA, Walk.

36. *E. (?) multiscripta*, sp. nov. ♂. Palpi brown. Front gray. Collar olive-brown. Upper side of thorax like the collar; upper side of the abdomen fuscous; lower side of thorax and abdomen paler, tinged with pinkish. Legs pale ochraceous with the tibiae margined with dark brown. The primaries are obscure brownish-gray with three dark spots on the costa, one beyond the base, margined internally and externally with light grayish lines, which extend downwardly on either side to the

cell. The second spot is located at the end of the cell and is subtriangular with its margin on the side of the apex perpendicular to the costa. Beyond it is a pale gray shade passing into a pale olive-brown shade, which covers the apical third and is interrupted just before the apex by the third dark brown costal spot, which is accentuated on the costa by two minute whitish spots. There is a dark brown shade on the outer third of the wing covering the region of the median nervules. The wing is traversed by obscure and interrupted transverse marginal, and transverse submarginal dark lines, between which on the nervules there is a series of minute chalky-white spots. The margin is marked by minute dark hastate spots upon the interspaces. The fringes are pale olive-brown. The secondaries are dark fuscous, paler on the costa and the inner margin. The fringes are lighter. On the under side the wings are fuscous with the costa and the outer margin tinged with pinkish. There is an obscure discal spot in the primaries and a very distinct sharply defined oval discal mark on the secondaries pupiled with paler gray. Both wings are traversed by obscure zigzag transverse limbal and submarginal lines, which are most sharply defined on the secondaries. The fringes on the under side are pinkish. Expanse, 53 mm.

The type was taken at Benita. I refer the species with a little doubt to the genus *Eudrapa*, though comparison with *Eudrapa mollis*, Walk., indicates very close relationship. Without more material, the reference must remain doubtful.

CATEPHIIDAE.

ARCTE, Koll.

(*Cocytodes*, Guen.)

37. *A. Maurus*, sp. nov. ♂. Front, collar, and upper side of thorax obscure brown. Upper side of abdomen dark fuscous. Lower side of thorax paler. Lower side of abdomen darker fuscous. Legs concolorous,

THE NEMASTOMATIDAE AND TROGULIDAE OF THE UNITED STATES.—II.

BY NATHAN BANKS, SEA CLIFF, N. Y.

NEMASTOMATIDAE.

The Nemastomatidae are readily divided into two well marked sub-families, which, according to some authors, should rank as families. They are separated as follows:—

- Mandibles longer than the body.
Ischyropsalinae.
- Mandibles shorter than the body.
Nemastominae.

One species of *Ischyropsalinae* has been described from the United States by Simon as a new genus, *Taracus packardi*. Another species appears to belong to the same genus or very near it.

- Body smooth *T. packardi.*
 - Body spiny *T. spinosa.*
- Taracus packardi* Simon. Colorado.

Taracus spinosa n. sp. Length, 2.1 mm.; width, 1.3 mm.; femur II, 2.2 mm. Color pale yellowish, the claws of the mandibles reddish brown. Cephalothorax smooth; eye tubercle smooth, with two projections on each anterior side, each projection with a stiff bristle at tip; a short distance behind the eye tubercle is a strong and prominent median spine, at each side of which there is an oblique row of tubercles, with bristles at their tips. The entire dorsum, venter and coxae are closely covered with projections, each with a stiff black hair at the tip, those on the dorsum are curved. The legs, mandibles and palpi, except the terminal joints,

are also covered with these bristles, which, however, are not situated on tubercles, except some on the mandibles. Palpi a little longer than the mandibles; fifth joint not one-half so long as the fourth, both with many short hairs. Fourth pair of legs wanting, second pair longest. It differs somewhat from the characters of the genus *Taracus*, in that the eye tubercle is not longer than wide.

California.

Of the *Nemastominae* we have two genera.

- Fourth joint of palpi much thickened.
Phlegmacera.
- Fourth joint of palpi scarcely thickened.
Nemastoma.

Phlegmacera Packard, must certainly be a *Nemastomid* and not a *Phalangid* as claimed by Packard [Cave memoir]; no claw is mentioned or figured at the tip of the palpi, and the last joint is shorter than the penultimate. Two species are known to me which may be distinguished thus:—

- A pair of prominent erect spines on the anterior part of the abdomen. *P. occidentalis.*
- No such spines. . . . *P. cavicoleus.*

Phlegmacera occidentalis, n. sp. Length, 2.4 mm. Color pale, with a large brown spot on the cephalothorax, the eye tubercle black; there is also a larger brown spot on the front part of the abdominal dorsum, widest behind, and within which are four median pale spots; tip of abdomen brown; venter

pale, sutures margined with brown; coxæ pale, with brownish bristles, palpi grayish with the tips of the second and third joints brownish; legs brownish, the trochanters pale, base and a ring near tip of femora, tips of the patellæ and tibiæ whitish, also a few white spots on the tarsi and metatarsi. The basal joint of the mandibles of the male is much prolonged above, the tip curving forward and bearing short black hairs. The eye tubercle is more prominent than in *P. cavicoleus*. The basal segment of the abdomen bears a row of spines, the median pair being much the largest; the next four segments have each a pair of humps crowned with stiff hairs. Third joint of palpi about equal to the fourth, the last joint more swollen than in *P. cavicoleus*. The palpi, as a whole, shorter than in that species.

Washington State (Trevor Kincaid).

Phlegmacera cavicoleus Pack. (*Sabacon spinosus* Weed, Amer. nat. June, 1893).

Described from Bat Cave, Kentucky (Packard) and New Hampshire (Weed). I have collected at Ithaca, N. Y., under rotten logs in a deep gorge, what I take to be the same species. The female agrees with Packard's description and figure; the male has the fourth joint of the palpi less enlarged than in the female, the basal joint of the mandibles is prolonged upward in a horn, and there are stiff bristles on the abdominal ridges.

Nemastoma crassipalpis Koch (Arachniden aus Sibirien und Novaja Semlja) belongs to this genus.

Of *Nemastoma* there are three species.

Fourth joint of palpi less than twice as long as the fifth. *N. inops*.

Fourth joint of palpi twice as long as the fifth.

Dorsum with some spines. *N. modesta*.

Dorsum without spines. *N. troglodytes*.

Nemastoma inops Pack. Bat Cave, Kentucky.

Nemastoma troglodytes Pack. Clinton's Cave, Utah.

Nemastoma modesta n. sp. Length, 1.2 mm.; gravid female, 2 mm. The color of the dorsum is dark red-brown; the femora, patellæ, and tibiæ of the legs brownish, the other parts of appendages yellowish. The dorsum is granulated; the eye tubercle quite wide, and the eyes look upward; from each side of the hind margin of the eye tubercle there extends toward the posterior angles of the dorsal shield a curved row of peculiar tubercles, which have their summits enlarged, lengthened and flattened; at about the region where the cephalothorax and abdomen are united there is a curved transverse row of these tubercles, connecting the two longitudinal rows; this connecting row has, behind, two short branch rows of a few tubercles; behind these short rows are two diverging rows of four curved spines. The abdominal segments behind the dorsal shield are usually crowded together, but in the gravid female they are widely separated with a snow-white connecting membrane. The hard parts of the venter are red-brown, the stigmata black, all granulated and furnished with bristles. The trochanters are yellow, somewhat globular and with bristles; the other joints of the legs have fine hairs and a few bristles. The femora are small at base, gradually enlarging toward the tip; patellæ same; tibiæ more equal, the metatarsi with parallel sides. Second pair of legs longest. First joint of the palpi is small at base and larger near the tip, the second much longer, the third a little longer than the second, the fourth a little shorter than the third, the fifth about one-third the length of the fourth; all with bristles, most numerous on joints four and five.

California and Washington State (Trevor Kincaid). Evidently not uncommon.

WING-LENGTH IN SOME NEW ENGLAND ACRIDIDAE.—II.

BY ALBERT P. MORSE, WELLESLEY, MASS.

Turning to another subfamily, the Acridinae, we find a genus—*Melanoplus*—in which the wing-length is perhaps as good a character as exists for separating the females of certain New England species; *c. g.*, *M. collinus* from *M. femur-rubrum*, *M. rectus** from *M. minor*.

Yet here, on the other hand, we meet a species, *M. junius* Dodge, presenting great variation in this particular. Some of the females possess wings and tegmina extending but two-thirds down the femora: others show them passing the end of the femur by nearly a fourth of its length. In the males they are somewhat less variable, and longer proportionally. It is to be noted, in connection with the brevity of wings in many specimens, that this species is of a sluggish disposition and progresses largely by leaping.

It is also interesting to observe, in the cases of two abortive-winged species of this subfamily—*Melanoplus rectus*

(= *Pez. borealis*) and *Pezotettix manca*—how the lack of available flight-organs is compensated by the alertness of the insects, an extremely swift movement of the hand being necessary to effect their capture.

Sharply marked off from the other members of the family by characters of much interest here are the little "grouse locusts"—Tettiginae. In these the wing-covers are reduced to minute proportions, while the dorsal part of the pronotum has been correspondingly developed to supply their place as a covering and protection for the delicate wings. The efficiency of the wings as flight organs in those forms in which they are fully developed is unimpaired by the brevity of the tegmina for the reason that the costal border of the wings has become considerably chitinized; when closed this portion also affords some protection on the sides below the pronotal process.

Here, then, is an opportunity to observe if in the case of variation in length of wings there be a corresponding variation not in length of wing-covers, which are here functionless as such, but in the length of that structure which serves the purpose of tegmina—the dorsal part of the pronotum.

Among the eight forms occurring in New England there are three cases in which two are separated merely on this

* From an examination of the limited material (consisting mainly of the types) in the collections of Mr. Scudder and the Museum of Comparative Zoology and the comparison with these of a relatively large series of specimens taken in Mass., together with a few from Speckled Mt., Me., I see no reason to think that *Melanoplus rectus* Scudd. is other than *Pezotettix borealis* Scudd. I use the latter name here for convenience. Mr. Scudder has himself stated the probability that *P. borealis* is *P. septentrionalis* Sauss. I would suggest in this connection that *Melanoplus curtus* Scudd., from 5000 ft. elevation, Colorado, is likely to prove the same species as *M. rectus*.

character of length of pronotum and wings.

Take first the species called *Batrachidea cristata*: here the wings are so small as to be quite functionless and the pronotum merely covers the body, often failing to reach the tip of femora. Compare with it the form described as *B. carinata*: in this the wings are large and amply sufficient for flight and the pronotum correspondingly developed posteriorly to afford them protection when closed. Owing to the high median carina on the anterior portion this backward prolongation of the tip of the pronotum gives an apparently turned-up appearance to its profile. *B. carinata* is found associated with *B. cristata* but is quite rare—but one or two specimens occurring in the hundred, and I have no doubt that this is but another case of reversion and should be so ranked.

Compare the two forms known as *Tettigidea polymorpha* and *T. lateralis*: the one has small wings and abbreviated pronotum, the other large wings and pronotum of ordinary length, noticeably passing the femora. These forms are about equally common and are usually found associated.*

Compare the forms known as *Tettix ornatus* Say and *T. triangularis*

Scudd. Here again, the only apparent difference is in the extent of pronotum and length of wings, structures which in this subfamily are undoubtedly interdependent, as is shown by individuals of other species of this genus, while the characters presented by the vertex and eyes, which offer a safe and ready means of separating these forms from the other New England species, are the same. In view of these facts I believe them to be forms of one species. These, also, are nearly always found associated, the short-winged form being somewhat less common.

While I have not had opportunity to study critically so large a series of specimens as is desirable I feel reasonably certain that the number of species of Tettiginae found in New England should be reduced to five, as follows:

1. *Tettix granulatus* Kirby.
2. *Tettix ornatus* Say and *T. triangularis* Scudd.
3. *Tettix cucullatus* Burm.
4. *Batrachidea cristata* Harris and *B. carinata* Scudd.
5. *Tettigidea lateralis* Say and *T. polymorpha* Burm.

Variation in wing-length seems to be less proportionally in *T. cucullatus* and *T. granulatus* than in *T. ornatus* though it may be very noticeable in specimens of *granulatus* even from the same locality. Such seems to be the case, also, in regard to its constancy in certain species of *Melanoplus* found in New England, as noted above.

While the fact of association of the two forms in the several cases mentioned is no evidence of their identity, it does

* Since the above was written Mr. W. S. Blatchley of Terre Haute, Ind., has informed me by letter that he has taken many pairs of the two forms of *Tettigidea* in copulation and has never seen *lateralis* crossed with *polymorpha*, and in consequence considers them distinct species. It is perhaps best to retain them as such, temporarily, at least. There is a good opportunity here for some thorough, painstaking person to conduct scientific breeding experiments with these interesting little locusts and thereby to add materially to our knowledge of the relationship of the different forms.

not contradict this view of their relation as would the fact of non-association.

In summing up the evidence which I have cited it would seem that: (1) Variations in length of wings are correlated with corresponding variations in length of tegmina or *analogous structures*. (2) In one species of a genus these parts may be quite constant in their proportions to other parts of the body, and in another may vary greatly. (3) Consequently, a difference in length of wing or interdependent structure unaccompanied by a difference in structure of other parts of the body is but more or less doubtful evidence of specific distinctness.

Large series of specimens from a wide range of country are not only desirable but necessary in order to arrive at a correct understanding of the relation of closely allied forms. Personally, I have found that wide acquaintance in the field with the various forms has been of great service.

PROCEEDINGS OF THE CLUB.

13 Oct., 1893. The 180th meeting was held at 156 Brattle St., Mr. S. Henshaw in the chair. Mr. A. P. Morse was chosen Secretary pro tem.

Mr. Lewis E. Hood of Somerville was elected to active membership.

Mr. S. H. Scudder showed some larvae of a Crambid from Plymouth Co., Mass., which injures cranberry vines by girdling the runners and rootlets. He also discussed the identity of some unknown "book-worms" which had caused damage in a library, suggesting the possibility of termites and Lepismidae. Mr. Henshaw suggested that some Ptinid or Tomicus might be concerned.

Mr. A. P. Morse showed a larva of *Lima-codes scapha* found on beech, its color and angular form suggesting the possibility of protective resemblance to a green beech-fruit. He also read a short paper entitled "Notes on the Orthoptera of Penikese and Cuttyhunk Islands."

Messrs. Scudder and Morse expressed the opinion that *Melanoplus punctulatus* Uhler, *Mel. griseus* Thomas, and *Mel. helluo* Scudd. would probably prove to be one species.

Just Published, by Henry Holt & Co., New York.

Scudder's Brief Guide to the Commoner Butterflies.

By SAMUEL H. SCUDDER. xi + 206 pp. 12mo. \$1.25.

An introduction, for the young student, to the names and something of the relationship and lives of our commoner butterflies. The author has selected for treatment the butterflies, less than one hundred in number, which would be almost surely met with by an industrious collector in a course of a year's or two year's work in our Northern States east of the Great Plains, and in Canada. While all the apparatus necessary to identify these butterflies, in their earlier as well as perfect stage, is supplied, it is far from the author's purpose to treat them as if they were so many mere postage-stamps to be classified and arranged in a cabinet. He has accordingly added to the descriptions of the different species, their most obvious stages, some of the curious facts concerning their periodicity and their habits of life.

Scudder's The Life of a Butterfly.

A Chapter in Natural History for the General Reader.

By SAMUEL H. SCUDDER. 186 pp. 16mo. \$1.00.

In this book the author has tried to present in untechnical language the story of the life of one of our most conspicuous American butterflies. At the same time, by introducing into the account of its anatomy, development, distribution, enemies, and seasonal changes some comparisons with the more or less dissimilar structure and life of other butterflies, and particularly of our native forms, he has endeavored to give, in some fashion and in brief space, a general account of the lives of the whole tribe. By using a single butterfly as a special text, one may discourse at pleasure of many; and in the limited field which our native butterflies cover, this method has a certain advantage from its simplicity and directness.

THE SEVENTH VOLUME OF PSYCHE

Begins in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume, but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

Vols. 1-6, Complete, Unbound, - - Now sold for \$29.00.

Vols. 1-6, and Subscription to Volume 7, - - \$33.00.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

Vol. 1. Introduction; Nymphalidae.

Vol. 2. Remaining Families of Butterflies.

Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo. half levant, \$75.00 net.

HOUGHTON, MIFFLIN & CO.,

4 Park St., Boston, Mass.

A. SMITH & SONS, 121 NASSAU STREET, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.



JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

DULAU & CO., FOREIGN BOOKSELLERS,

37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues. Paris 23-30.

PAPILIO BUDDHA.

Finest specimen, each five shillings or 10 for £ 2.

T. KRAPP.

Missionary Bethel, near Bielefeld, Germany.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 216.

APRIL, 1894.

CONTENTS:

THE HABITS OF THE ACULEATE HYMENOPTERA.—III.— <i>William H. Ashmead.</i>	59
NEW AND UNDESCRIBED GENERA AND SPECIES OF WEST AFRICAN NOCTUIDAE	
III.— <i>W. F. Holland.</i>	67
EARLY STAGES OF <i>SPILOSOMA LATIPENNIS</i> .— <i>Caroline G. Soule.</i>	71

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS 20c.

[Entered as second class mail matter.]

70573

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE,

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, Danaia archippus. Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichnology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate .50	
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, Retinia frustrana. col. pl. Boston, 1883. .25	
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

TACHINIDAE WANTED.

Named or unnamed Tachinidae in exchange, or by purchase, from any part of North America including Mexico, Central America and the West Indies. Will not promise to name or return specimens sent.

C. H. TYLER TOWNSEND,
Kingston, Jamaica.

PSYCHE.

THE HABITS OF THE ACULEATE HYMENOPTERA.—III.

BY WILLIAM H. ASHMEAD, WASHINGTON, D. C.

Family V. MELLINIDÆ. This family (if we can call it a family) is represented in our fauna by one genus with three species, and as these are exceedingly rare, no observations on any of them have been made. Westwood, however, has observed the European *Mellinus arvensis* burrowing in sand-banks, and Shuckard states the species preys upon Diptera. Kirby and Spence also say it selects the smaller flies, including the troublesome *Stomoxys calcitrans*.

Family VI. MIMESIDÆ. In this family we have 17 described species, distributed in two genera; the habits of none of them seem to be known.

According to Shuckard, the species belonging to the genus *Psen* Latr. nidificate in sand; whereas, those of *Mimesa* Shuck., according to Westwood, appear to be wood-burrowers and provision their cells with the larvae of different species of Homopterous insects.

Family VII. PHILANTHIDÆ. This family is well represented in our fauna, by no less than seventy-five species, distributed in four genera.

Westwood, whom I have drawn upon for many of the facts recorded in this paper, states that the species belonging to the genus *Cerceris* Latr. show considerable diversity in habits. The economy of *Cerceris ornata*, according

to Walckenaer, forms its nest in foot paths, and other situations exposed to the sun, to the depth of five inches, but in a tortuous direction, provisioning them with different species of Halictus, four being requisite for the food supply of one larva.

In the Trans. ent. soc. Lond. i, p. 203, Westwood gives an interesting account of the habits of *Cerceris arenarius* Linn. which forms a burrow in the sand and provisions it with a species of Cuculionid (*Strophosomus*) which it carries in flight by means of its four fore legs, its hind legs being extended. Other short-snouted weevils are also employed, such as *Pachygaster picipes*, *rancuss*, etc. According to Latreille, *Cerceris aurita* employs *Lixus ascanii* and other weevils. Westwood also mentions a cocoon of one of these species covered with débris of a multitude of a species of Chrysis, which he considered had probably served for food of the larva of one of these insects; while Packard, in his Guide, states that "Dufour unearthed in a single field thirty nests of *C. bupresticida* which were filled with ten species of Buprestis, comprising four hundred individuals, and none of any other genus; also that *C. tuberculata* provisions its nest with *Leucosomus ophthalmicus*, and *C. tricincta* with Clythra."

I can find nothing published on any American species; but Mr. H. G. Hubbard tells me that while a student at the Cambridge museum, some years ago, he observed a species provisioning its cells with the acorn weevil *Balaninus nasicus* Say; that specimens were given to Dr. Hagen and will be found in the Museum collection. From Mr. Hubbard's verbal description I think this insect may be *Cerceris venator* Cr.

Cerceris fumipennis Say provisions its cells with *Chrysobothris deutipes*, according to observations made by Mr. Hubbard.

The genus *Philanthus* Fabr. preys upon bees. Latreille who first discovered the habits of a species in this genus (Hist. nat. fourmis, p. 307) found that *Philanthus triangulum* Fabr. dug burrows in hot sandy situations and provisions its nest with honey-bees; a single bee being sufficient food supply for rearing a single wasp. The genus is poorly represented in Europe; but in this country we have many described species. Although so well represented, not a single note seems to have been published concerning the habits of any species.

In the south I have observed *Philanthus punctatus* Say preying upon *Halictus disparalis* Cr. and other small Halicti.

Family VIII. NYSSONIDAE. Although this family is represented in our fauna by 8 genera and 56 species, not a word has been published concerning the habits of a single species.

The genus *Gorytes* Latr. seems to confine its attacks to Homopterous insects belonging to the family Cercepedidae. Westwood says:—

In June, 1837, I observed the female of *Gorytes mystaceus* engaged in protruding her legs and sting into a patch of the frothy secretion caused by the larva of *Aphrophora spumaria*, without, however, being able to dislodge the occupant. Subsequently I saw it similarly occupied with a drop of water, evidently mistaken for the froth, but unsuccessfully; but I shortly afterwards observed it with a larva of this insect, which it carried beneath its body by the help of its middle legs. Mr. Shuckard has also captured it, as well as his *G. Fargeii* (= *G. campestris* St. Farg.?) with a similar prey.

The genus *Nysson* Latr. is said to nest in sand, but its prey has not been observed.

Family IX. BEMBECIDAE. This family comprises some of the largest and most showy of our fossorial wasps, no less than twenty-four species, distributed in nine genera, being known to occur in the United States.

The genus *Sphecius* Dahlb. comprise the giants of the family, which as a boy, were known to me under the name of Queen Hornets, and I really believed them to be Queens of the yellow-jackets. Although it has been known for years that our largest species, *Sphecius speciosus* Drury, formed its burrows in the ground and provisioned them with Cicadas, storing them with *Cicada dorsata*, *C. tibicens* and *C. marginata*, it was not until last year, in the publication of Dr. C. V. Riley's admirable article entitled "The larger digger-wasp" in *Insect life*, vol. iv, p.

248, that we had any information in detail of its habits, burrow, and development.

Dr. Riley is justly noted for the thoroughness of all of his entomological work, but in this paper, we have a model of just how the biology of our bees and wasps should be worked out; and I hope others will imitate it in working up the habits and development of other of our bees and wasps.

In this article Dr. Riley has given very thoroughly the entire life history of this interesting wasp, illustrating the same with most beautiful figures, the wasp with its prey, a diagram of its burrows, the position of egg attached to the Cicada, the larva, pupa, larva forming its cocoon, and the cocoon itself. I do not quote from it, as it is readily accessible and should be read by all to be thoroughly appreciated.

The habits of no other of our Bembecids seem to have been worked out in detail. In Florida I have observed *Monedula carolina* preying upon the large horse-fly *Tabanus atratus*, so troublesome to horses and cattle in the South. A singular peculiarity of this insect is its ability to fly backwards in front of a moving horse while watching the opportunity to suddenly bounce upon and seize one of these flies.

Mr. D. W. Coquillett tells me that while in California he has frequently observed *Bembex fasciata* Fabr. storing its nests with *Eristalis tenax*, while *Bembex obsoleta* Say employs flies belonging to the genera *Musca*, *Lucilia*, *Sarcophaga* and *Psilocephala*.

Here it will be well to quote from John Bartram's paper "On the yellow wasp of Pennsylvania" published in 1763 (Phil. trans., vol. 53 (1763), pp. 37-39), as I believe he has reference to a Bembecid. He says:—

I saw several of these wasps flying about a heap of sandy loam: they settled on it and very nibly scratched away the sand with their fore feet, to find their nests whilst they held a large fly under their wings with one of feet; they crept with it into the hole that lead to the nest and staid there about three minutes, when they came out. With their hind feet, they threw the sand so dexterously over the hole, as not to be discovered; then taking flight, soon returned with more flies, settled down, uncovered the hole, and entered with their prey.

This extraordinary operation raised my curiosity to try and find the entrance, but the sand fell in so fast that I was prevented, until by repeated essays I was so lucky as to find one. It was six inches in the ground, and at the farther end lay a large magot, nearly an inch long, thick as a small goose-quill, with several flies near it, and the remains of many more. These flies are provided for the magot to feed on before it changes into the nymph state: then it eats no more until it attains to a perfect wasp.

It will be seen on reading the account of the habits of the European *B. rostrata* that this statement of John Bartram's, made one hundred and twenty-eight years ago, is now confirmed.

The European *Bembex rostrata* has been very thoroughly worked out by Mr. C. Wesenberg, in a paper in the Danish language, entitled "Bembex rostrata: its life and instincts," published in the

Copenhagen Entomologiske meddelelser, vol. 3, 1891.

As a familiarity with the Danish language is not one of my accomplishments, I am indebted to Mr. Martin Linell for a translation of some of the more important portions; and as Mr. Wesenberg has discovered many new and important facts in regard to the life history of this species, in many respects totally at variance with the habits of all other fossorial wasps whose habits have been investigated, I feel sure a *resumé* of them here will be appreciated by my readers.

It makes its cell two or three inches deep in solid sand covering it up with loose sand and generally also with a little flat stone to prevent parasites from gaining access to the larva. The cell measures one cubic inch, the entrance tunnel being one and a half centimeters long and arcuate. A cell contains four or five fresh flies (*Lucilla*, *Eristalis*, etc.) and torn off wings, sucked out thoraces, etc., and in the middle of these a big flat larva.

All other digger-wasps furnish the food for their young once for all, either first laying their egg, then putting in food, or first filling up the cell with food, then laying their egg on it, and covering the whole without again visiting their cell or seeing their larva. Such, however, is not the case with *Bembex rostrata*, for just as soon as the larva has hatched, the female makes visits to it several times a day bringing each time a fresh fly for its larva.

Bembex, according to Wesenberg, lacks the power of paralyzing its prey and all the flies are dead and show deep marks on the thorax just above the tegulae, made by strong jaws of the wasp.

In two cases, he found the eggs laid on a single fly *Pollenia*. When the larva is hatched the mother brings more and more

flies, the flies brought being larger and larger as the larva grows. With a larva not quite grown he found 4 *Eristalis*, 6 *Syrphus*, 2 *Musca*, and 3 *Anthomyia* flies.

The fully grown larva was of a greyish white color $2\frac{1}{2}$ centimeters long, with the segments behind the head gradually expanded to the last segment.

Fabre took a young larva, fed it on flies, and before pupating it had devoured 82 flies.

He also says that 50 *Bembecids* will nest on a spot as big as a room, during a period of three months, the period for the development of each larva being two weeks. This will allow only five or six young ones for the season. But does each female have more than one nest? If so, how can it remember them? Mr. Wesenberg then tells how the larva forms its cocoon, quoting from Fabre, and follows with some remarks about the circle of small holes about the middle overlooked by Fabre.

As Dr. Riley has called special attention to similar holes in the cocoon made by *Sphecus speciosus* without satisfactorily explaining the reason for them, I give below what Wesenberg says about the formation of the cocoon and the reason for the existence of these holes.

The larva spins its cocoon thus: It first pushes all the remnants of food into a corner of its cell, spins fine white silk threads to all the walls, makes a net of pure silk supported by these threads, closed and tapering at one end but kept open at the other end by threads to the walls of the cell. Then the larva protrudes its head and scrapes sand from the wall; when it has a lump large enough it brings it by the mouth into its net and distributes the sand-grains uniformly over the inside with silk as cement. The outer side is then prepared with still greater care. Sand-grain after sand-grain is carried out and glued on, until the white silk cocoon is transformed into a dark brown sand cocoon. The sand lump is now used up, but still the cocoon is lacking a cover. A new lump of sand is now scraped together, taken inside

and the larva spins the cover of fine silk, dresses it with sand and then spins over the whole inside of its cocoon with a layer of fine silk so as not to scratch its fine thin skin. A circle indicates where the cover is fastened on. The cover loosens at this circle when the *Bembex* is ready to crawl out. This cocoon is water-tight. The larva changes skin after closing up its cocoon, becomes smaller and smaller and turns yellow, the head bends down under the thorax and it then hibernates.

Fabre has overlooked that the cocoon has about its middle a circle of 8 or 10 small holes and correspondingly on the inside as many small silk pads as covers. Underneath these pads are fine pits with elegantly polished sides, the bottom of these pits being perforated by a very minute hole that from the outside looks like a black puncture. Directly under the bottom is the dark brown sand cocoon.

What role have these communications played during the larval state?

Mr. Wesenberg's explanation is that when the larva has closed its cell it goes into a pseudo-pupa stage, and that within its body there still remains some particles of undigested food, which require air and oxygen for digestion, and that these holes are made purposely by the larva for admitting air, and just before the final pupal stage it closes them up, before spinning the silken pupal covering.

Family X. LARRIDAE. This is another family of digger-wasps, but with the species much more numerous although not so showy or highly colored as those in the preceding family. Several genera and between 60 and 70 species are known in our fauna.

The genus *Tachytes* Panzer comprise most of the luger forms. The

European *Tachytes pompiliformis* Pz., according to Shuckard, provisions its cells with small Lepidopterous larvae which is contrary to what has been observed of the species in America.

Mr. Wm. H. Patton, in Ent. news, vol. 3, p. 90, states that *Tachytes mandibularis* Ptn. is common at Hartford, Ct., "forming hillocks three or four inches in height and the same in breadth of base, upon the sidewalks and lawns about September first. It stores up *Xiphidium* for its brood."

Mr. D. W. Coquillett tells me in California he has observed *Tachytes rufofasciatus* Cr. storing its cells with young grasshoppers *Melanoplus cyanipes*; while *Tachytes harpax* preys upon *Xiphidium brevipenne*.

Dr. Riley, in Rep. U. S. ent. comm., vol. i, p. 317, states that *Larra (Larroda) semirufa* Cr. is reported to capture young *Melanoplus spretus*; while according to his ms. notes *Larra terminata* preys upon *Chortophaga viridifasciata*.

In the south, I have seen *Larra argentata* provision its cells with a small immature cricket, which it completely paralyzes before storing away in its clay cell. From a single cell, I have taken as many as six of the small crickets.

Mr. Patton (l. c. supra) says that *Lyroda subita* Say "is peculiar for its non-fossorial tarsi; and its method of carrying *Nemobius*, which it catches to feed its young is interesting. It holds the cricket by clasping the base of the antennae between its mandibles

and clypeus, the minute teeth here preventing the antennae from slipping—this explains the use of the teeth on clypeus.”

The species in the genus *Astata* Latr. prey upon Homopterous insects belonging to the Pentatomidae. The European *Astata boops* Schr. preys upon the nymphs of *Picromerus bidens* Linn., *Palomena viridissima* Poda and *P. dissimilis* Fabr., while in California Mr. D. W. Coquillett has taken *Astata nubecula* Cr. in October, preying upon *Thyanta rugulosa* Say and storing them in a burrow formed in a limestone formation.

Family XI. AMPULICIDAE. In this small family only a single species, *Rhinopsis canaliculata* Say, is found in the United States. It is exceedingly rare and nothing is known of its habits, but it has probably similar habits to its oriental cousin *Ampulex compressum* Fabr., which preys upon cockroaches.

Family XII. SPHECIDAE. The species, in this family, vary greatly in size and habits. It is represented in our fauna by about 80 species distributed in 9 genera, and some curious mistakes have been made about them both as regards the unity of habits in the species and their mode of living.

The genus *Sphex* Linn. preys upon young Acridiidae and Locustidae. Dr. Packard has observed *Sphex ichneumonea* L. in Massachusetts in the last week of July and during August and early in September, digging their holes in a gravelly walk.

The holes were four to six inches deep. In beginning its hole the wasp dragged away with its teeth a stone one half as large as itself to a distance of eight inches from the hole, while it pushed away others with its head. In beginning its burrow it used its large and powerful jaws almost entirely, digging to the depth of an inch in five minutes, completing its hole in about half an hour. After having inserted its head into the hole, where it loosened the earth with its jaws and fore legs, it would retreat backwards and push the dirt still farther back from the mouth of the cell with its hind legs. Just as soon as it reached the required depth the wasp flew a few feet to the adjoining bark and falling upon an *Orchelimum vulgare* or *O. gracile* stung and paralyzed it instantly, bore it to its nest and was out of sight in a moment, and while in the bottom of its hole must have deposited its egg in its victim. Reappearing it began to draw the sand back into the hole scratching it in quite briskly by means of its spiny fore tarsi, while standing on its two hind pairs of legs. It thus threw in half an inch of dirt upon the grasshopper and then flew off.

This is probably the case with all the species in this genus, only I think they must provision their nests with more than one locust.

Mr. J. Angus, according to Dr. Packard, has reared *Isodontia tibialis* St. Fargeau from a cavity previously tunnelled by *Xylocopa virginica*. This shows the species of this genus have different habits from *Sphex*, and is still further supported by an observation of Mr. D. W. Coquillett's, who tells me *Isodontia elegans* Pattn. in California preys upon *Oecanthus niveus* DeGeer.

The genera *Chlorion* Latr. and *Chalybion* Dahlb. are very closely allied in structure and color. Dr. Riley, in the Rep. U. S. ent. comm., vol. i, p. 328, says: "A steel-blue species, *Chlorion coeruleum*, though ordinarily using spiders, also employs locusts." This species, as far as my observations in Florida go, instead of "ordinarily using spiders" to provision its nest, invariably uses crickets, *Gryllus* and allies. This is also supported by Mr. Coquillett's observations on it in the West, who tells me he has taken it preying upon *Gryllus luctuosus*; also by Mr. Wm. H. Edwards's statement quoted by Riley (l. c. supra, p. 319), who took it in Coalburgh, W. Va., running about with a "hopper."

We have here, therefore, a case of mistaken identity, as it is *Chalybion coeruleum* Linn. and not the above species that preys upon spiders. Another curious error about this species has also crept into our literature, and is repeated again and again by our most prominent entomologists, which is that this also sometimes stores its cells with Lepidopterous larvae. This error probably occurred by some one finding in some of its cells Lepidopterous larvae, and without taking time to thoroughly investigate the matter, jumped to the conclusion they were placed there by the *Chalybion*, when in reality they were placed there by quite a different insect—an Odynerid or Eumenid.

There can be no doubt of this as I have in three cases succeeded in rearing the Odynerid.

Pelopæus cementarius Drury, widely distributed all over North America, with three or four distinct varieties, and known as the "Mud-dauber" also preys only upon spiders. In another paper I hope to give a full account of its life history and parasites.

The genus *Ammophila* Latr. preys upon Lepidopterous larvae, or at least all true *Ammophilæ*. In our fauna, I think we have two distinct genera confused.

Ammophila sabulosa Linn. of Europe, according to Latreille, provisions its cells with caterpillars and this agrees with the habits of the North American *Ammophilæ*. Westwood, however, states that Shuckard observed this same species "dragging a very large inflated spider up the nearly perpendicular side of a sand-bank at least 20 feet high and whilst burrowing makes a loud whirring buzz." Shuckard here evidently mistook a species of *Psammophila* for this insect, which at a distance very closely resembles one of these insects.

Walsh discovered his *Ammophila pictipennis* in southern Illinois provisioning its nests with cut-worms and I have seen it doing the same thing in the South. In the Proc. ent. soc. Wash., vol. ii, 1891, p. 256, Mr. Theo. Pergande has published at length some interesting observations of his made on *Ammophila gryphus* Smith, which preys upon the larva of *Heterocampa subalbicans*; while in Ent. news, vol. iii, p. 85, Dr. S. W. Williston has published similar observations on a

species found in Kansas and other western states—*Ammophila yarrowi* Cr.

A single caterpillar usually suffices for the food supply of a single wasp-larva but this species brought caterpillar after caterpillar “till four or five of them have been stored up for the sustenance of her future offspring.” Dr. Williston says:—

The things that struck us as most remarkable was the most unerring judgment in the selection of a pebble of precisely the right size to fit the entrance and the use of the small pebble in smoothing down and packing the soil over the opening, together with the instinct that taught them to remove every evidence that the earth had been disturbed.

In Florida I have seen *Ammophila cementaria* Smith preying upon a half grown Sphinx larva, which after paralyzing it seized by its large jaws just back of the head; and as the larva was too heavy for it to fly with, it straddled it and then dragged it off to its cell, moving forwards.

Family XIII. POMPILIDÆ. This family is well represented in our fauna by 10 genera and 127 described species, the majority of which seem to prey entirely upon spiders.

In the American naturalist for 1887, Dr. G. Lincecum has given us a most interesting account of probably our largest species, *Pepsis formosus* Say, known in the South as “The tarantula killer.” It preys upon *Mygale hentzii* Girard and Dr. Lincecum, in speaking of the effects of the sting upon the spider, says:—

The effect of the introduction of its venom is as sudden as the snap of the electric spark. The wasp then drags it, going backwards, to some suitable place, excavates a hole five inches deep in the earth, places its great spider in it, deposits an egg under one of its legs, near the body, and then covers the hole very securely.

Just as is found to be the case among the true bees, some of the genera being parasitic or inquilinous on those of some of the others, so in this family we have at least one that is parasitic—the genus *Ceropales* Latreille, which lives in the cells of the others. St. Fargeau, as quoted by Westwood, seems to have been the first to observe this curious habit, “having often observed the females of this genus enter backwards into the nests of some of the real fossorial species, which he considered a certain proof that their object was to deposit their own eggs therein.”

This parasitism has been confirmed in America by Walsh and Riley, who have bred *Ceropales rufiventris* from the cells of *Agenia bombycina* Cr. and other Ageniæ.

The genus *Agenia* Schiödt also preys upon spiders. Walsh and Riley in Amer. ent., vol. i, p. 131 have figured and described the thimble-shaped cells of four of our species—*Agenia bombycina* Cr., *A. corticalis* Walsh, *A. architecta* Say and *A. mellipes* Say—built under old bark of standing trees or under logs and stones.

From these cells, besides the *Ceropales* already mentioned, Walsh bred a Chalcid-fly *Pteromalus* sp. and *Ospry-nochotus junceus* Cr.

(Continued from page 50.)

the tarsi ringed with pale gray. The primaries on the upper side are dark brown with the inner margin and the apical area paler. There is a round black spot in the middle of the cell, and a large reniform spot at the end of the cell margined with black, the black margin in some specimens being partially replaced with whitish. There is a black basal spot. The wing is traversed by irregular deep black basal, sub-basal, and geminate limbal lines. The outer margin is marked with black subtriangular spots on the interspaces. There is an obscure pale submarginal line interrupted about the middle of the outer margin by a dark brown shade. The entire wing is sprinkled with purplish-blue scales. The secondaries on the upper side are uniformly dark fuscous. Both wings on the under side are fuscous, shining. The margin of the primaries is uniformly marked with pale ochraceous in some specimens. The inner margin is paler. Both wings have an obscure discal spot at the end of the cell. Both are crossed by an obscure blackish median band followed by a still more obscure submarginal band. The fringes on the under side are paler and lightly checkered with obscure ochraceous.

♀. The female is marked very much as the male, but in some specimens of the female, the transverse limbal line is margined on both sides by pale bluish-gray. Expanse, 65 mm.

This species seems to be quite common, and I have received numerous specimens from various localities on the West African coast.

AEDIA. Hübn.

38. *A. costimacula*, sp. nov. ♂. The palpi, front, and collar are brown. The patagia are dark blackish-brown margined with pale brown. The upper side of the thorax is brown. The upper side of the abdomen is fuscous. The lower side of the

thorax and the abdomen is fuscous. The legs are concolorous, the tarsi ringed with white. The primaries on the upper side are dark cinereous, marked with very dark brown lines and spots. There is a fine dark line at the base on the costa followed by a large subtriangular brown spot, which is succeeded near the middle of the costa by a smaller brown spot. There is an obscure annular mark on the cell. Beyond the base on the inner margin there is a dark brown line margined internally by pale gray. Beyond the cell the wing is traversed by a geminate curved discal line, the ends of the two members of which nearest the inner margin are very broadly dark brown. Beyond this, there is a finer parallel dark line, which vanishes before it reaches the costa. There is a series of waved dark submarginal markings accentuated between the first and second median nervules by a small white dot. There is a small black dot near the outer angle and a dark curved subapical shade beyond which just below the apex are one or two small dark brown subhastate spots. The secondaries are black with a round white spot at the base and a conspicuous white spot at the outer angle. On the under side both wings are dark rufous-brown, paler at the base and on the costa. The primaries have a white spot at the end of the cell, and below it a larger triangular spot, and a few indistinct whitish marks near the outer angle and at the apex on the costa. The secondaries have a whitish band across the base and a conspicuous white spot at the outer angle. Expanse, 30 mm.

39. *A. apicata*, sp. nov. ♂. This species closely resembles the preceding in the general coloration of the body and the under side of the wings, but differs in certain particulars. The primaries are uniformly ashen-brown with one small black spot just beyond the base below the cell and are clouded by a broad oblique brown shade, which runs from the inner margin near the base to the apex, just below which it is exca-

vated, leaving a semi-circular pale space in the middle of which there is a conspicuous black spot. The white spot at the base of the secondaries is not round as in the preceding species, but subquadrate. On the under side there is great similarity, but the white spot at the base of the secondaries is much larger and the ground color is blackish instead of reddish-brown. Expanse, 26 mm.

40. *A. eremita*, sp. nov. ♂. This species resembles in most respects the preceding species, but the patagia instead of being dark brown margined with pale brown, are uniformly pale brownish-cinereous like the primaries. The primaries are without markings, except a few obscure transverse lines about the middle and before the apex. On the under side, the primaries are almost exactly as in the preceding species. Expanse, 24 mm.

41. *A. scotosa*, sp. nov. ♂. Palpi, front, and collar bright chestnut-brown. The patagia are dark brown margined externally by whitish. The upper side of the thorax is very dark brown, as also the dorsal tufts on the abdomen. The abdomen and the under side of the thorax are pale brown. Legs concolorous. The primaries are cinereous on the costa and are traversed from the base to the apex by a very broad deep black fascia, widening outwardly, margined on either side by white lines. The external margin of this fascia is deeply indented at the outer angle by a whitish spot, interrupted by a few dark lines, and also on the outer margin opposite the end of the cell by a small white linear spot. The fringes are pale brown. The secondaries are broadly shining black, white at the base, with the fringes whitish. On the under side this species resembles the other species that have been described, but the white color at the base is broader and the white mark at the outer angle of the secondaries is more restricted. Expanse, 28 mm.

ERCHEIA, Walk.

42. *E. periploca*, sp. nov. ♂. Body and legs fuscous. The primaries are dark brown with the inner and outer margins evenly bordered with a pale fuscous band interrupted above the outer angle by a few darker markings. The secondaries are dark fuscous with the outer margin touched with white below the apex and before the anal angle. On the under side the primaries are pale fuscous with the border obscurely defined as on the upper side. Furthermore, a pale, slightly curved limbal band crosses the wing from the costa two-thirds of its length from the base to the outer angle. The secondaries are of the same color as the primaries, and are traversed by an irregularly curved narrow median line, by a broader and more obscurely defined limbal band parallel to the outer margin, and by a similar narrower and somewhat interrupted submarginal band. The margin of both the primaries and the secondaries is defined by a fine dark scalloped line. The fringes on the primaries are dark fuscous. The fringes on the secondaries are paler and white at the points indicated in the description of the upper surface. Expanse, 43 mm. Habitat Benita.

This species and *E. subsignata* Walk. are the only species of the genus which I have thus far received from tropical West Africa.

CATOCALIDAE.

ELIOCROEA, Walk.

43. *E. chloroptila*, sp. nov. ♂. Palpi fuscous; front whitish. Upper side of head, collar, and thorax glaucous. Upper side of abdomen pale reddish-cinereous. Lower side of thorax and abdomen very pale ashen tinged slightly with yellowish. The primaries are dark olivaceous-green crossed not far beyond the base by a broad band of pale greenish-white. The outer half of the wing is further ornamented by an irregularly curved transverse limbal and a transverse

submarginal line of blackish, the former defined externally by a paler glaucous line, which is enlarged into a spot upon the costa. In the centre of this spot is a subtriangular olivaceous mark. There are two small patches of blackish raised scales at the end of the cell. The secondaries are uniformly dark brown or fuscous with the fringes slightly paler. On the under side the primaries are dark fuscous with the inner margin broadly whitish and with the costa from the middle to the apex narrowly bordered with very pale ochraceous. The secondaries are pale fuscous with the outer third dark brown or blackish. Just beyond the cell, running from the costa to the first median nervule, is a narrow black transverse limb band. Expanse, 35 mm.

There is some variation in specimens, the greenish band crossing the primaries being in some darker green than in others.

EREBIDAE.

SYPNA, Guen.

44. *S. equatorialis*, sp. nov. ♂. Palpi front-fuscous. Upper side of thorax dark purplish-brown. Upper side of abdomen fuscous. Lower side of thorax and abdomen paler. The first and second pairs of legs are dark brown ringed with whitish. The third pair of legs are paler brown, likewise marked with whitish rings. The primaries are dark brown reflecting in certain lights a bluish-purple sheen. The wings are ornamented by dark brown transverse lines and bands as follows: a dark sub-basal band bordered on both sides by a narrow blackish line; beyond this crossing the end of the cell, a broad dark brown band constricted about the middle near the end of the cell; beyond this a very fine irregularly curved transverse limb line followed by geminate submarginal lines, the outer line being punctuated with patches of raised black scales, and being produced acutely toward the outer margin about the middle of the wing. The

interspaces are marked by small whitish dots on the margin. The margin is defined by a fine blackish regularly waved line. The fringes are dark fuscous, evenly crenulate. The secondaries are reddish-fuscous, marked near the anal angle by four or five incomplete dark brown lines parallel to the outer margin, interpolated with paler lines, the uppermost of which are obscurely continued across the wing to the costa, forming an obscure paler transverse median band. The wings on the under side are pale fuscous with the costa of the primaries marked with four or five minute pale dots near the apex. Both wings are traversed by very faint and obscure transverse median lines. Both have a broad and very obscure submarginal dark band. The fringes are slightly paler than on the upper side. Expanse, 55 mm.

DYSGONIIDAE.

ACHAEA, Hübn.

45. *A. faber*, sp. nov. ♂. Palpi, front, head, and thorax fawn. Upper side of abdomen slightly darker fawn. Lower side of thorax and abdomen pale cinereous. Legs concolorous with the upper edges of the tibiae marked with dark brown. The primaries are fawn color glossed with purplish on the middle of the wing. They are crossed by a narrow transverse sub-basal line running from the costa beyond the base to a little before the middle of the inner margin. Beyond the end of the cell is a broad darker band defined inwardly by a narrow irregularly curved line, and outwardly by a still narrower fine line angulated at the point where it crosses the radial nervule. The wing beyond this band is paler than the rest of the wing, and there are some very faint submarginal cloudings. The secondaries are fuscous with a broad black submarginal band running from the outer angle toward the anal angle, gradually diminishing inwardly. The costa near the outer angle and the outer

margin below it are broadly whitish. On the under side the primaries are pale cinereous, shading into shining stramineous on the inner margin. There is a conspicuous black angulated mark at the end of the cell, followed by a very faint transverse line running from the costa perpendicular to the inner margin. This is followed by a more sharply defined, regularly crenulate, transverse limbal line, beyond which about the middle of the margin is a broad obscurely defined sooty circular mark. The outer margin near the apex is pale. The secondaries are cinereous, profusely irrorated with dark brown spots. There is a well defined small circular spot at the end of the cell, followed by sharply defined and regularly crenulate transverse median, transverse limbal, and transverse submarginal lines, of which the transverse limbal lines seem most sharply defined. The margin near the extremities of the median nervule is clouded with dark brown. Expanse, 55 mm.

MINUCIA, Moore.

46. *M. despecta*, sp. nov. ♂. Palpi reddish. Front, collar, and thorax fawn. Upper side of abdomen pale fuscous; lower side of thorax and abdomen light gray. Legs darker. Primaries fawn. There are two conspicuous apical spots below the costa, the lowermost of which is the largest. Both are margined externally by a fine pale line, and they constitute the apical end of a series of fine submarginal linear markings. In addition there is a transverse linear brown line at the base. This line is very short. It is followed by a transverse sub-basal line, which runs from the costa a third of its distance from the base obliquely to the inner margin near the base. Beyond this line at the end of the cell is a narrow black linear mark; beyond the cell, there is a transverse limbal line acutely angulated just below the costa and produced obliquely from the costa in a straight line to the inner margin about its middle. The inner margin is narrowly

edged with dark brown scales. The secondaries are fuscous, darker on the outer third, tipped with white on the outer angle. The wings on the under side are pale gray with the outer third of the primaries, and of the secondaries until just before the anal angle, clouded with fuliginous. Both wings have the costa near the base slightly tinged with ochraceous. The inner margins of both wings are paler. Expanse, 50 mm.

47. *M. David*, sp. nov. ♂. Palpi fuscous. Front and upper side of thorax ferruginous. Upper side of abdomen fuscous. Lower side of thorax and abdomen pale fuscous. Legs dark fuscous. Primaries ferruginous, slightly darker on the inner margin, and sparingly irrorated with pale brownish scales. At the end of the cell is an oblong discal spot of darker brown. These wings are crossed by obscure and irregularly curved transverse sub-basal and transverse limbal lines and by an irregularly curved series of pale greenish submarginal markings, shaded externally and internally with fuscous. In some specimens these markings are almost entirely fuscous. There is a dark subapical shade. The secondaries are dark fuscous with the costa whitish, shining. The fringes are paler, inclining to whitish at the outer angle. On the under side both wings are very pale shining fuscous, slightly darker on the cell, and with the outer third broadly blackish, the nervules, which are lighter in color, being distinctly defined upon the darker ground. The fringes are pale. Expanse, 55 mm.

48. *M. producta*, sp. nov. ♂. Allied to the preceding species, but at once distinguished from it by the form of the secondaries, which have the outer margin strongly produced opposite the end of the cell. The color is furthermore prevalently darker, and the under side of the secondaries is bright tawny-ochraceous. The expanse of wing is also greater, being 63 mm. Habitat Benita.

EARLY STAGES OF SPILOSOMA LATIPENNIS.

BY CAROLINE G. SOULE, BROOKLINE, MASS.

The eggs, which were received from Miss Morton, were laid June 9th and 10th, 1893. They were very small, hemispherical, pale yellow-white, and were laid in an irregular mat, the flat side on the paper.

June 18th.—The eggs grew lead-colored; then two dark lines and three pinkish dots showed in each egg, and just before 9 P. M. the young larvae hatched. The larvae were a trifle over 1-16 inch long, sparsely covered with long blackish hairs, and were of a pale yellow color until they grew green with food. There was a dark spot on each side of the face, and the mouth-parts were pinkish. There were three rows of dark warts on the dorsum, and a dark spot on eleventh segment. The larvae were sluggish, and ate little except their egg-shells which were entirely eaten. *Plantago major* was supplied.

June 22nd.—The larvae spun little mats on the tin and remained motionless, looking thick and dull.

June 23rd.—First moult. The larvae were 3-16 inch long, yellower than before, and had a glassy green look after eating. The feet and props were transparent, pale yellow. There were no dark warts or marks, except the face-marks and mouth-parts as before. The hairs were black on the dorsum, white elsewhere.

June 27th.—They became quiet again, after eating better in this stage.

June 28th.—Second moult. Length $\frac{1}{2}$ inch; yellow and transparent, till green with food. Not as glassy as before. Hairs longer, and a little denser. No other changes.

July 2nd.—Became quiet.

July 3rd.—Third moult. Length $\frac{3}{4}$ inch. General effect hairy and gray. Head yellow with dark face-marks and mouth-parts as before. Feet and props pale yellow. Body

green with food, a broken subdorsal and lateral line of gray dots on each side. Warts very pale yellow, with a large bright yellow one on each side of eleventh segment, just below the dorsal line. Face-marks less noticeable. Hairs longer, especially over the head and on eleventh segment, and with more dark ones. During this stage the larvae ate more, but were still very sluggish.

July 7th.—Became quiet.

July 8th.—Fourth moult. Length one inch in most cases. Head and feet pale yellow. Props gray with pale yellow tips. Mouth-parts pinkish brown. Body gray with darker subdorsal and lateral lines. Warts on eleventh segment pale yellow and conspicuous, elsewhere gray. Hairs almost all gray, with a few white ones over the two ends. The general effect was very hairy and maltese gray. In this stage the larvae were less sluggish, moving very rapidly, and ate more. Like the other "hairy caterpillars" they curled up when touched or shaken from the leaf.

July 11th.—They became quiet.

July 12th.—Fifth moult. Length $1\frac{1}{2}$ inches. Head and feet pale yellow. Props gray with yellow tips. Body dark gray. Hairs chiefly tan-colored, with a few long black ones. No light warts. Spiracles white and noticeable for the first time, those on eleventh segment being largest.

July 15th.—Became quiet.

July 17th.—Sixth moult. Length $1\frac{1}{4}$ inches for the largest ones. Head clear yellow-brown, horny-looking, with dark brown upper half. Median suture deep. Feet clear yellow-brown. Props dark brown with putty-colored tips. Body velvety dark brown, almost black. Hairs dark tan for the lower third, black the rest of their length. Spiracles very conspicuous, white, largest on eleventh segment. General look — blackish-

tan. In this stage the larvae were most active, moving very rapidly. The general appearance was like very fine Russian sable! At this time three were one moult behind the first ones, and three were two moults behind.

July 28th.—The first ones spun their cocoons between leaves, or lay quiet under

leaves, without spinning.

July 31st.—Pupae cast the larval skin. Length of pupa 5-16 inch, stout, black, with the segments punctate and having well-defined ridges. Spiracles bright orange. Anal end with several sharp points. Eyes and antennae well defined, wing cases short.

THE SEVENTH VOLUME OF PSYCHE

Begins in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume, but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

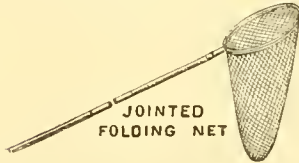
Vols. 1-6, Complete, Unbound, - Now sold for \$29.00.
Vols. 1-6, and Subscription to Volume 7, - - \$33.00.

A. SMITH & SONS, 121 NASSAU STREET, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.



JOINTED
FOLDING NET

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PAPILIO BUDDHA.

Finest specimens, each five shillings or 10 for £2.

T. KRAPP, Missionary,

Bethel, near Bielefeld, Germany.



PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 217.

MAY, 1894.

CONTENTS:

THE HABITS OF THE ACULEATE HYMENOPTERA.—IV (Concl.).— <i>William H. Ashmead.</i>	75
FURTHER NOTES ON COLEOPTERA FOUND WITH ANTS.— <i>Henry Frederick Wickham.</i>	79
TWO CAVE BEETLES NOT BEFORE RECORDED (Illustrated).— <i>H. Garman</i>	81
NEW AND UNDESCRIBED GENERA AND SPECIES OF WEST AFRICAN NOCTUIDAE.— IV (Plate 1).— <i>W. J. Holland.</i>	83
PREPARATORY STAGES OF PSEUDOHAZIS SHASTAENSIS BEHRENS.— <i>Harrison G. Dyar.</i>	91

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]



Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5.00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, *without change of form*, to the author of any leading article, if ordered at the time of sending copy, . . . Free

Author's extras over twenty-five in number, under same conditions, each per page, . . . 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " " "	1.25	1.00
Half " " " "	2.25	1.75
One " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$20.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danais archipus</i> . Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichnology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> . col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report. Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PAPILIO BUDDHA.

Finest specimens, each five shillings or 10 for £ 2.

T. KRAPP, Missionary,
Bethel, near Bielefeld, Germany.



AFRICAN NOCTUÆ (HOLLAND).

PSYCHE.

THE HABITS OF THE ACULEATE HYMENOPTERA.—IV.

BY WILLIAM H. ASHMEAD, WASHINGTON, D. C.

The species in the genus *Pompilus* Fabr., judging from the records, seem to have a diversity of habits. According to Westwood, *Pompilus niger* Fabr. in England provisions its cells with small Lepidopterous larvae; *Pompilus fumipennis* Zett. with ants, while *Pompilus petiolatus* preys upon spiders. Now no doubt this diversity of habits will be found correlated by structural differences, which should be used in separating this extensive genus into subgenera. In our fauna, most of our species in this genus, or at least those whose habits are known, feed upon spiders.

Mr. D. W. Coquillett has observed in the West *Pompilus tenebrosus* dragging off ♂ different spiders with which to store its cells. Mr. Theo. Pergande tells me he has observed several different species belonging to the genus *Pompilus*, in District of Columbia, Maryland, Virginia and Missouri, carrying off spiders, while I have observed the same thing in Florida.

Family XIV. MASARIDÆ. Nothing positively seems to be known respecting the habits of the few genera and species comprising this family. All our species are rare and occur in the Western States.

Family XV. VESPIDÆ. Packard calls this family "one of the higher families" and includes in it, as sub-families, the Masaridæ and Eumenidæ, placing it near the head of the Aculeata, next to the true bees. Anthophila.

This position I consider very unnatural, as in structure and habits the species comprising it are totally different from the true bees. The pronotum extends back to the tegulae as in the Pompilidæ, Sapygidæ, Thynnidæ, Scoliidæ and Mutillidæ, and they agree with these families in structure, as well as with the fossorial wasps (except the parasite families) in habits. They are strictly predaceous wasps, insectivorous, and have no relation whatever with the true bees.

Vespa and *Polistes* feed their young upon the "chewed up fragments of Lepidopterous and other insects," while the Eumenidæ build mud or clay cells which they fill with dead or paralyzed Lepidopterous and Coleopterous larvae and possibly other insects, just as do the Pompilidæ.

The fact that some of them have three sexes should have no weight against structure and habits, and it should not influence us in assigning the family its natural position, which is, in my opinion, next to the family Pompilidæ.

The exotic species in the genus *Polybia* St. Fargeau are said to enclose their cells by a papery or external covering, but this is not the case with *Polybia cubensis* in Florida. This species builds its papery comb just like *Polistes*, without a covering, attached to the twig of an orange tree.

The habits of the genera *Vespa* and *Polistes* Latr. are probably known to most of us here and I shall not go very particularly or fully into a description of them now.

The *Vespas* as we all know were "The first paper makers," and probably suggested to some of the ancestors of the human race the idea of manufacturing this now absolutely necessary commodity.

In our fauna only three genera with forty-five species are known.

Our most common species in the genus *Vespa* Linn. are *Vespa maculata* Linn., *V. germanica* Fabr. and *V. diabolica* Sauss. The former usually, if not invariably, builds its nest on the limb of some tree, or under some old shed; the two latter in an excavation in the ground or in old stumps; both, however, and in fact all species in this genus, enclose their combs in a globular papery covering. For a full account of these interesting wasps and others consult Walsh, Amer. ent., vol. i, pp. 138-141; Packard's Guide, p. 147; and Marlatt, Proc. ent. soc., vol. ii, p. 80.

The different sexes of all of our species are not known and some of our species may be nothing but the sexes of other species, as seems to have been proved lately in the case of *Vespa*

cuneata and *V. carolina*. The former is known only in the male and neuter sexes; the latter only in the female sex, and all of these were taken last fall from a single nest by Mrs. McKewen, in Virginia.

These, therefore, should be conjoined as one species, under the older name of *V. carolina* Drury.

The parasites of these insects in Europe are *Crypturus argiolus* Gras., *Sphécophaga vesparum* Curtis, *Rhipphorus paradoxus*, Diptera *Anthomyia incanum* and Volucellae, and Stylops, while in America, *Euceras burrus* Cr., *Mesostenus arvalis* and *M. thoracicus* Cr., *Trigonalys bipustulatus* and Stylops have been reared from them.

Family XVII. EUMENIDAE. This is an extensive family and from an economic standpoint of the greatest importance to our farmers and fruit-growers, very few of whom know anything at all of the great benefit they are deriving every year from these brightly marked wasps. They are known as "potter-wasps," from the material used in constructing their cells.

All the species prey upon destructive Lepidopterous and Colcopterous larvae or caterpillars and as the species are very numerous they must destroy many thousands during the year. The caterpillars, after first being paralyzed with their sting, are then stored up in their cells as food for their offspring, from six to a dozen or more being found in each cell.

The species belonging to the genera *Zethus* Fabr. and *Eumenes* Fabr., form globular cells of clay or sand, or sand and

mud mixed, which are attached by a small pedicel to the twig of some shrub or tree. These are filled with larvae, a single egg is placed in each cell and all are hermetically sealed up by a cap of clay. The cell of *Zethus spinipes* Say I have taken most frequently in Florida, attached to the twig of the Iron-tree, while *Eumenes fraterna* Say is usually attached beneath one of the large leaves of the Scrub Palmetto. The latter species, according to Dr. Harris, preys upon the Canker-worm in Massachusetts, but in Florida and elsewhere it also preys on other small caterpillars. I have bred from these cells in Florida *Rhipiphorus dimidiatus*.

In the south, *Monobia quadridens* preys upon large Cut-worms, as I have frequently seen it carrying them into its cells, which were placed in the old burrows of the Carpenter-bee *Xylocopa virginica*, the sides of which it had renovated by a thin veneering of clay and then filled with clay cells from the bottom upwards. More than one wasp was seen going in and coming out of a single burrow and undoubtedly several individuals live and work in harmony together.

It is quite probable that the species in the genus *Odynerus* were originally wood-borers and sand-borers, although now they are less particular in selecting a locality in which to nidificate, the most insecure and oddest places imaginable being often selected by them. Many now also appropriate the galleries and cells made by different bees and wasps, the old mud-dauber's cells being

a favorite locality. A few even construct their cells in an irregular mass of clay and sand surrounding a twig or plant, which on first sight might be easily mistaken for a clump of dried mortar or sand.

All of the *Odyneri* store their cells with Lepidopterous and Coleopterous larvae; and sometimes even with Hymenopterous larvae belonging to the destructive Saw-fly family Tenthredinidae. *Odynerus capra* Sauss. was observed by the Rev. T. W. Fyles to provision its cells with the larvae of the Larch saw-fly *Nematus erichsonii*. Indeed, the service of these insects to the farmer and gardener must be of incalculable value, as they destroy immense numbers of the destructive tineina, geometrina, tortricina, pyralina and noctuina larvae during the season.

In Florida, I have observed *O. errinys* St. Farg. making its nests in the lock of my front door and in old holes in my board fence. I have also reared it many times from cells constructed in old oak-galls *Amphibolips cinerea*. Nine specimens, varying greatly in size, were reared from a single gall. *O. albophaleratus* Sauss. has also been bred from the oak-gall *Amphibolips confluens* Harris, in Massachusetts, while *O. fulvipes* Sauss. was observed by Walsh building its cell in a spool, certainly a queer and insecure place. The habits of many other of our species could be given but these will be left for another paper.

Many of the *Odyneri* are parasitized by species in the family Chrysididae and a few by two or three Ichneumonids.

Linoceras junceus Cr. is the only ichneumonid reared from them in this country.

Family XVII. SAPYGIDAE. All the species in this family, as well as in the three following families—the Tynnidae, Scoliidae and Mutillidae—are without doubt parasitic.

Mr. R. Desvoidy was the first to prove the parasitic habits of *Sapyga*, by breeding the European *Sapyga punctata* from the cells of *Osmia halicicola*; also by his observation on *Sapyga chelostomae* which is parasitic on one of the bees, *Chelostoma* sp.

Palochium repandum Spinola, representing another genus in the family, is parasitic on *Xylocopa violacea*.

Notwithstanding the fact that in our fauna, this family is represented by 2 genera and 22 species, no observations have been published respecting a single species.

In Dr. Riley's collection, now in the National museum, is, however, a single specimen of a *Sapyga* bred at Toronto, Canada, by Mr. W. A. Williams from the cells of *Pelopaeus cementarius*.

Family XVIII. SCOLIDAE. Very little seems to be known of the habits of the 5 genera and 44 species of these insects found in our fauna.

All reliable observations published show the species are parasitic on various scarabaeid larvae and I believe most of the species will be found to attack the larvae of the Coleopterous family Scarabaeidae.

Tiphia inornata Say has been bred by Dr. Riley from *Lachnosterna* larvae,

while, as recorded by Mr. Howard, in *The Standard natural history*, vol. ii. p. 226, "Passerini found the larva of *Scolia flavipes* within the body of the Lamellicorn beetle *Oryctes nasicornis*, and similarly Coquerel states that *Scolia oryctophaga* lives on *Oryctes simia* in Madagascar. Sumichrast supposes that the females of *Scolia azteca* lay their eggs in certain larvae which abound in tan at Tehuacan." In the South I have seen our common *Scolia nobilitata* Fabr. preying upon what I take to be the larvae of a *Diptotaxis*.

Family XIX. THYNNIDAE. This family is closely related structurally to the preceding, and to the Mutillidae. No species is described from North America, unless we call the brief mention of *Thynnus californicus* (Ent. news, 1892, p. 104), by Wm. H. Patton, a description. The family is well represented in South America, Africa, and Australia, and although there are several hundred described species, up to the present time, the habits of not a single species is known. The family is probably parasitic on bees.

Family XX. MUTILLIDAE. This family is extensively represented in our fauna by 8 genera and over 160 species, many of the genera being characterized from one sex, usually the male, the opposite sex being unknown. It is to be hoped that our students will make an effort to discover the females in those genera now known only in the male sex.

The species are without doubt parasitic in the nests of bees. *Mutilla europaea* is parasitic on *Bombus lapid-*

darius in Europe. In this country, Mr. E. A. Schwarz has bred in Alabama, *Sphaerophthalma saubornii* Blake, in both sexes, from the cells of an Andrenid, *Nomia* sp., while Dr. C. V. Riley has bred *Sphaerophthalma balteola* Blake from the cells of an Anthidium sp. sent him from Florida.

The Ants comprising the families XXI DORYLIDÆ, XXII FORMICIDÆ, XXIII ODONTOMACHIDÆ, XXIV PONERIDÆ, and XXV MYRMICIDÆ, will be treated in a separate paper.

Family XXVII. CHRYSIDIDÆ. This family is represented in our fauna by eleven genera and seventy-seven species. It forms a connecting link, through the family Proctotrypidæ, with the HYMENOPTERA TEREBRANTIA, and the species composing it are among the most brilliant colored of our wasps. Some of the species are said to be "inquilines" or "guest-flies," others true parasites, but I believe all are genuine parasites. Mocsary in his recent great work, "Monographia Chrysididarum orbis terrarum universi" has brought together, in a tabular form, all the records of the rearings of these insects

and it will be only necessary for me here to mention the habits of some of our own species.

Benj. D. Walsh seems to be the only one in North America who has made a record of the rearing of a species in this family. In Amer. ent., vol. 1 (1868), p. 135, he records having bred *Chrysis coerulans* Fabr. var. *bella* Cr. from *Eumenes fraterna* Say.

In treating of the genus *Trypoxylon*, I have already stated having seen *Chrysis verticalis* Pattn. entering the burrows of *Trypoxylon carinifrons* Fox, and this species is undoubtedly parasitic on that wasp. In Florida, I have bred *Chrysis coerulans* Fabr. and *C. perpulchra* Cr. from the cells of *Pelopaeus cementarius* Drury, while from those of *Odynerus quadrisectus* Say issued *Chrysis densa* Cr.

I have now given a *resumé* of the habits of the Aculeate Hymenoptera, arranging the families in what I conceive to be their natural sequence, and as the Chrysididæ terminates the series, my address, already too long, comes to an end.

FURTHER NOTES ON COLEOPTERA FOUND WITH ANTS.

BY HENRY FREDERICK WICKHAM, IOWA CITY, IOWA.

These records are offered as a continuation of the series begun in the last volume of Psyche.* Most of them are new, either as to the beetle or its host and the few others relate chiefly to

doubtful species and are given as additional evidence regarding the true state of affairs. The ants are identified by Mr. Theo. Pergande, whose authority is amply sufficient guaranty as to correctness. Most of the Staphylinidæ are given on the word of Capt. Thos. L.

* Page 321.

Casey, and many of them have only lately been described by him; the few manuscript names are given as being a trifle better than none because it will be at least possible to ascertain the identity of the species recorded by reference to his cabinet. The Scydmaenidae were named by Dr. Brendel. My thanks are due to all these friends for aid in the very difficult groups which have to be investigated in this class of work.

Ptomaphagus parasitus Lec. I took several specimens at Iowa City in the nest of *Formica subsericea* Say. This ant supports a host of inquilines and parasites as the following record of species will show. All of those credited to it were taken from a single large nest on the same afternoon.

Scydmaenus rasmus Lec. One specimen at Iowa City, with *Lasius niger* L.†

Scydmaenus flavitarsis Lec. With *Formica subsericea*, one specimen.

Eumicrus motschulskii Lec. ("Apparently a large specimen of this species and certainly not *grossus*"), one specimen with *Lasius niger* at Iowa City.

Adranes lecontei Brend. Found in the autumn, at Iowa City, in the nest of a *Lasius* which Mr. Pergande thinks may be a variety of *L. minutus* Em. In the spring, I take it with *L. aphidicola* Walsh.

Ceophyllus monilis Lec. Occurs at the same time and in the same nests as the preceding species.

Batrissus lineaticollis Aubé. Taken with *Formica subsericea*. Only two or three specimens obtained.

Atheta iowana Casey (in litt.) and *A. terminata* id., both occur with *F. subsericea*. *Atheta limatula* id. was taken at Iowa City with *Lasius niger* while *A. exilissima* id. was captured with *Solenopsis debilis* at Cañon City, Colo.

Lomechusa cava Lec. At Iowa City with *Camponotus pictus* Forel. Several specimens are often to be found in the same nest.

Myrmedonia caliginosa Casey. With ants at Iowa City, April 20. No specimens of the host were saved.

Myrmecochara crinita Casey. This is the species which was most unfortunately referred to *Gyrophaena* in the first paper. I am indebted to Mr. E. A. Schwarz for first calling attention to my error. Mr. Fauvel considers the insect as constituting a new genus but now that it has received a specific name it will be a matter of no great difficulty to keep track of it in the future.

Microdonia occipitalis Casey. With ants, at Walnut, Arizona, July 21. Two specimens.

Myrmobiota crassicornis Casey. At Iowa City with *Lasius niger*. Two specimens.

Heterothops fumigatus Lec. With *Formica subsericea*. It is more often to be found at large than in ants' nests.

Philonthus microphthalmus Horn. One specimen with *F. subsericea*. I once got another specimen with an ant

† Mr. Pergande writes that this is the form heretofore considered identical with *L. alienus*.

(*Aphaenogaster fulva*) but usually take it at large.

Scopacus brevifennis Casey (in litt.). This is the species recorded in the previous paper, without a name. It occurs with *Aphaenogaster fulva*.

Oxytelus placusinus Lec., and *O. suspectus* Casey were taken with *Formica subsericea*. They probably make galleries of their own in the ant-hill rather

than dwell in the run ways of the ants.

Atomaria mesomela Hbst., "or one of the other 4-maculate species" (Brendel). This occurs at Iowa City with an *Aphaenogaster*, the identity of which cannot be determined with the limited material in hand. Several specimens were taken from one nest. This is probably not the customary habit of this species.

TWO CAVE BEETLES NOT BEFORE RECORDED.

BY H. GARMAN, LEXINGTON, KY.

Two small beetles have proved so constantly present in small caves in the vicinity of Lexington that it seems worth while to place them on record as cave insects. Both have pretty well developed eyes and may therefore live at times in ordinary situations, but they are perfectly at home in the deepest parts of caves and are at times very abundant there. In all my collecting in ordinary situations I have not seen either species out-of-doors, and am disposed to consider them true cave dwellers.

Choleva alsiosa, Horn. This is a small black beetle (one of the Silphidae) about 4.5 mm. in length, described in 1885 by Dr. Horn from the Yukon River, Alaska. Is it possible that the low temperature prevailing in the caves has enabled this insect to persist here since glacial times? I have several hundred specimens, male and female, all taken in caves beyond the penetration of light.

Calodera cavicola, n. s. A small, reddish brown insect with very short wing covers and a slender elongated body. Head generally darker than the body, sometimes nearly black in alcoholic specimens. The middle of the abdominal somites also darker than elsewhere giving this division of the body an annulated appearance. Specimens taken from the caves and kept alive seem to me to become gradually darker in general color. It is one of the Staphilinidae.

Length 4.5—6.0 mm. Greatest width about 1.0 mm. Outline of head, seen from above, nearly circular, truncate behind, its length contained $1\frac{1}{2}$ times in width, pubescent and obsoletely punctate above. Antennae when drawn back reaching nearly to posterior edge of prothorax, gradually enlarging from the base, finely pubescent, and with a ring of rather strong hairs on most of the segments. First to third segment cylindrical, the basal largest and longest of the three, the second and third nearly equal; fourth segment shortest, contracted

at each extremity, widest at middle; segments five to ten, inclusive, similar in shape, being angular in outline and increasing in width from base to tip; eleventh segment largest, oval, truncated at base. Labrum slightly excavated medially, rounded at sides, with a number of rather strong setae arising from its surface, its length contained about $2\frac{1}{2}$ times in its width from side to side. Mandible short, sickle-shaped distally, its tip acute, its cutting edge very finely denticulate and provided with a fringe of very fine setae. Lacinia of maxilla with an internal membranous expansion furnished near the tip with a series of rather strong, curved spines and a dense growth of pubescence. Galea tapering to tip, also with a

width of prothorax), its length contained $1\frac{1}{5}$ times in width, outline nearly circular. Elytra not quite reaching the first abdominal somite, truncate behind, with a small excavation near outer angle. Wings small and weak, not used for flight as far as observed. Sides of abdomen nearly parallel as far as the sixth somite which narrows rapidly to the seventh which is small; outline of somites seen from above nearly square; a groove along each side of the abdomen with a raised outer margin.

Color pale fulvous. Head darker, sometimes nearly black. Three anterior abdominal somites with a transverse black bar a little before the middle. Somites four and five with a larger, more obscurely outlined

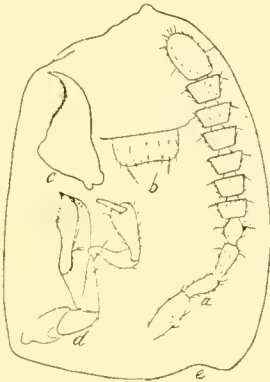


FIG. 1.

FIG. 1. *a*, antenna of *Calodera cavicola*; *b*, labrum; *c*, mandible; *d*, maxilla; *e*, outline of elytron. (From camera lucida sketches).

dense growth of pubescence distally. Basal article of maxillary palpus very small, cylindrical; second segment gradually enlarging towards tip where it attains its greatest diameter; third segment largest, also enlarging from base to tip; distal segment small and slender, gradually tapering towards tip. Prothorax wider than head (width of head about one and a third times in

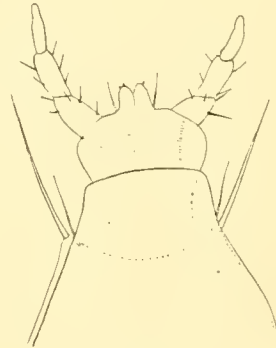


FIG. 2.

FIG. 2. Labium of *C. cavicola*. (From camera lucida sketch).

dark area in place of the bar. These marks are obscure in some specimens, and show best in alcoholic specimens examined with the microscope.

The species is very common in some caves, occurring with *Anophthalmus horni* in the deepest parts. From the character of the ligula Mr. E. A. Schwarz thinks it may belong to the genus *Ocalea* instead of *Calodera*.

(Continued from page 70.)

NAXIA, Guen.

49. *N. xanthodera*, sp. nov. ♂. Palpi pale gray, head whitish, collar and patagia reddish-yellow, upper side of thorax brown, upper side of abdomen fuscous, lower side of thorax and abdomen fuscous, legs concolorous. The primaries are reddish, glossed with purple and marked on the outer and inner margin with yellowish. They are crossed by a number of obscure and fine wavy lines. The secondaries are uniformly fuscous. The fringes are paler, marked with whitish near the outer angle. On the under side, both wings are pale cinereous, the primaries having the inner margin whitish and the outer margin above the inner angle slightly clouded with fuscous. There are a few obscure whitish subapical points forming an incomplete submarginal series in the primaries. Both wings have an obscure discal spot and the secondaries are crossed by curved and regularly crenulate obscure lines, of which the submarginal line is the most distinct. Expanse, 45 mm.

50. *N. debilis*, sp. nov. ♂. Allied to *N. senior*, Walk., but smaller and much paler. In *N. senior* the outer third is dark succeeded on the margins by a whitish area. In *N. debilis* the outer third of the wing is very little darker than the rest of the wing, and on the under side the lines, which traverse the wings in *N. senior* are much paler. The expanse of wings in *N. senior* is from 55 to 60 mm. In the case of *N. debilis* it is only about 40 mm.

This may be a small and light colored form of *N. senior*, but its facies is different, though it is very hard to define in words just wherein the difference consists. It seems to be common and constantly occurring in the same localities and at the same time of year with Walker's species.

51. *N. multilineata*, sp. nov. ♂. Palpi, front, and collar rufous. Upper side of

thorax and abdomen fuscous. Lower side of abdomen fuscous; lower side of thorax paler. The legs are dark fuscous, the tarsi ringed with yellowish-white. The primaries are lilacine-brown, crossed by a multitude of dark brown lines, which in strong sunlight show a coppery lustre. Below the apex these lines coalesce and enclose a subtriangular paler area, at the outer extremity of which is a coppery red spot. The secondaries are dark fuscous on the outer margin, which is defined by a fine narrow wavy line. At the anal angle are a couple of dark lines alternating with pale gray lines running inwardly toward the middle of the wing. On the under side, the wings are dark fuscous, laved with grayish on the outer margin and at the base, and crossed by a multitude of fine crenulate lines defined outwardly by hastate pale grayish or pale reddish markings, the reddish tint prevailing toward the costa in both wings. The apical extremity of the costa in the primaries is reddish touched with a number of minute light dots. Expanse, 38 mm.

52. *N. infirma*, sp. nov. ♂. Body and legs uniformly pale fawn. Upper side of primaries and secondaries fawn. Both wings are sprinkled with small dark cinereous scales, and are traversed by a somewhat broad irregularly curved submarginal band of ferruginous. Both are further marked by obscure and irregularly curved and broken sub-basal, median, and limbal transverse lines. On the under side, the primaries are fuscous with the outer margin uniformly paler. The dark area is traversed by a curved limbal and a curved submarginal line. The secondaries are fuscous like the primaries, but the outer pale margin is not so light as in the primaries. These wings have a distinct discal dot and are crossed by four or five parallel curved transverse lines. Expanse, 35 mm. Habitat Benita. Taken in November.

PSIMADA, Walk.

53. *P. Africana*, sp. nov. ♂. Upper side of thorax and abdomen fuscous, lower side paler, covered in part with whitish hairs. The primaries on the upper side are slaty-brown, crossed by obscure transverse lines and marked on the costa before the apex by a dark brown subtriangular spot, the apex of which pointing inwardly is obtuse, or rounded, and the outer margin defined by a very fine whitish line. The secondaries are of the same color as the primaries marked by a few scattered submarginal dark brown spots, and above the anal angle on the inner margin by a curved brown line. On the under side both wings are paler than on the upper side, especially at the base. Both have a pale discal spot at the end of the cell; both are crossed beyond the cell by an irregularly curved and acutely zigzagged transverse limbal line, followed by a submarginal curved series of pale spots. Expanse, 40 mm.

54. *P. imperatrix*, sp. nov. ♂. Somewhat larger than the previous species, and with the outer margin of the primaries strongly produced, or angulated, at the extremity of the third median nervule. The upper side of the body is ashy-brown. The lower side is paler, grayish. The primaries upon the upper side are hoary brown crossed by numerous more or less obscure dark lines and series of spots. On the costa before the apex is a large dark brown triangular spot, from the lower or apical end of which several small spots, gradually diminishing in size, extend in a series in the direction of the outer angle. Beyond these spots below the apex is a curved brown shade running from the large triangular brown spot to the outer margin at its middle. The secondaries are colored like the primaries above. The middle of the wing is crossed by a series of fine subhastate brown markings, shaded outwardly by olivaceous-gray, and succeeded by a similar submarginal series of heavier spots, which are most conspicuous on the inner

margin near the anal angle. The margins of both wings are marked upon the interspaces by minute dark brown transverse dashes. On the under side, both wings are fuscous with their inner margins and the apex of the primaries grayish. Both are crossed by obscure transverse median, limbal, and submarginal lines composed of subhastate markings, which are bordered externally by paler lines and spots inclining to ochraceous. The submarginal series is the heaviest and most conspicuous, the apical extremity on the primaries being broad, and the pale spots being succeeded externally by darker lines, so that they appear as a central bar of light spots upon a broad darker band. Expanse, 47 mm.

DYSGONIA, Hübn.

55. *D. neptunia*, sp. nov. ♂. Closely allied to *D. joviana*, Cram., and *D. arcuata*, Moore, from the former of which it differs in having the outer margin of the median dark band evenly curved and not excised in the region of the median nervules, and from the latter it differs in having the median band much wider and the sub-basal transverse band very slightly bowed out toward the margin below the cell. *D. joviana* is found on the western coast of Africa and is represented in my collection. Its facies differs positively from that of this species. The present species is furthermore considerably larger than *D. joviana*. The differences between this species and the other species described in this paper are most clearly illustrated by the figures on the plates accompanying this article. It is exceedingly difficult among these forms, which are closely allied and yet distinct, to define with words the differences, which consist mainly in the size and in the outline of the transverse bands of the primaries. Expanse, 43 mm.

56. *D. plutonia*, sp. nov. ♂. Allied to the preceding species, from which it differs in having the dark median band on its inter-

nal margin diffuse and not regularly convex inwardly. Furthermore, the apical dark spot on the primaries is surrounded by a fine pale line and distinctly demarked from the broad brown curved subapical shade, or subapically produced upper angle of the broad transverse median band. In *D. joviana*, *D. neptuna*, and *D. conjunctura* this apical spot fuses with the subapical prolongation of the median band. The submarginal transverse line is obscure.

♀. The female is like the male, but having the submarginal line straight and sharply defined and bordered outwardly by a pale narrow line. Expanse, ♂ and ♀, 42 mm.

57. *D. Camerunica*, sp. nov. ♂. Head and body on upper and under side fuscous. The primaries on the upper side are pale ashen. The basal third is dark brown, the brown area being regularly defined by a straight line of very dark brown, running from the costa perpendicularly to the inner margin. Beyond the cell, the wing is crossed by a broad median band of dark brown, diffuse inwardly, and externally deeply toothed and scalloped. On the costa before the apex is a paler area, subhastate in form, with the point, which is directed inwardly, very blunt, or rounded. This spot is defined on all sides by a pale gray line, the barbs, which point outwardly, being shaded with dark brown. Just at the apex, located between the barbs of this subhastate spot is a small oval dark brown spot. There are some fine cloudings on the lighter marginal area, just beyond the median band, and on the edge of the wing near the middle of the margin. The secondaries are dark fuscous with the fringes paler, except at the middle of the outer margin, where they are concolorous. On the under side, the primaries are pale fuscous with the fringes somewhat lighter than the body of the wing. There are obscure traces of transverse limbal and submarginal lines, most distinct near the costa. The secondaries are pale fuscous,

lighter near the base, crossed by regularly curved and very dentate median and submarginal dark brown lines, defined externally by parallel paler lines. The fringes are as on the upper surface, but a trifle paler. ♀. The female is very like the male. Expanse, 33 mm.

This species somewhat resembles *D. (Ophiusa) derogans*, Walk., but may be at once distinguished by the scalloped and dentate outline of the dark median band on its external margin.

58. *D. humilis*, sp. nov. ♂. The body is obscure brownish-gray above, paler on the lower side. The legs are concolorous. On the upper side, the primaries are obscure brownish-gray. There is a dark sub-basal band as in the preceding species, margined externally by paler ashen. The wing is crossed by a curved line, running from the apex, convex inwardly, to about the middle of the inner margin. Beyond the cell, this line fuses with a short curved line sweeping from the costa two-thirds of the distance from the base outwardly toward the outer margin. This short curved line and the upper end of the line running from the apex enclose a semi-circular paler subapical area, near the outer edge of which are some exceedingly obscure darker small spots. The secondaries are uniformly fuscous. Both the primaries and the secondaries on the under side are uniformly fuscous. There is a faint trace near the costa on the primaries of a paler transverse limbal line.

♀. The female is like the male. Expanse, 35 mm. Habitat, Valley of the Ogové and the Cameroons.

This and the preceding species are two of the smallest species in the genus.

GRAMMODEN, Guen.

59. *G. Benitensis*, sp. nov. ♂. Allied to *G. (Fodina) euclidicola*, Walk., from which it may be distinguished among other things by the absence of the white transverse half-

band at the base, which is so conspicuous in *euclidicola*. Furthermore, the white lines forming the V-shaped mark, which are conspicuous in *euclidicola*, in *Benitensis* do not make an acute angle with each other at the inner margin, but are separated at the apex of the V and fuse with a pale line, or band, which borders the inner margin, running from the base along the whole length of the margin to the outer angle. In other respects this species closely resembles *euclidicola*. Expanse, 45 mm. Habitat Benita.

60. *G. pusilla*, sp. nov. ♂. Front pale brown. Thorax and abdomen above and below very pale ochraceous. The primaries are creamy-white, marked by two conspicuous triangular black spots upon the middle of the wing, distinctly separated from each other by a narrow band of the prevalent light ground color of the wing. The innermost of these spots forms a scalene triangle with its base parallel to the inner margin. The outermost spot has its base toward the costa, the base being slightly concave. The apex points to the outer angle; the sides are nearly equal. The margin is slightly clouded with pale wood-brown, and is marked by a number of minute transverse brownish dashes on the interspaces. The fringes are pale, tipped slightly with fuscous. The secondaries are uniformly creamy-white with the margin and fringes as on the primaries. On the under side both wings are pale creamy, immaculate. ♀. The female is like the male. Expanse, 25 mm.

EUCLIDIIDAE.

TRIGONODES, Guen.

61. *T. binaria*, sp. nov. ♂. Front and collar fuscous. Upper side of thorax and abdomen fawn. Lower side of thorax and abdomen paler. Legs concolorous with the anterior margins of the first two pairs dark brown. The primaries on the upper side are argillaceous laved on the costa and the

outer margin with grayish. There is a small round discal dot at the end of the cell and below the cell are two dark black subtriangular spots with their bases toward the costa and their apices toward the inner margin. The spots coalesce with each other on the line of their bases just below the discal spot at the end of the cell. They are margined externally on the sides of the inner and outer margins with a narrow pale creamy line. There is a dark brownish subapical shade just beyond the outermost spot and some indistinct submarginal cloudings near the outer angle. The margin is marked with minute brown spots on the interspaces. The fringes are concolorous. The secondaries are argillaceous clouded with fuscous near the base and on the outer margin, especially in the neighborhood of the outer angle. The fringes on the secondaries are paler than on the primaries. On the under side, the primaries are pale argillaceous marked with an obscure discal spot, and crossed from the costa by an incomplete transverse limb and a broader transverse submarginal band of dark fuscous. The secondaries are uniformly pale argillaceous, inclining to ochraceous.

♀. The female is marked very much like the male. Expanse, ♂ and ♀, 43 to 46 mm. Habitat, Gaboon and Cameroons.

62. *T. inornata*, sp. nov. ♂. Closely resembling the preceding species, for which the description given will suffice, save that the primaries on the upper side entirely lack the two very conspicuous dark black triangular spots on the median area and the secondaries on the under side possess an obscure discal dot at the end of the cell, and are crossed beyond the cell by an incomplete transverse median band. The primaries are marked on the upper side by a dark transverse submarginal shade, running diagonally from the apex to the inner margin two-thirds of the distance from the base.

♀. The female is marked like the male. Expanse, ♂ and ♀, 42 to 45 mm.

POAPHILIDAE.

ACANTHOLIPES, Led.

63. *A. triangulifera*, sp. nov. ♀. Head and collar dark brown. Upper side of thorax and abdomen fawn. Lower side of thorax and abdomen paler. Legs concolorous with the front margins of the tibiae and femora darker brown. Primaries on the upper side rosy-fawn, darker on the outer margin. On the inner margin beyond the base is a large subtriangular dark brown spot. The apex of this spot points toward the costa, and from it a fine line is continued upwardly to the costa. Beyond the apex of this dark spot in the middle of the cell is a small circular black spot; at the end of the cell, a reniform spot. A fine irregularly curved line runs from the costa above the reniform around toward the inner margin, fusing with the large subtriangular dark spot beyond the base near the point where the first median nervule intersects the outer margin of this large spot. Upon the costa just before the apex is a moderately large subtriangular dark brown spot. The margin is marked by a few linear transverse lines below the apex. The fringes are concolorous. The fringes on the upper side are fuscous, darkest on the outer margin. On the under side, the wings are pale rosy-fawn, the secondaries somewhat lighter than the primaries. Both wings have an obscure discal spot at the end of the cell and both are traversed beyond the cell by an incomplete transverse limbal dark line. Expanse, 30 mm. Habitat Benita.

64. *A. detersa*, sp. nov. ♀. Front and collar dark brown. Upper side of thorax and abdomen fuscous, lower side slightly lighter. The primaries and the secondaries on the upper side are fawn with the outer margin lighter, inclining somewhat to ochraceous. The only markings on the upper surface of the wings are, on the primaries, a very narrow and indistinct regularly curved sub-

basal line followed on the cell by a median dot and an obscure reniform spot, and beyond the latter there is a very narrow and obscure irregularly curved transverse limbal line running from the costa outwardly, passing around the end of the cell, making an inward loop and then running to the inner margin near its middle. On the under side, the wings are pale fawn with the costa of the primaries before the apex and the inner margin laved with light ochraceous. The fringes of the primaries on the under side are darker than the body of the wing. Expanse, 28 mm.

65. *A. pustulata*, sp. nov. ♀. The body is marked as in the preceding species. The primaries on the upper side are fawn, marked with heavy dark brown spots and fine dark brown lines. On the costa beyond the base is a small oval black spot, about the middle of the costa three small subtriangular spots, on the costa before the apex a large subquadrate spot. There is a circular black spot on the middle of the cell; at the end of the cell a large black reniform spot; on the inner margin beyond the base a large triangular spot, the apex resting upon the middle of the cell, the base covering the inner margin for about one-half of its length, but not quite reaching the point of insertion of the wing. This spot, as well as the reniform, is followed by a fine dark brown line. The secondaries on the upper side are uniformly pale fuscous. On the under side both wings are pale rosy-fawn. The primaries are somewhat darker in the region of the cell and marked at the end of the cell by an obscure transverse discal line. Expanse, 28 mm.

66. *A. catovantha*, sp. nov. ♂. Head and collar dark brown. Upper side of thorax pale fawn; upper side of abdomen pale fuscous; lower side of thorax and abdomen very pale ochraceous. Legs concolorous, margined on the tibiae with pale brown. The primaries are luteous, shading on the

outer margin into pale brown marked by a very dark subtriangular spot on the costa before the apex and by a band of dark brown crossing the middle of the wing, more or less obsolete in the region of the costa, very distinct toward the inner margin. The paler costal extremity of this band is interrupted by a sharply defined black dot near the end of the cell, and beyond it by a lunate black spot surrounded by a fine pale creamy line. Beyond this, running from the costa toward the outer angle, which it does not reach, is an incomplete transverse discal line margined internally by a pale creamy line. The secondaries on the upper side are pale luteous, shaded with fuscous on the inner margin. On the under side, both wings are pale luteous with the cell in the primaries and the region about the origin of the median nervules clouded by reason of the reappearance on the under side of the heavy black markings of the upper side. Expanse, 30 mm. Habitat Benita.

67. *A. umbrosa*, sp. nov. ♀. Head and collar dark brown. Upper side of thorax and abdomen fuscous; lower side fuscous, very little paler than the upper side. Legs concolorous. The primaries on the upper side are rosy-brown with a pale ochraceous reniform spot at the end of the cell and a larger ochraceous spot on the inner margin before the outer angle. On the costa before the apex is a dark brown subtriangular spot. A very obscure and narrow sub-basal brown line runs diagonally from the costa to the inner margin, slanting inwardly. A similar line runs from the reniform to the inner margin slightly curved below the reniform and slanting outwardly. Beyond the reniform another fine line runs from the costa toward the outer angle, which it does not quite reach. The margin is marked by a fine dark line. The fringes are slightly darker than the rest of the wing. The secondaries on the upper side are uniformly dark fuscous with the fringes a trifle paler. On the

under side, the primaries are fuscous with the costa and the inner margin paler. The secondaries on the under side are pale fuscous, profusely irrorated with minute brownish scales. The fringes of both primaries and secondaries on the under side are darker than the body of the wing. Expanse, 34 mm.

68. *A. transversata*, sp. nov. ♂. Head, collar, thorax, and abdomen brown; under side paler. Primaries on the upper side brown with the basal area and the costa lighter. The costa is marked by three equidistant triangular brown spots and by a moderately large subquadrate brown spot just before the apex. There is a circular black spot in the middle of the cell and a large reniform spot at its end surrounded by a blackish line. A moderately broad dark line runs from the inner margin beyond the base toward the cell, which it reaches a little behind the circular round spot in its middle. A brownish cloud runs from the interior angle of the large subquadrate spot near the apex across the wing in the region of the reniform and is continued beyond the reniform to the inner margin in the form of geminate obscurely defined curved lines. The third of the costal spots, reckoning from the base, is defined externally by a very narrow white line and is produced to the inner margin as a fine irregularly curved and sinuate transverse limbal line. The secondaries are uniformly dark fuscous. On the under side, both wings are fuscous. The primaries have the inner margin pale testaceous, the costa paler than the body of the wing and profusely irrorated with minute brown scales. There is also beyond the cell, an incomplete transverse dark limbal band extending from the costa as far as the origin of the median nervules. The secondaries are a trifle paler than the primaries, inclined to brownish, and profusely irrorated over their entire surface with minute darker scales. The secondaries have an obscure discal spot and an obscure and

incomplete transverse discal line running from the costa inwardly.

♀. The female is like the male. The antennae, however, are simple, as is characteristic of the genus, while those of the male are doubly pectinated. The markings of the female are also more obscure than in the male, and on the under side the transverse bands are obsolete. Expanse, 30 mm.

69. *A. argillacea*, sp. nov. ♂. Resembling the foregoing species, but differing in having the head and collar dark brown, a usual characteristic of the entire group to which there is an exception in *A. transversata*. The upper and lower side of the abdomen together with the legs are pale fuscous. The primaries are fawn on the upper side. There is a conspicuous reniform spot at the end of the cell margined with blackish. The wing is crossed by a curved sub-basal and by a transverse limbal line, the latter strongly angulated near the second median nervule, sweeping inwardly until it nearly touches the reniform below, and then continued downwardly to the inner margin at its middle. The transverse sub-basal and limbal lines are thickened on the costa and appear there as dark brown triangular spots. Between these dark spots about the middle of the wing is an obscure brown dash. On the costa before the apex is a very dark brown subtriangular spot. The edge of the costa at the apex is marked by a few light dots. The margin is defined by fine blackish transverse dashes on the interspaces. The fringes are fuscous. The secondaries are pale fuscous, the margin defined as on the primaries, the fringes being a trifle paler than the body of the wing. On the under side, both wings are pale reddish-fawn with the fringes darker, and have the area of the cell clouded with fuliginous, and the inner margin pale testaceous. Both primaries and secondaries have an obscure discal spot at the end of the cell. The primaries, furthermore, have above this spot a dark brown mark on the costa; the secondaries

beyond the discal spot toward the inner margin, have an obscure and incomplete transverse median band.

♀. The female is marked much as the male, but is generally paler. Expanse, 30 mm. Habitat Kangwé.

HYOSPILA, Guen.

70. *H. angulilinea*, sp. nov. ♂. Head, collar, and upper side of the thorax rich velvety black. Upper side of abdomen dark fuscous; lower side of thorax and abdomen pale fuscous. Legs concolorous. The primaries have the ground color wood-brown. On the middle of the cell is a minute round black spot, surrounded by a narrow pale creamy line. On the inner margin beyond the base is a large subtriangular dark brown spot with its apex resting upon the cell, its base on the inner margin. This spot is defined externally by a narrow pale creamy line. On the side of the insertion of the wing this subtriangular spot has its margin concave. In the direction of the outer margin of the wing, this spot has its edge convex and slightly toothed just before the inner margin of the wing. A fine creamy line runs from the costa before the apex inwardly, then sweeps upwardly toward the costa, and turning down again, sweeps outwardly, reaching the inner margin two-thirds of the distance from the base. The wing beyond this fine line is heavily clouded with dark blackish-brown, darkest in immediate proximity to the line, and thence becoming paler outwardly to the outer margin, which is laved with ashen. The margin is defined by minute narrow transverse dashes. The fringes are ashen like the adjoining portion of the wing. The secondaries are uniformly dark fuscous. The fringes a trifle paler. On the under side, both wings are pale fuscous, slightly darker toward the outer margin, and both have an obscure discal spot at the end of the cell. Expanse, 30 mm.

71. *H. (P.) nigribasis*. ♂. The antennae in this species are not so strongly pectinated in the male as in the preceding species. The head and thorax are rich velvety black. The metathorax is clothed with grayish hair. The upper side of the abdomen is dark fuscous. The under side of the thorax and abdomen are dark fuscous. The legs are black. The primaries on the upper side are pale wood-brown with the outer margin irregularly spotted with pale grayish-olivaceous maculations. At the base of the primaries is a very large and conspicuous velvety black spot coalescing at the base with the black vestiture of the thorax. This spot is rudely triangular with the apex resting on the cell, the side toward the thorax regularly concave, the apex blunt, and the side toward the outer margin convex. Its base rests on the inner margin. It is defined above by a narrow whitish line. The secondaries are uniformly dark fuscous with the costa at the base shining testaceous. The fringes are a trifle paler than the body of the wing. On the under side, both wings are uniformly dark fuscous with the inner margins a little paler.

♀. The female does not materially differ from the male. Expanse, 40 mm.

It may be remarked that the large spot at the base of the primaries in some specimens, which I believe to be truly referable to this species, is reduced and variously modified in form; in a few specimens being almost obsolete. The form shown in the plate is the prevalent form, however, and may be accepted as typical, seven-tenths of the specimens examined by me being marked exactly as is shown in the figure.

72. *H. jaculifera*, sp. nov. ♀. Allied to the preceding species, but very distinct. Head and collar dark velvety black. The upper side of the thorax and abdomen are dark brownish; the lower side of the thorax and abdomen paler. The legs are inconspicuous, or very little darker than the adjacent

parts of the body. The primaries are brown with the costa and the apical one-third clouded with smoky-brown. An acutely pointed and narrow triangular velvety black spot with its base resting on the inner margin is situated beyond the base. The apex which points toward the costa rests upon the middle of the cell. Beyond this spot are some faint and fine transverse paler lines and there is a broad and diffuse pale reniform spot at the end of the cell. The margin is defined by a very fine evenly scalloped dark brown line. The fringes are paler. The secondaries are fuscous with the base and the fringes paler. On the under side, the wings are pale fuscous, lighter on the inner margins and on the costa of the primaries. The secondaries are profusely irrorated with very minute dark scales. Expanse, 35 mm.

BAREIA, Walk.

73. *B. tenebrosa*, sp. nov. ♀. Head, thorax, and upper side of abdomen dark fuscous; lower side of thorax and abdomen paler grayish. The legs are blackish with the tarsi minutely ringed with whitish. On the upper side the primaries and secondaries are grayish, hoary. The primaries have the costa marked by a number of minute white spots on the edge. They are crossed by very fine and obscure basal, median, and limbal angulated transverse lines. There is also a very fine angulated submarginal line shaded inwardly near the apex by dark reddish-brown spots and succeeded before the apex by parallel fine white lines, separated from each other by a very fine darker line. On the middle of the outer margin and on the margin just at the apex is a dark brown linear transverse line, or dash. The secondaries are traversed by a curved and angulated sub-basal and median fine line. The submarginal markings of the primaries are continued upon the secondaries, and the fringes of the secondaries are pale tinged with ochraceous at the outer

PREPARATORY STAGES OF PSEUDOHAZIS SHASTAENSIS BEHRENS.

BY HARRISON G. DYAR, NEW YORK.

PSEUDOHAZIS SHASTAENSIS Behrens.*

1880—Behrens, No. Am. ent., i, 62.

var. DENUDATA Neumoegen.

1891—Neum., Can. ent., xviii, 145.

I have received the eggs of this species from Mrs. S. J. Kidder, who has very kindly taken the trouble to find them and forward them to me in good condition. They were received in the fall of 1892 and hatched on May 11th following.

Eggs—Deposited in a ring shaped mass around a leaf stem or twig, without covering. Oval, flattened at the sides, round on the base, but flat on top, forming a distinct, elliptical area, slightly depressed centrally at the micropyle. Smooth, shining, pale brown, covered with a white pigment below and on the narrower sides and forming a distinct ring around the top surface, inside of which is a dark brown border. Height 1.8 mm.; broad diameter centrally 1.6 mm., at top 1.1 mm.; narrow diameter centrally 0.8 mm., at top 0.7 mm. Duration of this stage throughout the hibernating period.

Larva, stage I—Head round, bilobed, shining black; antennae prominent; width 0.7-0.75 mm. Body dull black, feet reddish. Rows of modified processes, apparently arranged as in the mature larva, but only three rows discernible. Row i very long, rather slender, the anterior ones distinctly furcate or trifid, each branch with a very long, minutely spinulose, pale seta, even longer than the shaft. The processes are

shorter posteriorly, not furcate, though many bear two of the long setae. Row ii shorter than i with a seta from the middle and one from apex. Row iii very short, but many of the tubercles bear two setae. Anal plate concolorous with anal feet. Duration of this stage 13 days.

Stage II.—Head shining black, labrum and bases of antennae paler; width 1.0-1.2 mm. Body black, the tips of the spines straw colored. Processes very long, especially on joints 2-4 dorsally, where they are 1.5 mm. long. The others are nearly as long, but become gradually shorter posteriorly. The processes bear about six branches and are furcate at tip, each branch bearing a single pale stiff hair, longer than the branch itself. The branches arise alternately. Anal plates three, large, black; one suranal, the others at base of each anal foot.

Stage III.—Head depressed medially, shining black, clypeus whitish; width 1.4-1.8 mm. The characters of the mature larva are now first seen. Body black, the processes of row i with a short shaft on joints 4-12 and close set branches, each tipped with a short, black bristle or a long, pale seta. The branches are brownish yellow, contrasting with the body. The other processes have a long, thick shaft and separated branches as all did in the previous stage. Rather scant, pale hairs arise from the skin.

Stage IV.—Much as in the next stage, but darker, more shining, the body less hairy, and without any distinct lines. Width of head 2.2-3.3 mm.

Stage V.—Head rounded, median suture deep in front, clypeal sutures double; many coarse pale hairs. Color shining black, shaded with dull crimson on clypeus; width 3.7-4.5 mm. Processes arranged as follows: row i subdorsal on joints 2-11, a single dorsal one on joints 12 and 13, none on anal

* The common form of *Pseudohazis* with purplish fore wings has, strictly, never been described. Boisduval says of *eglanterina* "alae anticae albido-carneae" which applies to the form described as *arizonensis* by Strecker. Behrens' *shastaensis* was described from very black examples of the purple winged form, so this name will obtain. The form is constant, and has as good right to specific recognition as any species in the genus.

plate; row ii lateral, on joints 2-13; row iii substigmatal on joints 2-13; row iv above bases of legs on joints 2-4 and correspondingly on joints 5, 6, 11 and 13 anteriorly. There are three forms of the processes. The first, rosette-like, has a very short shaft with some 50 light brown quills with short black tips, which probably produce the strong urticating effect, besides a few central black branches which bear long terminal hairs. This type is found in row i on joints 4-12. The second is intermediate. The shaft is long with brown quills arranged around the base and some 10 black spines with terminal hairs, branching irregularly from the shaft and usually forming a trifid or bifid apex. This type is found in row i on joints 2, 3 and 13 and in row ii on joints 2-13. In the third form there are no quills, the long shaft furnished with irregularly distributed, subradiate branches tipped by long hairs. The branches are black; but many are partly or wholly light brown. This type is found in rows iii and iv. Three shining black, irregularly indented, hairy anal plates and a large rounded quadrangular cervical shield, bearing the processes of rows i and ii on joint 2. Body black with faint subdorsal and lateral and broader substigmatal, sinuate lilac lines, or nearly immaculate. Hair from the skin white, not long, but quite abundant, giving a grayish appearance to the larva.

Spiracles reddish white with a black line centrally. Claspers of abdominal feet tinged with dull crimson.

Cocoon.—Very slight, composed of a few threads drawing together loose material or, more commonly, none. The larvae conceal themselves, but do not enter the earth.

Pupa.—Rounded conical, thickest through the thorax, tapering posteriorly. Cases large and prominent, but very even and closely packed. Anterior end rounded; posterior end also rounded, much smaller. Segmental incisures abrupt, not deep, with little capability of motion. Cremaster reduced to a bunch of short hairs on a slight prominence, colored red-brown, curving outward. Surface finely granular. Color dark mahogany red, the cases a little paler. Length 25 mm.; width through thorax 9 mm., through abdomen at second moveable incisure 7 mm. Four incisures are well marked; but the posterior one is scarcely moveable, being coarsely punctured, while the others are smooth. Imago in about 50 days after pupation.

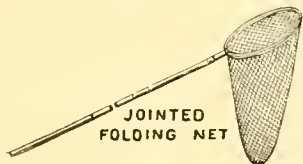
Food plants.—Wild lilac (*Ceanothus*), Manzanita (*Arctostaphylos*), etc. Fed in confinement on cultivated cherry.

Larvae from Watsonville, California. Others seen, but not bred, at Yosemite and Monterey, Cal. and Portland, Oregon. The larvae are gregarious till quite large.

A. SMITH & SONS, 121 NASSAU STREET, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,
Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.



JOINTED
FOLDING NET

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

PSYCHE

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. Nos. 218-221.

JUNE-SEPTEMBER, 1894.

CONTENTS:

ON THE PIGEON MITE, HYPODECTES FILIPPI.— <i>Henry B. Ward.</i>	95
NOTES ON SOME MELOIDS, OR BLISTER BEETLES, OF NEW MEXICO AND ARIZONA.— <i>C. H. Tyler Townsend.</i>	100
A PRELIMINARY LIST OF THE ACRIDIDAE OF NEW ENGLAND.— <i>Albert P. Morse.</i>	102
NEW AND UNDESCRIBED GENERA AND SPECIES OF WEST AFRICAN NOCTUIDAE.— V (Plates 3-5).— <i>W. F. Holland.</i>	109
A PRELIMINARY LIST OF THE BUTTERFLIES OF NORTHEASTERN MISSISSIPPI.— <i>Howard Evans Weed.</i>	129
NOTES ON THE REARING OF PLATYSAMIA CECROPIA.— <i>Katherine W. Huston.</i>	131
BIBLIOGRAPHICAL NOTES VI. BIOLOGIA CENTRALI-AMERICANA: HEMIPTERA HETEROPTERA.— <i>Samuel Henshaw.</i>	134
NOTES ON BOMBYCID LARVAE.— <i>Harrison G. Dyar.</i>	135
ENTOMOLOGICAL NOTES (The New England species of <i>Spharagemon</i> , illustrated; death of Edward Norton; Kolbe's Entomology; the species of <i>Crambus</i> about <i>Ithaca</i>).	138
PROCEEDINGS OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.	139
SUPPLEMENT (Conclusion of Dr. Holland's article).	141

PUBLISHED BY THE

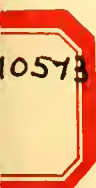
CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

Published May 31, 1894.



Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5.00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE,

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " " "	1.25	1.00
Half " " " "	2.25	1.75
One " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLANDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale

by the CAMBRIDGE ENTOMOLOGICAL CLUB:	
Burgess, E. Contributions to the anatomy of the milk-weed butterfly, Danais archippus. Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, Retinia frustrana. col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 13 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PAPILIO BUDDHA.

Finest specimens, each five shillings or 10 for £2.

T. KRAPP, Missionary,
Bethel, near Bielefeld, Germany.



AFRICAN NOCTUÆ (HOLLAND).
(REDUCED ONE FIFTH.)



AFRICAN NOCTUÆ (HOLLAND).

(REDUCED ONE FIFTH)



AFRICAN NOCTUÆ (HOLLAND).
 (REDUCED ONE FIFTH)

PSYCHE.

ON THE PIGEON MITE, HYPODECTES FILIPPI.

BY HENRY B. WARD, PH.D., LINCOLN, NEBR.

The November, 1892, number of *Insect Life* contained a note by Prof. D. S. Kellicott on a mite found in the thymus of a pigeon; on the authority of Murray ('77) it is said to be *Hypoderas columbae*. Last spring while working in the zoological laboratory of Harvard University, I obtained specimens of this same form through the kindness of Dr. W. McM. Woodworth, who had found them some time previously in the loose peritracheal tissue of a pigeon. Study of the parasites and of the literature bearing upon the group revealed so many points of interest, especially concerning this stage in the life history, that it seems proper to present here an abstract of the work of previous investigators since the number of names under which this form has been described renders its study difficult. The apparent lack of information among American students as to its interesting and complicated life history is due also, no doubt, to the inaccessibility of most of the papers bearing upon the subject. Together with this review is given as complete a bibliography as it has been possible to prepare. For assistance in this I am indebted to Mr. A. D. Michael of London, Eng. and to Profes-

or J. A. Lintner of Albany, N. Y. Reference has been made in the bibliography to reviews, abstracts and translations of the original articles so far as known to the writer, but the list is probably not complete.

The first published account of this parasite seems to have been that of Montagu ('68) whose description and figures leave no doubt as to the close relationship of the form he observed to that found in the pigeon, while at the same time the specific identity of the two forms must always remain uncertain on account of the incompleteness of his description. He named the form which he found in the gannet, *Cellularia Bassoni*.

Two Italian naturalists, Géne ('48) and Filippi ('61), were the next to record observations on similar mites. Filippi made a new genus, *Hypodectes*, to include them and described five species parasitic in the areolar tissue of various birds, each species receiving a name from its host.*

In the same year Giebel ('61), without knowledge of this last paper, published a posthumous article by Nitzsch

*His synopsis of these species together with their hosts is to be found in Mégnin ('79, p. 131).

in which a number of species were figured and described under the name of *Hypoderas*, *n. g.* In a note some time later Giebel ('63) acknowledged the identity of Nitzsch's genus *Hypoderas* with *Hypodectes* Fil., which had been brought to his attention and which might justly claim priority. In this note Giebel criticizes the plan of Filippi in naming the species after the host since, as Nitzsch emphasizes, the same species may be found in more than one host and, on the other hand, the same host may harbor more than one species of the parasite.

Robertson ('66) published a short account of the discovery of a mite parasitic in the English pigeon, but he appears to have been entirely ignorant of the work of his predecessors, except Montagu, whom he quotes. He gives a short account of the anatomy of the mite, recognizes it as an imperfect form, remarks upon its evident relationship to the Sarcoptidae and announces his intention of pursuing the subject further, a purpose which seems never to have been fulfilled.

Gerstäcker ('67) makes a brief mention of Robertson's work and identifies this mite as a species of *Hypodectes* Fil.*

A full account of the anatomy and histology of *Hypodectes columbae*, *n. sp.* is to be found in Slosarsky ('77).† In this paper, read before a congress of Russian naturalists at Warsaw in 1875,

the author adds a new species to the genus *Hypodectes* Fil. He found no internal structure at all except the narrow muscle bands just under the cuticula by which the movements of the body and appendages are effected. Further than this the interior of the body consisted of a granular vesicular mass in which cell structure could not be demonstrated.*

To the researches of Mégnin is due the greater part of our knowledge of the life history of this form. In a series of papers ('73-'79) he established the larval nature of a number of mites without mouth-parts which had previously been regarded as distinct genera, and showed them to be merely abnormal (?) stages in the life history of other known species. With Ch. Robin (Robin et Mégnin '77) he investigated among others the form found in the pigeon and showed it to be an abnormal (adventitious or "hypopial"†) *nymph of Pterolichus falciger* Mégnin.

* In sections cut last spring I was equally unable to find either nuclei or cell walls in this granular mass. Claparède ('68) has shown that the metamorphoses of the Acarina are not simply ecdyses, but that the body undergoes an extended hystolysis.

† Hypopial, adj. derived from *Hypopus*. Mégnin ('73, p. 492) says "The conclusions to be drawn from my observations is that the genera *Hypopus*, *Homopus* and *Trichodactylus*, and the numerous species which have been established as subdivisions of those genera, must be stricken from our zoölogical nomenclature. The word *Hypopus* may be retained, but only as a common name serving to designate the curious *cuirassé*, *heteromorphous* and *adventitious nymph* of the Tyroglyphi whose office is the preservation and dissemination of the species to which it belongs." The name was afterwards used by the same author for similar nymphs in other families, *e. g.* *Pterolichus* (Robin et Mégnin, '77, p. 493).

*The species which Robertson examined is said by Mégnin ('79, p. 131) to be the same as Filippi's *Hypodectes nycticoracis*.

† On the authority of Mégnin ('79).

Later Mégnin alone ('79) published an extensive memoir on the mites of the cellular tissue of birds. Therein he reviews the work of many of his predecessors and adds to his own previous contributions a more extended account of this stage and of its relation to the life history. Mégnin had found in *Lophyrus coronatus* Vieill. not a single form but two, one of which he showed to be the male nymph of *Pterolichus falciger*; the other he was inclined to regard as the female nymph of the same species on account of its strong resemblance to the normal female. Mégnin explains the occurrence of these forms in the cellular tissue in the following way:

So long as the conditions of existence remain the same, the succession of stages in the life history of the mites is invariably egg, larva, normal nymph, male or female, and then the egg again. If, however, the conditions change, if the food or shelter necessary to life begin to disappear, the colony seems doomed to destruction. Certain species escape that fate, thanks to a curious biological phenomenon which we discovered and named adventitious or hypopial metamorphosis. This has been found to occur in four species of *Tyroglyphus* and in one of *Pterolichus*, *P. falciger*, a plumicolous sarcoptide of the pigeon. . . . When a pigeon invaded by a colony of these mites begins to pull out its feathers, the mites are deprived of shelter and of the secretions which serve them as food, the normal life cycle is arrested and the

normal nymph instead of giving rise to a male or female increases in size and brings out of its skin a new form, fitted to a new mode of life. This form is worm-like and has been described and figured under the name of an adventitious or hypopial nymph; it introduces itself into the follicles of the feathers, or even by the respiratory organs and reaches the cellular tissue, especially the peritracheal, which is very loose in birds. Here it lives and grows by absorption, for it has neither orifices nor internal organs, and returns to the surface only when the normal conditions are established.

Mégnin found a normal nymph of *Pterolichus falciger* enormously developed and in process of metamorphosis; it contained the larger hypopial nymph. As to the nature of the smaller form which is supposed to be the hypopial nymph of the female, he was not able to furnish any direct proof.

Trouessart et Mégnin ('85) in their revision of the group, have placed the adult, of which *Hypodectes* is the hypopial nymph, in a new genus, *Falciger*.

Murray ('77) refers to the form found in the pigeon under the generic name of *Hypodectes*; but his description and figures are entirely inadequate for identification.

In the United States this form has been reported several times. H. Gorman ('84) was the first to record its occurrence. He described it under its proper name, and recognized its nym-

phal character. Leidy ('90) noted very briefly its occurrence in the blue heron.* Kellicott's note ('92) has already been referred to; and to this list must be added its occurrence in the pigeon at Cambridge, Mass., as found by Woodworth. It will thus be seen to be widely distributed and will no doubt be found in most localities. It may be hoped that more extended observations will furnish further evidence on its life history.

This review should not be terminated without calling attention to a paper by Michael ('84) which, though it does not deal with the mite found in the pigeon, is of great interest from its bearing on the hypopial stage in other mites. The author first gives a very complete review of the literature on *Hypopus* and tabulates at the close of that part of his paper the eight different views as to what a *Hypopus* really is. His own experiments are then given and after showing their entire incompatibility with six of the diverse theories, he says (p. 379): "My own opinion decidedly confirms Ménézin's view that the true *Hypopus* is a heteromorphous nymphal form of *Tyroglyphus*, and possibly of some allied, or other, genera." At the close of his paper (p. 389) Michael summarizes his conclusions thus: "It appears to me:

1. That the true *Hypopipi* are not adult animals, but are a stage in a life history.
2. That they are heteromorphous

nymphs of *Tyroglyphus* and some allied genera.

3. That it is not all individuals that become *Hypopipi*, but only a few.

4. That the hypopial period takes the place of that between two ecdyses in the ordinary life history.

5. That, in those species which I have examined, the hypopial stage commences with the second nymphal ecdysis.

6. That the change to *Hypopus* is not caused by unfavorable circumstances, and is not any extraordinary or exceptional circumstance, but is a provision of nature for the distribution of the species occurring irrespective of adverse conditions.

7. That, in the present stage of our knowledge, we can no more say why one nymph becomes a *Hypopus* and another does not, than we can say why one ovum produces a male and another a female."

It will be seen from this that while observations and experiments of Michael serve to establish and fix with greater precision Ménézin's view as to the occurrence of such a stage, the conclusions of the two authors as to the cause of its occurrence are widely at variance. To be sure Michael's work does not touch the hypopial form found in the pigeon and it is difficult to see how the explanation he offers with evident probability for the other forms, *i. e.* "the distribution of the species irrespective of adverse conditions," could possibly apply to the case of a hypopial form which like that from the pigeon lives in an inactive

*There is no evidence, however, that this is the same species.

state in the tissue of the body of a bird.

Note. Since the above was written a year ago, there have been further references to similar parasites. I wish to call attention only to the parasite of the Goura, found by Dr. L. Karpalles,* which does not seem to have been identified by the finder. It is probably this genus.

University of Nebraska,
Lincoln, Neb.

Mich. 1894.

BIBLIOGRAPHY.

- BARALDI, GIOV.
'75. Stato particolare di una ninfa d'Acaride. *Hypodectes carphagae*, n. sp. *Atti Soc. Tosc. sci. nat.*, tom. i, p. 87-103, 1 taf.
- CLAPARÈDE, ED.
'68. Studien an Acariden. *Zeitschr. für wiss. zool.*, bd. xviii, 4, p. 445-546, taf. xxx-xl.
- FILIPPI, FILIPPO DE.
'61. Note zoologiche. I, *Hypodectes*, novo genere di Acaridi proprio degli ucelli. *Archiv. zool. anat. e fisiol.* (Genova) fasc. i, p. 54-60, tav. v.
- GARMAN, II.
'84. Pterolichus falseiger, Mégnin, observed in the United States. *Amer. nat.*, vol. xviii, p. 430-431, 1 wood cut.
- GENÉ, G.
'48. Brevi cenni su un acaridio del genere dei Sarcopti che vive sulla *Strix flammea*. Scritto postumo, Torino 1848.
- GERSTÄCKER, A.
'67. Bericht über die wissenschaftlichen leistungen im gebiet der entomologie während des jahres 1865-66, ii. hälfte. *Archiv für naturgeschichte*, bd. xxxiii, theil 2, p. 305-533.
- GIEBEL, C. G.
'61. Die Milbenarten der gattung *Hypoderas* Nitzsch. *Zeitschr. f. d. gesamt. naturw.*, bd. xviii, p. 438-444.
'63. *Hypoderas* Nitzsch. = *Hypodectes* Filippi. *Zeitschr. f. d. gesamt. naturw.*, bd. xxi, p. 79-80.
- KELLICOTT, D. S.
'92. *Hypoderas columbae*. A note. *Insect life*, vol. v, no. 2, p. 77-78, 1 fig.
- LEIDY, JOS.
'90. *Hypoderas* in the Little Blue Heron. (Florida caerulea.) *Proc. acad. nat. sci. Philad.*, 1890, p. 63.
- MÉGNIN, P.
'73. Sur la position zoologique et le rôle des Acariens parasites connus sous les noms d'*Hypopus*, *Homopus* et *Trichodactylus*. *Comptes rendus*, tom. lxxvii, p. 129-132, p. 492-3. Translated in *Ann. mag. nat. hist.*, ser. 4, vol. xii, p. 429-30.
'74. Memoire sur les *Hypopus* (Dugés) Acariens parasites encore nommés *Homopus* Koch et *Trichodactylus* L. Dufour. *Journ. anat. et physiol.*, tom. x, p. 225-254.
'76. Note sur la faculté qu'ont certains Acariens, avec ou sans bouche, de vivre sans nourriture pendant des phases entière de leur existence, et même pendant toute leur vie. *Comptes rendus*, tom. lxxxiii, p. 993-995. Translated in *Ann. mag. nat. hist.*, ser. 4, vol. xix, p. 270-271.
'79. Les Acariens parasites du tissu cellulaire et des reservoirs aériens chez les oiseaux. *Journ. anat. et physiol.*, tom. xv, p. 123-153, pl. vii-viii.
- MICHAEL, A. D.
'84. The *Hypopus* question, or the life history of certain Acarina. *Journ. Linn. soc. Lond.*, *Zool.*, vol. xvii, p. 371-394, pl. xv.
- MONTAGU, G.
'68. Observations on some peculiarities observable in the structure of the gannet;

*Ver. zool.-bot. gesellsch. Wien, bd. xliii, p. 46-7.

and an account of an insect discovered to inhabit the cellular membrane of that bird. Mem. Wernerian nat. hist. soc., vol. i, p. 176-193, pl. vii, figs. 1-3.

MURRAY, A.

'77. Economic entomology, Aptera. Scribner, Welford, and Armstrong, N. Y.

ROBERTSON, C.

'66. Note on an undescribed species of *Acarus* found in the pigeon, *Columba livia*. Quart. journ. micr. sc., n. s. vol. vi, p. 201-203, 4 figs. Abstracted in Amer. nat., vol. iii, p. 389.

ROBIN, CH., AND MÉGNIN, P.

'77. Mémoire sur les Sarcoptides plumicoles. Journ. anat. et physiol., tom. xiii, p.

209-248, pl. xi-xii, p. 391-429, pl. xxii-xxv, p. 498-521, pl. xxvi-xxix, p. 629-656, pl. xxxvi-xxxviii.

SLOSARSKY, A.

'77. On the anatomy and systematic position of *Hypodectes columbae*, n. sp. Warsaw, 1877, 14 pp., 1 pl. (In the Russian language.)

TROUËSSART E.-L. ET MÉGNIN, P.

'85. Les Sarcoptides plumicoles ou Analgésines. I. Les Ptéroliches. Journ. de microgr., tom. viii, p. 92-101, 150-157, 211-219, 257-266, 331-338, 380-385, 428-436, 527-532, 572-579. tom. ix, p. 63-70, 109-117. Also published separately, Paris, A. Doin, So., 84 pp., 17 figs., 2 pl.

NOTES ON SOME MELOIDS, OR BLISTER BEETLES, OF NEW MEXICO AND ARIZONA.

BY C. H. TYLER TOWNSEND, KINGSTON, JAMAICA.

The blister beetles form quite an important and characteristic feature of the coleopterous fauna of the southwest. I remember that the only entomological specimens that I could find in the Museo nacional, in the City of Mexico, were a case of the different species of native blister beetles. The Mexican highlands are quite rich in these forms, and it would seem that the descendants of the Spaniards in Mexico take a natural public interest in the relatives of the Spanish fly. At any rate, this interest exists to the exclusion of all other insects, so far as the Mexican national museum is concerned.

New Mexico and Arizona belong to the same natural region as the highlands of Mexico, and the following notes on

nineteen species of meloids collected in those territories will be of interest. The specimens from Grant County, N. Mex., were collected by Mr. W. J. Howard, in 1882, and formed a part of a collection donated by Hon. W. G. Ritch, ex-secretary of the Territory, to the Historical society, at Santa Fé, N. Mex.

Cystodemus wislizeni Lec.—Found singly crawling on sandy mesa to eastward of Las Cruces, toward Organ mountains, August 20, and other dates. This is a very peculiar spherical shaped species, of a brilliant blue or purple color, with more or less of metallic reflections. Det. by Liebeck.

Megetra vittata Lec.—A very large number of this large, lubber-like, black

and red blister beetle were found on ground in a very restricted area at Pescado, on the Zuni Indian reservation, N. Mex., July 31, 1892. They seem like a lubber-grasshopper edition of a blister beetle. The abdomens of the females were especially swollen and filled with eggs, as was seen by opening one. They are black with transverse red stripes or bands. A number of pairs were observed in coitu. Their numbers, and peculiar form and markings, make the occurrence an interesting one. Det. by Liebeck. A single specimen was found in the Organ Mountains, Doña Ana County, N. Mex., Nov. 26, 1892, at the north end of the range near base, back of and east of San Augustine. One specimen was also found in the collection made by Mr. W. J. Howard in Grant County, N. Mex., in 1882.

Meloe sublaevis Lec.—A single specimen from Grant County, N. Mex. (W. J. H.). This has much the appearance of *Megetra*. It is wholly black, with short elytra, covering little more than two-fifths of the abdomen. Det. by Riley.

Nemognatha immaculata Say.—One from Grant County, N. Mex. (W. J. H.). It is very pale dilute yellowish in color, with tarsi and antennae darker. Det. by Riley.

Macrobasis longicollis Lec.—This is a large gray blister-beetle. Collected in Las Cruces. Det. by Riley.

Macrobasis ochrea Lec.—One specimen from Grant County, N. Mex. (W. J. H.). This is an elongate species, of a straw yellowish color. Det. by Riley.

Macrobasis gissleri Horn.—Found in the blooms of *Yucca baccata*, May 15, 1892. Region of the Organ Mountains, near Las Cruces, N. Mex. Several specimens. This is the species mentioned in *Zoe*, vol. iii, p. 114, as *Epicauta cinctipennis* with a query. Specimens were afterward determined by Dr. Riley as *M. gissleri*.

Epicauta pardalis Lec.—Found great numbers of this species bunched on low weeds and grass in a restricted area, along roadside just west of the continental divide, between Patterson and Gallo Spring, Socorro County, N. Mex., June 21, 1892. Det. by Liebeck.

Epicauta maculata Say.—Several specimens found on plateau a few miles to the north of San Francisco Mountain, Arizona, July 5, 1892. Det. by Liebeck.

Epicauta funebris Horn.—Several specimens, Las Cruces, Oct. 24. On various weeds. Det. by Riley.

Epicauta corvina Lec.—Two specimens of this black species from Grant County, N. Mex. (W. J. H.). Det. by Riley.

Pyrota terminata Lec.—One from Sabinal, N. Mex., August 7, 1892. It is pale straw yellow, with three large black markings on each elytron, the anterior one split into two. Head and thorax with more of an orange tinge. Two also from Grant County, N. Mex. (W. J. H.). Det. by Riley.

Pyrota postica Lec.—This is a large black and yellow meloid—see *Insect life*, vol. v, p. 40. It is light orange yellow, with four black dots on pro-

thorax, two black spots at base of each elytron, and one very large subquadrate spot before tip. Tarsi black, and under side of thorax and abdomen more or less black. Occurs very numerous near Las Cruces, N. Mex., on *Larrea mexicana*, particularly on flowers. Det. by Liebeck.

Cantharis deserticola Horn.—This is a black meloid, with orange head and thorax. Three specimens from Grant County, N. Mex. (W. J. H.). Det. by Riley.

Cantharis nuttalli Say.—This is a beautiful metallic green species, the elytra with a greenish purple luster. The wing covers are rather tapering apically. One from Grant County, N. Mex. (W. J. H.). Det. by Riley.

Cantharis cyanipennis Say.—This is a purplish blue species, with tapering

elytra, somewhat smaller than *C. nuttalli*. One from Grant County, N. Mex. (W. J. H.). Det. by Riley.

Cantharis biguttata Lec.—One specimen collected at Zuni Pueblo, N. Mex., July 29, 1892. It is yellowish in color. Det. by Riley.

Cantharis sphaericollis Say.—Two specimens of this beautiful green species were found on San Francisco Mountain, Arizona, July 15, 1892. Western slope, probably about 10,000 feet. Det. by Liebeck.

Eupompha fissiceps Lec.—One from Las Cruces. on mesa toward Organ Mountains, July, 1892, (E. C. Holmes). This is a beautiful bluish green metallic species, with head and legs rufous. The elytra are roughened. Det. by Riley.

A PRELIMINARY LIST OF THE ACRIDIDAE OF NEW ENGLAND.

BY ALBERT P. MORSE, WELLESLEY, MASS.

In the following list I have sought to aid the student beginning the study of this family by providing a catalogue and ready means of indicating, for exchange or other purpose, the species and more noticeable less important forms of locusts found in New England. While several points yet remain to be settled regarding the relations of certain forms and the identity of others, it is believed that the list will be found convenient to use and practically complete.

In order to make it as complete and correct as possible I shall be grateful for information of any errors and desirable or necessary additions. This desire, together with the hope that it will lead to wider interest in and a more thorough knowledge of the group, leads me to publish it at the present time.

The New England representatives of the family Acrididae are distributed in this list among five subfamilies, twenty-three genera, forty-five well-defined

species, with two additional forms of doubtful specific value, and about ten tolerably distinct forms characterized by unimportant variations in color and structure; some of these last have been and still are occasionally referred to as species. Of this number two are new species recently described and six have not been reported in previous lists, while several names occurring in the literature of the group have been reduced to synonyms or retained in places below specific rank.

I have met in the field in various parts of New England all but two species, and one of these I have taken in an adjoining state, while I have examined representatives of all. Some of them are the most abundant of insects while others are extremely rare, one species, *Hesperotettix viridis* Thos., not having been reported, so far as I am aware, from the territory east of the Mississippi River until taken by me at Wellesley.

The list is based chiefly upon material personally collected, but also upon an examination of the types of the species described by Mr. Scudder — to whom I am under obligation in many ways—together with other material in his collection, and upon the more important literature on the group. To Mr. Wm. Beutenmüller I am indebted for notes on those species occurring in the vicinity of New York.

A few of the principal synonyms and names less exactly equivalent accompany those of the species and genera in the list and I have added in the index

the generic and specific names used in eight of the most important or generally accessible publications (see index) on the New England members of the family, referring to the numbers borne by those groups in the list, thus making it to a considerable degree synonymical and bibliographical, a feature which the novice and possibly others will appreciate. Such notes as it seemed would render the list more convenient to use are also added to it and references to descriptions of certain species not included in the literature cited, as well as to the more useful of those contained therein.

A more extended work containing diagnostic keys and notes on the habits and distribution of the species is contemplated.

In numbering the species and forms I have not attempted to indicate the difference between subspecies, variety, and dimorphic form, but have used a somewhat elastic modification of the decimal method which I trust will be found clear, brief, and in consequence convenient to use in designating these forms in exchanges, *e. g.*, and readily capable of sufficient extension to allow of all necessary additions likely to occur. This method is as follows:—each species is indicated by a numeral; each of its marked forms distinguished by structural characters by a decimal of this; each form distinguished by general coloration by a figure in the hundredths place; and in case of color differences pertaining to special parts by a figure in the thousandths place.

Its application will be readily understood by examining successively Nos. 33, 34, II, 2, and 24.

Additional forms of the numbered species can be readily inserted by continuing the notation, and other species can be added by prefixing a letter to the number of the preceding species.

LIST.

The principal synonyms are enclosed in parentheses. References to the more useful descriptions are indicated by abbreviations arranged alphabetically (see literature in index).

- C = Comstock,—Introd. to Entom.
 F = Fernald,—Orth. N. E.
 H = Harris,—Ins. Inj. Veg.
 ScI = Scudder,—Mat. Monog.
 ScII = “,—in Geol. N. H.
 SmM = Smith,—Orth. Maine.
 SmC = “,—“ Conn.
 T = Thomas,—Syn. Acrid. N. A.

The generic names are those in general use; the specific names are for the most part those given in the works of Fernald and Scudder except where recent studies have shown the need of change.

TRYXALINAE.

1. *Chloealtis* (*Chrysochraon*).

See notes on the forms of this genus in *Psyche*, 1894, pp. 13, 14.

1. *conspersa* Harr. C 102, F 36, H 184, SmM 145, SmC 375, T 76.
 .00 *conspersa* Harr., punctate.
 .01 “ *abortiva* Harr., maculate. H 184.
 2. *viridis* Scudd., wings short. F 36, ScI 455, SmC 374, T 75.
 .00 *viridis* Scudd., wings short, green.
 .01 *viridis* Scudd., wings short, brown.

- .1 *viridis punctulata* Scudd., wings long. F 36, ScI 455, T 77.
 .10 *viridis punctulata* Scudd., wings long, green.
 .11 *viridis punctulata* Scudd., wings long, brown.

2. *Stenobothrus*.

For description of *St. olivaceus* and critical and diagnostic notes on several forms of this genus see *Psyche*, 1893, 477-479. *St. speciosus* Scudd. is erroneously reported from Mass. and Conn. in Gerstaecker, *Archiv. f. Nat.*, xxix, ii, 358.

3. *curtipennis* Harr. C 102, F 37, H 184, SmM 147, T 91.
 .0 *curtipennis* Harr., wings short.
 .1 “ *longipennis* Scudd., wings long. ScI 457, SmM 147.
 4. *aequalis* Scudd. (*maculipennis*). C 102, F 37, ScI 459, T 89.
 .00 *aequalis* Scudd., green.
 .01 “ *bilineatus* Scudd., brown. ScI 460, T 90.
 5. *pelidnus* Burm. (*propinquans*). ScI 461, T 90.

Mr. Scudder informs me that from an examination of Burmeister's type *St. propinquans* Scudd. is a synonym. From an examination of the types of *St. propinquans* and a small number of other N. E. specimens I suspect that they must be considered as long-winged individuals of *St. aequalis* Scudd. As this would involve a considerable shifting of names it seems best to give each a place until additional evidence accumulates. The type of Burmeister came from Penn'a. I have seen specimens from the west, referred to this name by good authorities, which belonged to a distinct species, not found, so far as I am aware, in New England.

6. maculipennis Scudd. ScI 458, T 87.
 .00 " " , green.
 .01 " " , brown.
7. olivaceus Morse. See note under genus.
 .00 " " , green.
 .01 " " , brown.

3. Stethophyma (Arcyptera).

8. lineata Scudd. F 38, ScI 462, 463, T 98.
 9. gracilis Scudd. ScI 463, T 99.
 10. platyptera Scudd. ScI 463, T 99.

OEDIPODINAE.

4. Chortophaga (Tragocephala).

11. viridifasciata DeG. C 104, F 40, H 182, T 103.
 .00 viridifasciata virginiana Fab., green.
 .01 " infuscata Harr., brown. H 181, T 102.
 .011 viridifasciata infuscata radiata Harr., wing veins black. H 183.

5. Encoptolophus (Oedipoda).

12. sordidus Burm. (nebulosa) C 103, F 41, H 181, T 116.

6. Arphia (Tomonotus, Oedipoda).

13. xanthoptera Burm. F 39, ScI 469-470, SmC 372, T 105.
 14. sulphurea Fab. F 39, ScI 470, SmC 372, T 105.

7. Camnula (Oedipoda).

15. pellucida Scudd. F 41, ScI 472, T 137.

8. Hippiscus (Oedipoda).

16. rugosus Scudd. F 42, ScI 469, T 132.
 17. tuberculatus Pal. de B. (phoenicoptera, corallina). F 42, H 176, SmC 371, T 135.

9. Dissosteira (Oedipoda).

18. carolina Linn. C 104, F 43, H 176, SmC 371, T 117.

10. Spharagemon (Oedipoda, Dissosteira).

For an extended treatment of the N. E. species of this genus see Proc. Bost. soc. nat. hist., v. xxvi, p. 220-240.

19. aequale Say. (F 143, H 178, T 114)?
 .01 " scudderi Morse. See note under genus.
20. holti Scudd. (balteatum, aequale). C 104, F 43.
21. saxatile Morse. See note under genus.

11. Scirtettica (Dissosteira, Oedipoda).

22. marmorata Harr. F 44, H 179, T 111.

12. Circotettix (Oedipoda).

23. verruculatus Kirby (latipennis). F 45, H 179, ScI 471, T 115.

13. Psinidia (Oedipoda, Locusta).

24. fenestralis Serv. F 44, H 180, SmC 373, T 118, 119.
 .000 fenestralis Serv., wings red.
 .001 " eucerata Harr., wings yellow. H 180, T 119.

14. Trimerotropis (Oedipoda, Locusta).

25. maritima Harr. F 45, H 178, SmC 373, T 124.

ACRIDINAE.

15. Schistocerca (Acridium).

26. alutacea Harr. C 106, F 31, H 173, SmC 370, T 171.
 27. rubiginosa Harr. C 106, F 31, ScI 467, SmC 370, T 170.

16. Paroxya.

28. atlantica Scudd. F 34.
 .01 " " , melanistic.

17. *Hesperotettix* (*Ommatolampis*).
 29. *viridis* Thos. T 156.
 18. *Melanoplus* (*Caloptenus*, *Pezotettix*).
 30. *bivittatus* Say (*flavovittatum*).
 .001 " *femoratus* Burm. C 110, F 32, H 173, SmC 362, T 166.

Mr. W. S. Blatchley of Indiana finds these two forms paired and considers them to belong to one species. *M. femoratus*, the red-legged form, is alone found in New England, but of *M. minor* specimens with red and with glaucous hind tibiae are about equally plentiful.

31. *punctulatus* Uhl. (*griseus*). F 32, ScI 465, T 163, 165.
 32. *femur-rubrum* DeG. C 110, F 33, H 174, SmC 362, T 163.
 33. *atlantis* Riley. C 110, F 33.
 34. *junius* Dodge.
 .0 " " , wings short.
 .1 " " , " long.

For description see Canadian Entomologist, viii, p. 9, 1876.

35. *minor* Scudd.
 .000 " " , hind tibiae glaucous.
 .001 " " , " " red.

For description see Proc. Boston soc. nat. hist. xvii, 478, (1875), or Scudder's Century of Orthoptera, p. 22, (no. 30).

36. *collinus* Scudd. F 32.

19. *Pezotettix*.

Pezotettix and *Melanoplus* are here used merely in the sense of indicating the shorter- and longer-winged series of species.

37. *borealis* Fieb. (*borealis* Scudd., *rectus*, *septentrionalis*). F 32, 33, ScI 464, SmM 149, T 153, 222, 227.

I have elsewhere (*Psyche*, 1894, p. 53) stated my belief that *Mel. rectus* Scudd. = *Pez. borealis* Scudd. and Mr. Scudder had previously stated the probability that *borealis* = *septentrionalis* Sauss. On calling his attention to the description by Brunner von Wattenwyl (*Verh. zool. bot. gesel.* Wien 1861, 223) of a specimen from Labrador referred to *Cal. borealis* Fieb. he kindly looked into the matter with me and expressed the opinion that the synonymy should probably be as follows: *Caloptenus borealis* Fieb., 1853 (orig. descr. in *Lotos* III, p. 120, 1853, Labrador) = *Cal. borealis* Fieb. (auct. Brunner), 1861, = *Pez. septentrionalis* Sauss., 1861, = *Pez. borealis* Scudd., 1862, = *Mel. rectus* Scudd., 1878. Brunner's description fits better than that of Fieber.

38. *scudderi* Uhl. C 107, SmC 370, T 152.
 39. *manca* Smith. F 30, SmM 149, T 149.
 40. *glacialis* Scudd. C 107, F 29, T 148.

OPOMALINAE.

20. *Opomala*.

41. *brachyptera* Scudd. F 35, ScI 454, T 63.
 .0 *brachyptera* Scudd., wings short.
 .1 " " , " long.

TETTIGINAE.

See remarks on New England species in *Psyche*, 1894, pp. 53, 54.

21. *Tettix* (*Tetrix*).

42. *granulatus* Kirby. F 46, ScI 474, T 182.
 43. *ornatus* Say. F 46, ScI 474, T 183.
 .0 " "

- .1 ornatus triangularis Scudd., wings and pronotum abbreviated. F 47, ScI 475, T 185.
 44. cucullatus Burm. F 47, ScI 474, 475, T 185.

22. **Batrachidea.**

45. cristata Harr. F 48, ScI 478, SmC 377, T 190.
 .0 cristata Harr.
 .1 " carinata Scudd., wings and pronotum long. F 49, ScI 479, T 190.

These forms have been placed in Tettix by some recent authors.

23. **Tettigidea (Tetrix).**

46. lateralis Say. F 48, H 187, ScI 477, T 187.
 47. polymorpha Burm. F 48, H 187, ScI 477, SmC 377, T 188.

Additional species especially to be looked for are *Schistocerca americana* and *Spharagemon oculatum*. These have been taken on Staten Id. Mr. Beutenmüller suggests also *Acridium obscurum* and *Hippiscus discoideus* which have been found in New Jersey.

INDEX.

In addition to the names used in the list, those occurring in the eight most important or generally accessible works on the New England Acrididae are included. These works are the following:—

C = Comstock, J. H. — Introduction to Entomology (pp. 97-112). Pub. by author, Ithaca, N. Y., 1888.

F = Fernald, C. H. — The Orthoptera of New England, pp. 61; *same*, in 25th Report Mass. Agric. College (pp. 85-

145), Jan., 1888; *same*, in Report Sec. Board Agric. Mass., 1887, (pp. 421-481). The pagination of the separate is used.

H = Harris, T. W. — A Treatise on some of the Insects Injurious to Vegetation, 3rd ed., 1862 (pp. 165-191). First edition pub. 1841.

ScI = Scudder, S. H. — Materials for a Monograph of the North American Orthoptera, including a Catalogue of the known New England Species.— *in* Boston Journ. Nat. Hist., vol. vii, no. iii, 1862 (pp. 409-480).

ScII = *ibid.* — The Distribution of Insects in New Hampshire, *in* Hitchcock's Geol. N. H., vol. i, 1874 (pp. 370-379).

SmM = Smith, S. I. — On the Orthoptera of the State of Maine, *in* Proc. Portland Soc. Nat. Hist., 1868 (pp. 143-151).

SmC = *ibid.* — Report of the Entomologist to the Conn. Board of Agric. for 1872, *in* Annual Rep't Sec. Agric. Conn. for 1872 (pp. 345-383).

T = Thomas, Cyrus. — Synopsis of the Acrididae of North America Rep't U. S. Geol. Surv. Terr., Hayden, vol. v, pt. i, 1873.—pp. x, 262.

So much of the bibliography and synonymy is given in this literature (especially in F, ScI, and T) that it seemed unwise to encumber this list with them. The principal synonyms are inserted in the list; to find additional ones note the number of the species in the list and look for it among the right-hand numbers in the index.

Generic names begin with a capital, specific with a lower case letter.

Names are numbered according to the list. Those numbered at the left will be found in the list; those numbered at the right have been used in an erroneous or more or less synonymous sense, and the numbers are those borne in the list by the species to which reference is made.

INDEX.								
			dorsalis	43	phoenicopterus	17		
1	abortiva		5	Encoptolophus	10	platyptera		
	Acridium	15	24	eucerata	47	polymorpha		
	Acrydium	15, 18	30	femoratus		propinquans	5	
	Arcyptera	3	32	femur-rubrum	13	Psinidia		
19	aequale	20	24	fenestralis	2	punctulata		
4	aequalis	4, 19		fenistralis	24	punctulatum	2	
26	alutacea		40	flavovittatum	30	31	punctulatus	
	alutaceum	26	9	glacialis		quadrinaculata	43	
	Arcyptera	3	42	gracilis		11	radiata	
6	Arphia		42	granulata	42	rectus	37	
33	atlanis			granulatus		27	rubiginosa	
28	atlantica			griseus	31	rubiginosum	27	
	atlantis	33		[harrisii (undescribed)]		rugosa	16	
	balteatum	20	17	Hesperotettix		16	rugosus	
22	Batrachidea		8	Hippiscus		21	saxatile	
	bilineata	43	11	infuscata		15	Schistocerca	
4	bilineatus		34	junius		11	Scirtettica	
30	bivittatus		46	lateralis		19, 38	scudderii	
20	bolli		8	latipennis	23	septentrionalis	37	
37	borealis			lineata		sordida	12	
41	brachyptera			Locusta	1, 2, 4-6, 8-14	12	sordidus	
	Caloptenus	18, 19	3	longipennis		10	Spharagemon	
7	Camnula		6	maculipennis	4, 6		Stetheophyma	3
45	carinata		39	manca		3	Stethophyma	
18	carolina		25	maritima		14	sulphurea	
	Chimarocephala	4	22	marmorata			sulphureus	14
1	Chloeahtis			melanopleurus	1		Tetrix	21, 23
	Chloiahtis	1	18	Melanoplus	18, 19	23	Tettigidea	
4	Chortophaga		35	minor		21	Tettix	
	Chrysochraon	1		nebulosa	12		Tomonotus	6
12	Circotettix		7	Oedipoda	5-14		Tragocephala	4
36	collinus			olivaceus		43	triangularis	
1	conspersa			Ommatolampis	17	14	Trimerotropis	
	conspersum	1	20	Opomala		17	tuberculatus	
	corallina	17	43	ornata	42, 43		verruculata	23
45	cristata		16	ornatus		23	verruculatus	
	cucullata	44		Paroxya		11	viridifasciata	
44	cucullatus		5	parvipennis	47	2, 29	viridis	
3	curtipennis		15	pelidnus		13	xanthoptera	
9	Dissosteira	9, 10, 11	19	pellueida			xanthopterus	31
	Dissosteria	9		Pezotettix				
				phoenicoptera	17			

(Continued from page 90.)

angle. On the under side, the primaries are hoary with the inner margin shining testaceous. A rich maroon band rounded at the costa crosses the cell and terminates upon the shining inner area. This is followed outwardly by some whitish lines and mottlings. The outer third is broadly fuliginous, this dark area being invaded on the side of the costa and the inner margin by minute bluish-gray maculations. The marginal markings of the upper side reappear upon the lower side, but far more distinctly, the dark spots being blacker and the paler lines brilliantly white. The secondaries are crossed by a dark velvety black sub-basal band, are broadly marked with warm brown on the middle and outer third, this dark tract being ornamented near the inner margin by some heavy velvety black markings, and on the outer margin being invaded by a profusion of minute chalky-white mottlings. Expanse, 33 mm.

This singular moth is represented in my collection by a single specimen.

TOXOCAMPA, Guen.

74. *T. dedecora*, sp. nov. ♂. Head and collar rich maroon. Patagia and thorax pale fawn. Upper side of abdomen pale stramineous. Under side of abdomen pale straw-yellow. The upper side of the primaries is pale lilacine-fawn, lighter on the outer margin. There are faint and obscure traces of a pale reniform and discal spot and the wings are traversed by very fine and obscure transverse sub-basal and transverse median lines, which cross the wing from the costa to the inner margin, slanting outwardly, and there is also a very faint and fine transverse limbal line, which after running parallel to the median line as far as the second median nervule, returns inwardly along the line of that nervule and coalesces with the transverse median line. The secondaries are uniformly pale straw-

yellow. On the under side, both wings are straw-yellow; both have a faint discal spot at the end of the cell; both have the margin near the apex ornamented by brownish transverse dashes. Expanse, 40 mm. Habitat Benita and Kangwé.

THERMESIIDAE.

THERMESIA, Guen.

75. *T. aurantiaca*, sp. nov. ♀. Palpi, head, and collar dark brown. Upper side of thorax and abdomen orange-yellow; under side of thorax and abdomen slightly paler yellow. Legs concolorous with the anterior margins and the tarsi of the first two pairs brown. The primaries and secondaries on the upper side are pale orange-yellow with the fringes dark brown. The dark brown of the fringe on the primaries is continued inwardly on the outer margin below the apex, forming a distinct sub-lunate shade, punctuated on the margin outwardly and inwardly by a few small black spots. There is a minute brown spot in the cell and a moderately large reniform spot at its end. The reniform is pale brown, surrounded by a blackish line. There is a faint sub-basal curved line; beyond the reniform are geminate curved discal lines, the innermost the most distinct, the outermost interrupted, consisting of a series of faint spots or dashes upon the nervules. There is a series of submarginal spots or dashes located upon the nervules and parallel to the limbal lines. On the secondaries the transverse limbal and submarginal markings are continued from the primaries. On the lower side, the wings have the ground color as on the upper side. The inner margin of the primaries is immaculate, shining. The remainder of the wing is profusely irrorated with minute ferruginous spots and the outer margin is heavily clouded with dark brown. The secondaries have the costal and apical area irrorated with ferruginous spots like the primaries and the

apical portion of the outer margin is likewise clouded with dark brown. There is a minute discal spot on the primaries and both wings are crossed by incomplete, but quite distinct, transverse median, transverse limbal, and geminate submarginal brown lines. Expanse. 40 mm. Habitat Valley of the Ogové.

76. *T. discipuncta*, sp. nov. ♂. Allied to *T. (Azasia) rubricans*, Walk., and *T. (Remigia) subjecta*, Walk., but totally distinct. The head, collar, and upper side of the thorax are fawn. The upper side of the abdomen is paler fawn. The lower side of the thorax [and abdomen are dark fawn. The legs concolorous with the tibiae densely covered with hairs; the tarsi dark brown ringed with white. The prevalent color of the upper surface of the primaries and secondaries is fawn. Both wings have a minute dark brown spot in the middle of the cell. The primaries are crossed by five irregularly curved basal, sub-basal, median, limbal, and marginal transverse lines. At the end of the cell, in the primaries, is a very heavy and conspicuous black reniform spot. The transverse median brown line is enlarged at its costal extremity, forming a distinct subtriangular costal spot, which in some specimens fuses with the reniform. The margin is indicated by minute transverse linear dashes. The fringes are concolorous. The transverse lines on the primaries are continued upon the secondaries, the fringes of which are slightly paler than on the upper side, tinged on their inner margins with ochraceous. Both have a small discal dot. In the case of the primaries this dot is in some specimens reduplicated. The apex of the primaries is marked with a blackish shade punctuated by a deep black subapical spot. Both wings are crossed by curved transverse median and transverse limbal lines, and both have the marginal area marked with a few obscure brownish dots.

♀. The female closely resembles the male. It is worthy of observation that on the under side the dark discal spots and the dark apical markings of the primaries are sometimes replaced by whitish spots, a color variation, which is not unusual in some genera of noctuids. Expanse, 32 to 37 mm. Habitat Valley of the Ogové.

EUCAPNODES, gen. nov.

Palpi long, porrect, densely clothed with hairs; first joint long, extending beyond the front; second joint two-thirds the length of the first; third joint short, lanceolate, the hairs at its outer extremity widely diverging, giving it a fan-like shape. The antennae at the base are greatly swollen, the joints at their insertion forming a short peduncle heavily clothed with hairs, projecting from the vertex above the palpi, in a conspicuous manner. The remaining three-fourths of the antennae in the male are very finely ciliate. The primaries are subtriangular with the costa near its insertion incrassated on the lower side; convex before the apex. The inner margin is straight; the outer margin evenly rounded. The secondaries are suboval with the costa slightly convex, the outer and inner margin rounded, the inner margin slightly excised at the anal angle. The legs have the femora and tibiae very heavily clothed with long and dense hair. The tibiae of the last pair are armed with long double terminal and median spurs. The tarsi are short and naked.

I erect this genus for the reception of *Capnodes sex-maculata*, Walk. This species is generically very distinct from *Capnodes*, to which Walker assigned it, and may be at once distinguished by the very peculiar formation of the palpi and antennae.

CAPNODES, Guen.

78. *C. (?) haematoëssa*, sp. nov. ♂. Front dark brown with a minute white spot

at the insertion of each of the antennae. Collar dark rufous. Patagia and upper side of thorax red. Upper side of abdomen pale fuscous tipped with darker fuscous. Under side of thorax and abdomen pale luteous. Legs concolorous, the first and second pair with their anterior margins dark brown. The prevalent color of the upper surface of the wing is bright red. The costa is uniformly bordered on the primaries with dark brown. There is a narrow basal line which is continued along the costa and the inner margin fusing with a curved and denticulate sub-basal dark brown line, thus enclosing a large light red spot. Beyond the sub-basal line in the cell are two minute blackish dots. A broad median brown line crosses the wing from the costa to the inner margin, slanting outwardly. This is followed at the end of the cell by two minute black dots surrounded by an area of somewhat paler red than the body of the wing. From the costa a transverse limbal line runs with a regular outward curve as far as vein four, where it returns inwardly making a loop between veins three and four, and then with a broad and regular curve sweeps around to the inner margin. An irregular and very fine submarginal line extends across the wing from the costa before the apex to the inner margin before the outer angle, coalescing with the transverse limbal line on veins three and four. The parts of the wing included between the limbal and submarginal line are lighter in color than the rest of the wing. The inner margin between the sub-basal line and the limbal line from the margin to vein one is clouded with fuscous. The secondaries are clouded near the base and costa by pale fuscous. There is a small discal dot in the cell followed by an obscure transverse blackish line, succeeded by a transverse limbal line, which is sharply produced on veins three and four as upon the primaries. On the under side, the wings are obscure ochraceous with the primaries shaded toward the apex with pale rosy-brown. The fringes are darker and the transverse

lines of the upper surface reappear upon this side. Expanse, 32 mm.

79. *C. nana*, sp. nov. ♂. Collar, thorax, and abdomen on the upper side fulvous; on the lower side, pale ochraceous. Legs concolorous. The wings on the upper side are pale ferruginous clouded with darker purplish-red lines and markings. The primaries are traversed by a curved basal and median line, the area between which is darker than the rest of the wing. There is a minute discal dot in the cell; an obscure limbal band of purplish-brown, from which a ray or shade of the same color runs outwardly in the region of the median nervules to the margin. There is a dark irregularly curved submarginal line and the margin is defined by fine transverse lines on the interspaces. The fringes are concolorous. The secondaries have the bands of the primaries continued upon them, and are slightly lighter in color than the primaries. On the under side, both wings are pale yellowish with the outer margins broadly laved with pink. Expanse, 20 mm.

80. *C. (♀) sideris*, sp. nov. ♂. Head, thorax, and abdomen on the upper side dark brown. On the lower side, the thorax and abdomen are pale fawn. The legs are concolorous. The primaries on the upper side are rosy-brown, crossed by obscure and diffuse sub-basal, median, and limbal bands of which the latter is the broadest. There are also at the end of the cell two pale ochreous spots pupilled with blackish. The secondaries are of the same color as the primaries and are crossed with very indistinct sub-basal and median bands of obscure brown. The latter band is accentuated on the nervules by minute light colored points, which are obscurely surrounded by darker brown. The margins of both primaries and secondaries are defined by a very fine evenly crenulate line. The fringes are a trifle darker than the body of the wing. On the

under side, both wings are uniformly pale brown with a lilacine tint in certain lights. There is an obscure suggestion of an incomplete transverse limbal line on the primaries. Expanse, 40 mm.

81. *C. (?) acidalia*, sp. nov. ♂. Body pale cinereous. Legs whitish, the anterior margins of the tibiae of the first and second pair edged with brown. The primaries and secondaries are pale cinereous. They both have a minute blackish dot at the end of the cell. The primaries are crossed by a sub-basal and parallel limbal band, and have a triple series of very fine light brown sub-marginal waved markings. Just below the costa before the apex are two minute blackish dots. The margin is defined by minute blackish transverse dashes on the interspaces. The fringes are pale. The bands which traverse the primaries are continued upon the secondaries and the margins are marked in the same way. On the under side, both wings are pale whitish. The transverse lines of the primaries reappear, especially those forming the submarginal series. The secondaries have no transverse markings. Neither of the wings on the under side shows the discal dot in the cell, which appears on the upper surface. Expanse, 22 mm.

I refer this species provisionally and with doubt to Capnodes.

SELENIS, Guen.

82. *S. puncticosta*, sp. nov. ♂. Head, collar, and patagia dark brown. The upper side of thorax and the tips of the patagia, hoary gray; the upper side of the abdomen fuscous; the lower side of thorax and abdomen pale fuscous. Legs slightly darker. The primaries are rich dark brown with a wide hoary gray costal band running from the base, where it touches the inner margin, almost to the apex. The band is toothed about the end of the cell and there invades the dark brown outer portion of the wing.

Along the costa is a series of five or six minute dots and at the toothed expansion of the costal band is an obscure reniform spot. The secondaries are uniformly pale brown with the costa stramineous, shining. The fringes are paler. On the under side, the primaries and secondaries are pale brown with the inner margin of the primaries laved with cinereous. There is a minute white discal spot at the end of the cell in both wings, and the apex of the primaries is marked with whitish. The secondaries are traversed by obscure and indistinct paler transverse median and limbal bands.

♀. The female does not differ materially from the male, except that the broad costal band of gray is less conspicuous, its inner margin being obscurely defined, except near the base. Expanse, ♂, 30 mm.; ♀, 34 mm.

83. *S. limbata*, sp. nov. ♀. Head, and collar brown; patagia brown edged with grayish. The top of the thorax is grayish marked with a few blackish spots. The upper side of the abdomen is fuscous. The lower side of the thorax and abdomen is pale fuscous. Legs concolorous. Pectus dark brown. The primaries are marked with a broad coppery-red triangular spot, the apex of which points to the apex of the wing, which it does not quite reach, the base of which rests on the inner margin, extending for about one-third of the distance from the base to the outer angle. The costal area above this coppery-brown spot is dark brown marbled with transverse parallel lines of pale rufous, which shade into bluish-white in immediate proximity to the large triangular brown spot. The outer margin of this brown spot is defined by two nearly parallel chalky-white lines separated by a darker brown line, and beyond these lines on the outer margins are some dark cloudings. Just below the apex on the outer margin is a yellowish spot. The coppery-red spot of the primaries is continued upon the secondaries, covering the entire basal two-thirds of

the wing. The chalky-white lines, which define the outer margin of the spot are also continued upon the secondaries, as are the marginal cloudings. On the under side, both wings are obscure fuscous with the costa of the primaries near the apex a trifle paler and marked with a few obscure whitish dots. There are faint suggestions on both wings of transverse limbal lines. Expanse, 33 mm.

MESTLETA, Walk.

84. *M. flavicostata*, sp. nov. ♂. The front deep black. The collar black with its inner margin bright yellow. Patagia and upper side of thorax and abdomen blackish-brown. Under side of the body paler, inclining to whitish. The first pair of legs with the tibiae brown; the last two pairs whitish. The primaries on the upper side are very dark brown, inclining to blackish, especially at the base. The costa is bordered from the base almost to the apex by a uniform narrow border of pale yellow, upon which there is a faint suggestion of the presence of an obscure transverse median and transverse discal dark line, which are scarcely distinguishable upon the dark ground of the wing. The secondaries are uniformly dark blackish-brown. On the under side, both wings are obscure fuscous with the costa of the primaries indistinctly margined with pale ochraceous. Expanse, 24 mm.

85. *M. lithina*, sp. nov. ♂. Front fuscous. Collar pale wood-brown. Patagia, thorax, and metathoracic end of abdomen whitish on the upper side. The upper side of the latter portion of the abdomen is chocolate-brown. The lower side of the thorax and abdomen whitish. Legs concolorous. The primaries and secondaries on the upper side are prevalently brown. Along the costa of the primaries is a broad whitish longitudinal band, which is continued across the base of

the secondaries. This band covers the greater portion of the cell at the extremity of which is a minute reniform spot. In the middle of the cell are a few small obscure olivaceous spots. The costa along the outer border is faintly laved with pale olivaceous. Just below the broad light colored band, which borders the costa, located on the outer margin, is a semi-circular whitish spot interrupted by some minute darker spots. The wing is crossed by a very fine light discal transverse line, which runs from near the middle of the inner margin toward the costa as far as the edge of the white band, where it is sharply retracted, and terminates upon the middle of the costa. This line is continued upon the secondaries as a transverse median line. On the lower side, both wings are obscure pale fuscous; both have a pale discal dot at the end of the cell.

♀. The female is much like the male. Expanse, ♂ and ♀, 20 mm.

86. *M. discifascia*, sp. nov. ♂. Front and collar pale chocolate-brown. Patagia, thorax, and metathoracic end of the abdomen chalky-white. The posterior portion of the abdomen on the upper side chocolate-brown. The lower side of the thorax and abdomen are very pale chocolate-brown. The legs are concolorous. The costal tract of the primaries is marked by a broad chalky-white longitudinal band, extending from just before the apex to the inner margin, covering about one-third of its length from the base and continued across the base of the secondaries. This band is succeeded outwardly by a broad band of pale chocolate running from the middle of the inner margin toward the apex, and terminating in a point near the origin of the median nervules. This band is continued across the secondaries, covering the outer end of the cell and is defined on the secondaries by a fine sub-basal and somewhat irregularly curved transverse median line. This band is succeeded in the primaries by a paler area, which is likewise continued across

the secondaries in the form of a pale limbal band, defined by a minutely crenulate transverse limbal line. This band is much paler on the secondaries than on the primaries, in some specimens being almost white. The submarginal area of both wings is marked with minutely crenulated and reduplicated chocolate-brown lines. The margin is indicated in both wings by minute transverse blackish markings, succeeded by a fine pale line. The fringes are obscurely checkered with pale and dark chocolate. On the under side, the wings are obscure stone-gray, the basal third in both being darker than the outer two-thirds. Both wings have a small blackish discal dot at the end of the cell; both are crossed by regular curved transverse limbal and submarginal bands. The primaries are marked by a pale whitish spot on the costa just before the black discal dot at the end of the cell. The margins fringed as on the upper side. Expanse, 18 mm.

87. *M. lathraca*, sp. nov. ♂. Closely allied to the preceding species, but smaller and with the outer portion of the primaries and the outer two-thirds of the secondaries uniformly dark chocolate-brown. The broad costal band of chalky-white in the primaries extends across the secondaries, covering their base, the upper side of the thorax and the anterior end of the abdomen being likewise chalky-white. This style of marking is characteristic of the genus. There is a very obscure trace of a transverse limbal line on the primaries continued across the secondaries. Otherwise there is no marking on the upper surface, except a few blackish and exceedingly minute dots on the costa of the primaries, in some specimens wholly wanting. On the under side, both wings are obscure stone-gray with an obscure discal dot at the end of the cell. Expanse, 15 mm.

TATORHINIA, Butl.

88. *T. fuscosa*, sp. nov. ♂. Head and upper side of thorax and abdomen dark fus-

cous, pectus brown. Lower side of thorax and abdomen whitish. Legs concolorous with the anterior edges of the femora and tibiae in the first two pairs rich chestnut-brown. The primaries are fuscous. Beyond the base there is in the cell a translucent white spot, beyond which is a straight transverse dark line, margined internally by paler gray. At the end of the cell is a linear translucent mark, and beyond it a broad black transverse limbal line, curved just below the costa, and terminating a little beyond the middle of the inner margin. This dark line is defined outwardly by a paler gray line. The inner margin near the outer angle is edged with blackish scales. The secondaries have an oval translucent white spot at the end of the cell. Running from the anal angle toward the costa, which it does not quite reach, is a black line, defined outwardly by a narrow white line. The fringes just before the anal angle are whitish. On the under side, both primaries and secondaries are fuscous, laved with whitish near the base and upon the inner margin of the secondaries. The spots of the upper surface reappear but the transverse lines only reappear upon the secondaries. Expanse, 33 mm.

I refer this species to Mr. Butler's genus, with which the structure of the palpi, the long and heavily ciliated antennae of the male, and the form of the legs show it to agree. Thus far I have no female specimen. There is quite a dissimilarity in this genus between the male and the female.

TRACTA, Saalm.

89. *T. geometroides*, sp. nov. ♀. Allied to *T. albooculata*, Saalm., from which it may at once be distinguished by the absence of the white spot in the primaries, which is replaced by a black spot; by the absence of the submarginal ray-like markings on the nervules; and by the fact that the transverse median line on the secondaries is not angulated below the costa. On the under side

both wings are uniformly very pale fawn profusely irrorated with minute dark scales, the inner margin of the primaries alone being immaculate and shining. Expanse, 42 mm.

90. *T. (?) bilinea*, sp. nov. ♀. The first and second joints of the palpi and the entire upper side of the body are dark fawn. The third joints of the palpi, which are very slender and long, are light colored. Under side of thorax and abdomen paler fawn. Legs dark fawn with the tarsi ringed with whitish. The primaries and the secondaries on the upper side are dark fawn, agreeing in color with the upper side of the body. The primaries are crossed by an obscure curved sub-basal brown line; parallel to it a median line of similar color; just beyond it at the end of the cell, a small dark brown dot pupiled with white. From the apex to the middle of the wing, a heavy dark brown line runs. This is paralleled on the side of the base for two-thirds of its length by a fine limbal line, which is abruptly retracted a short distance below the costa, terminating upon the costa a little beyond the end of the cell. The heavy dark transverse oblique line is continued across the secondaries to the inner margin, as is also the finer inner line which runs parallel to it. On the under side, the primaries and the secondaries are obscure fuscous. The primaries have their inner margin shining testaceous. The secondaries on the inner margin are irrorated with pale ashen gray. Both wings have a white discal spot at the end of the cell, followed by a fine dark brown incomplete and curved transverse median line, beyond which both wings are crossed by a somewhat irregularly curved series of whitish macular markings surrounded by dark fuscous shadings. The margin is defined by minute blackish linear dashes. The fringes are concolorous. Expanse, 35 mm.

The male of this species is unknown to me.

RICLA. Walk.

91. *R. subpallescens*, sp. nov. ♂. Allied to *R. expandens*, Walk. The upper side of the body is dark plumbeous; the lower side, pale fawn with the abdomen tipped with dark plumbeous as on the upper side. The legs are concolorous, with the anterior margins of the tibiae dark. The primaries on the upper side are dark plumbeous. There is a minute white spot in the middle of the cell, and a dark transverse linear spot at its end. The wing is crossed from the apex to the middle of the inner margin by a dark blackish shade, which is interrupted in some specimens where it crosses vein four. Coalescing with the apical extremity of this dark shade is a semi-circular shade of the same color, which sweeps around from the apex to the marginal extremity of vein four. The marginal area circumscribed by this semi-circular shade is pale plumbeous, accentuated on the side of the base by some small ferruginous spots. The dark shade, which crosses the primaries from the apex, is continued across the secondaries to the anal angle, and is marked externally by a few pale cinereous maculations of which one opposite the end of the cell is large and conspicuous. On the under side, the primaries are fuliginous, paler on the margin and toward the base. The secondaries are whitish with the costa and the margin near the outer angle laved with pale fuliginous. Expanse, 40 mm.

HETEROSPILA, Guen.

92. *H. hecate*, sp. nov. ♂. Palpi, front, collar, upper side of thorax and abdomen obscure reddish-brown. Lower side of thorax and abdomen paler, inclining to whitish. Legs concolorous. The primaries on the upper side are obscure reddish-brown, becoming paler towards the outer margin. On the middle of the cell is a small pure white spot. At the end of the cell, is a minute black spot surrounded by pale ochraceous

scales. There are some obscure traces of a transverse line running from the apex to the middle of the inner margin, and of irregularly curved submarginal lines. The margin is regularly marked with minute chalky-white spots on the interspaces. The fringes are concolorous. The secondaries are colored like the primaries, having the costa at the base shining stramineous. There is an obscure suggestion of a transverse median line, most distinct on the inner margin. The margin is accentuated with minute white spots as on the primaries. On the under side, the wings are uniformly very pale fawn profusely irrorated with minute brown spots, save on the inner margin of the primaries, which is immaculate. The minute white marginal dots reappear upon the lower side bordered within quite narrowly with blackish points. Expanse, 37 mm

93. *H. sestia*, sp. nov. ♂. Front, collar, and upper side of thorax and abdomen pale fawn; lower side pale fawn, inclining to whitish. Legs concolorous. The primaries are pale fawn, inclining to whitish on the outer margin, which is marked on the interspaces with minute blackish points. There is a minute black dot in the middle of the cell, and another one like it at the end of the cell. From the apex to near the middle of the inner margin runs a dark brown line, obscurely defined outwardly by a paler line. This line is continued across the middle of the secondaries, which are colored like the primaries, but are without any discal spot. On the under side, both wings are very pale fawn, inclining to whitish, profusely irrorated with minute very pale and obscure striae. The two black discal dots reappear upon the under side of the primaries. The inner margin of the primaries is whitish, shining, immaculate. Expanse, 40 mm.

94. *H. cinerea*, sp. nov. ♂. Palpi and front brownish. The collar and upper side of the thorax are pale fawn. The lower side of the thorax and abdomen are whitish. The

legs are concolorous, with the tibiae brown. The primaries are pale fawn, crossed by an obscure dark sub-basal line. Beyond it in the cell is a minute brown dot; at the end of the cell, a similar small brown dot, from which an obscure pale brown shade runs upwardly to the costa. A transverse limbal line crosses the wing from the costa two-thirds of the distance from the base to the inner margin about its middle. This line is angulated opposite the end of the cell, and where it crosses vein two, at both of which points there is a minute blackish, but distinct mark. There is a faint and very irregularly curved submarginal transverse line, beyond which the outer area as far as the margin is clouded with slightly darker fawn. The margin is punctuated with pale brown transverse dashes. The fringes are whitish, obscurely checkered with pale brown at the extremities of the nervules. The secondaries are colored as the primaries, with the costa near the base whitish, shining. The wings are traversed by an obscure incomplete transverse median line, most distinct on the inner margin. The curved submarginal line of the primaries is continued across the secondaries, which are clouded beyond it, as in the primaries, with darker fawn. The marginal spots are as on the primaries. The fringes are pale and are not checkered. On the under side, the wings are very pale argillaceous, with the costa and the basal area of the primaries clouded with light fuscous. The extremity of the cell and the area immediately beyond it and about the origin of the median nervules is broadly laved with pure ochraceous. The margin on the under side is marked by a fine evenly crenulated dark brown line. The fringes are pale. The dark brown crenulate line defining the margin of the primaries is continued upon the secondaries, which are otherwise totally devoid of markings. Expanse, 40 mm.

95. *H. taeniata*, sp. nov. ♂. Palpi dark brown. Front reddish; vertex pale argillaceous. Upper side of thorax and abdomen

argillaceous with a rosy tint. Under side of thorax and abdomen pale ochreous. Legs concolorous, with the tibiae of the anterior pair dark brown. The primaries are pale argillaceous with a minute dark brown spot on the middle of the cell, and another at its end. The margin is indicated on the interspaces by minute dark brown spots. The fringes are slightly darker than the rest of the wing. From the apex a rich dark brown band runs to the middle of the inner margin, and is continued across the secondaries to the middle of their inner margin. The secondaries are marked like the primaries. On the under side, both wings are pale ochraceous. The fringes are dark brown, and on the margin at the middle of each interspace is a minute dark brown spot. Expanse, 45 mm.

96. *H. calescens*, sp. nov. ♂. Palpi fulvous. Vertex pale yellow. Upper side of thorax and abdomen brown; the tuft of hairs at the extremity of the abdomen white. The lower side of the thorax is pale yellowish. The lower side of the abdomen is pale fuscous. The legs are yellowish, with the tibiae of the anterior pair pale brown. The primaries are bright fulvous, very broadly clouded about the middle with dark brown, and crossed by a number of obscure transverse lines. Upon the costa, before the base, about the middle, and at the apex, are bright yellow spots. In the middle of the cell is a minute very pale yellow elliptical spot, bordered with black; at the end of the cell, a large circular bright yellow spot; and above it, a minute spot of the same color. Both are bordered with darker brown. The secondaries are warm fulvous, like the primaries, with the costa near the base whitish. On their outer two-thirds, these wings are traversed by a number of obscure transverse brown lines. The fringes of the primaries and secondaries are obscurely checkered with dark brown. On the under side, the

primaries are obscure fuscous, with the inner margin whitish, and the costa and the outer margin near the apex broadly pale ochraceous. There is a black spot in the middle of the cell and a bright white spot at its end, margined with blackish. There are a few dark subapical brown spots and suggestions of obscure transverse lines beyond the cell. The secondaries are dark fuscous with a pale lunate spot at the end of the cell, bordered with dark fuscous. Beyond the cell, there is an obscure transverse line regularly curved, succeeded by a broad transverse limbal shade and a regularly curved submarginal series of blackish spots. The fringes on the under side are darker than the rest of the wing and very obscurely checkered with dark brown. Expanse, 33 mm.

97. *H. umbrina*, sp. nov. ♂. This is probably only a dark variety of *H. sestia*, from which it differs simply in having the wings prevalently dark chocolate-brown, instead of pale fawn.

♀. The female is colored exactly like the male. The antennae of the female are simple. Expanse, ♂ and ♀, 42 mm.

98. *H. piperita*, sp. nov. ♂. Palpi pale brown; vertex, collar, and upper side of thorax pale fawn. Upper side of abdomen whitish. The tuft of hair at the end of the abdomen is fawn. Lower side of thorax and abdomen fawn, inclining on the abdomen to whitish. Legs concolorous. The primaries are pale fawn with the outer margin produced at the end of vein four. There is a small brown spot in the middle of the cell, and a large brown spot at its end. From the apex to the inner margin beyond its middle runs a dark brown line margined by a pale whitish line. Just below the apex, this line coalesces with a fine and obscure submarginal line, which is festooned and acutely produced outwardly between veins three and four. The outer margin of the wing beyond this

submarginal line is darker than the rest of the wing. The margin is indicated by a fine brown line, which is regularly crenulate, returning inwardly at the middle of the interspaces, the inward points being accentuated by minute black spots. The fringes beyond are uniformly pale brown. The secondaries are marked like the primaries, and have a lunate discal mark at the end of the cell. The transverse line of the primaries is continued across the secondaries to the anal angle. The marginal markings are the same as on the primaries. On the lower side, both wings are pale argillaceous, profusely irrorated with minute brown scales, except on the inner margins of the primaries, which are whitish. There is a minute black spot in the middle of the cell of the primaries, followed by a similar minute spot at the end of the cell. There is no discal mark on the secondaries. The outer margin is indicated by minute black spots on the middle of the interspaces.

♀. The female is marked exactly like the male, but the wings are broader and the antennae are simple. Expanse, ♂ and ♀, 50 mm.

This species is very distinct and may be distinguished from the rest of the species of this genus by the strongly angulated outer margin of the primaries. The differences between the various species hereinbefore described are best recognized by an examination of the photographic representations given in the plates. I have referred the foregoing species to the genus *Heterospila* upon the strength of a determination made by Mr. Hampson of a specimen from Tenasserim, which appears to be strictly congeneric with the species described in this paper. Nevertheless, an examination of Guenee's description of his genus *Heterospila* apparently reveals certain diacritic points, which are lacking alike in the specimen determined by Mr. Hampson and in the species under consideration. The reference must, therefore, be accepted as simply provisional.

PLATYDIDAE.

EPISPARIS, WALK.

99. *E. lamprina*, sp. nov. ♀. The primaries and secondaries are acutely produced at the extremity of vein three. The secondaries have the outer margin toothed from the anal angle to the extremity of vein three. The palpi and front are very pale ferruginous. The upper side of the thorax is reddish-fawn with an ochreous tuft of hair on the metathorax. The upper side of the abdomen is pale fawn. The lower side of the thorax is whitish. The lower side of the abdomen is pale fuscous tipped with white. The primaries on the upper side are pale ferruginous, shading on the outer third into pale fawn. The wings are ornamented by a series of exceedingly intricate spots and lines, of which the marginal series are white and translucent. There is a minute black dot in the middle of the cell and a white semi-translucent spot margined with brown at the end of the cell. There is a minute white spot at the base; an irregularly curved and angulated sub-basal line. From the lower angle of the cell a brownish median line runs to the inner margin. From the white spot at the lower angle of the cell a transverse series of semi-translucent whitish markings slants outwardly to the inner margin, which it touches about two-thirds of the distance from the base. Beyond the end of the cell are some pale ferruginous markings surrounded by darker fawn; beyond these a hastate translucent white spot with its apex pointing toward the margin; and below it two slightly curved similarly colored spots. The submarginal series of translucent spots describes an irregular curve from the apex to the outer angle, the curved series being convex inwardly, the third and sixth spots, reckoned from the outer angle, being the largest. The third spot is subhastate in form with its apex, which is blunt, pointing inwardly. The sixth is subquadrate. Beyond

the third spot toward the margin are two pale ochreous spots opposite the barbs of spot three, and between them exactly on the margin a small transverse ochreous spot. The margin from the extremity of vein three to the inner angle is checkered with whitish lunulate markings. The secondaries are fawn-colored like the outer margin of the primaries with the costa shining testaceous and the inner margin laved with pale ferruginous. The cell contains a subtriangular translucent white spot. On either side of the cell and just beyond it are some minute transverse pale ferruginous lines. Beyond the cell, the wing is crossed by an irregular series of translucent white markings, one of which, the largest, located on vein six, is subhastate in form. Those nearest the anal angle coalesce, forming an incomplete transverse band enlarged in the direction of the costa. Near the extremity of vein two upon the outer margin are two small white spots. The scalloped portion of the inner margin from vein three to the anal angle is obscurely edged with whitish. On the under side, both wings are whitish toward the base laved with fawn on the outer margin, and the spots and lines of the upper surface reappear upon this side. Expanse, 45 mm.

I referred this species originally to the genus *Zethes*, together with the two succeeding species, but except for the crenulate outline of the inner half of the outer margin of the secondaries, I can find no substantial ground for separating these forms from the genus *Episparis*. The genus *Zethes* as represented by the Indian forms in my collection appears at all events not to be the proper receptacle for these African insects.

100. *E. connubens*, sp. nov. ♂. The antennae are heavily doubly ciliate for about half their length from their insertion. The palpi and the front are chestnut-brown. The collar and the upper side of the thorax and abdomen are fawn. The lower side of the thorax and abdomen are white, except at

the tip of the abdomen, which is shaded with fawn. The legs are white with the anterior margins of the first pair and the end of the tibiae in the second and third pair marked with dark brown. The tarsi, which are white, are minutely ringed with dark brown. The primaries and secondaries are fawn on the upper surface. There is a minute white dot on the costa at the base and at the costal extremity of the sub-basal and discal transverse lines. The wing is traversed by very irregular and sharply zigzagged transverse basal, sub-basal, median, and limbal lines, of which the median line is the heaviest and somewhat diffuse. The remaining lines are fine. There is an irregularly curved submarginal series of dark spots running from the apex, curving inwardly to the outer angle. The spots located opposite the end of the cell and on either side of vein three have translucent whitish centres. The fringes are obscurely checkered with pale ochreous on the interspaces, and there are some obscure rusty patches of scales near the extremity of vein three. The secondaries are pale fawn with the costa near the base shining stramineous, and the inner margin clothed with whitish hairs. The wing is crossed about its middle by a transverse series of lines and markings, running from the costa to the anal angle. The spots composing this series have white translucent disks margined with dark fuscous tinged with ferruginous about the end of the cell. On the lower side, the wings are very pale fuscous, shading into whitish on the base and upon the inner margin of the primaries. Both wings have a distinct but minute blackish discal dot at the end of the cell, succeeded by incomplete transverse median and limbal bands. The limbal band is composed of dark brown subhastate markings located on the interspaces. The submarginal spots of the primaries reappear on the lower side and the outer margin near the extremity of the median nervules is marked with pale ferruginous maculations.

♀. The female does not differ from the male save in the absence of the pectinations at the base of the antennae. Expanse, ♂, 44 mm.; ♀, 46 mm.

There is an allied form from Madagascar in the British Museum located in the genus *Zethes*, which was unnamed when I saw it some eighteen months ago.

101. *E. hieroglyphica*, sp. nov. ♂. The antennae are doubly pectinate for one-half their length from their insertion; beyond this simple. The margins of both wings from the inner angles to the extremity of vein four are scalloped as in the two preceding species. The palpi and front, as well as the upper side of the thorax and abdomen, are brown. The pectus and lower side of the thorax and abdomen are likewise brown as are the legs, which, however, have the tarsi and their inner margins white. The tarsi are lightly ringed with dark brown, as are also the median and terminal spurs, which are white. The basal area of the primaries is dark brown, defined outwardly by a pale fine line, which is abruptly retracted just below the costa. Just below the sharply acute angle which this line makes is a minute black dot on the cell, followed by an obscure transverse median line, running from the costa to the inner margin, succeeded by an incomplete and irregular dark limbal line, which runs from the inner margin toward the costa, terminating near the origin of vein four. A blackish shade runs from the middle of the costa outwardly terminating near the extremity of vein four. There is a fine transverse limbal line, which runs from the inner margin toward the costa as far as vein three, where it bifurcates, sending a branch toward the middle of the costa and another toward the apex. This line is silvery white, and between its branches includes a dark spot, which lies on the lower side of the dark longitudinal shade, which has been already described. On the costa about two-thirds of the distance from the

base is a subtriangular white spot defined inwardly by brown. There is a confused and very irregular series of submarginal silvery white lines and markings, which are translucent, and which may be better recognized by the figure in the plate than by any description. The secondaries are fuscous with the discal area marked with blackish adorned with a translucent sub-hastate spot near the end of the cell, followed toward the inner margin by a smaller translucent spot. The inner margin near the anal angle is marked by fine chalky white lines and there is a profusion of confused paler lines on the inner margin. The under side is pale fawn, shading on the inner margin of the secondaries into whitish and with the outer margin of the primaries near the extremity of the median nervules clouded with dark brown. The subapical white spot on the primaries reappears conspicuously on the under side. The other markings are obscurely indicated.

♀. The female is like the male, differing only in the structure of the antennae, which are simple. Expanse. ♂ and ♀, 40 mm. Habitat Kangwé and Benita.

102. *E. lunata*, sp. nov. ♂. Palpi and front brown; vertex cinereous, collar brown, patagia brown, tipped with cinereous. Metathorax clothed with grayish hair. Upper side of abdomen pale brown. Lower side of thorax and abdomen pale gray, darker at the anal extremity. Legs concolorous, anterior pair margined in front with dark brown. The primaries on the upper side are obscure brown with the costa and the outer margin hoary. On the outer margin below the apex is a dark brown semi-circular spot. At the end of the cell is a large translucent lunate spot. The wings are crossed by irregularly curved and dentate sub-basal, median, and geminate limbal lines, which coalesce with a longitudinal ray of brown, running below the cell and along vein two, terminating on the outermost of the geminate limbal lines. A straight submarginal

line runs from the costa a little before the apex to the outer angle. The secondaries are dark brown with the costa and the outer margin hoary gray. They are traversed by a dark median and a curved and zigzag fine limbal line, which is defined outwardly by a fine paler line. There are some obscure submarginal brown markings. On the under side, the wings are pale gray with the outer margins clouded with fuscous. The spots and markings of the upper side reappear upon the lower side indistinctly.

♀. The female is very like the male, and has the costa of the primaries distinctly marked with a number of whitish spots, of which the one nearest the apex is the most distinct. Expanse, ♂ and ♀, 42 mm.

103. *E. complex*, sp. nov. ♂. Closely allied to the foregoing species, but having the transverse lines differently arranged. The under side of the body and the legs are paler than in the preceding species, inclining to whitish. The upper side of the primaries and secondaries are lilacine-brown. The primaries have a very fine curved and crenulate sub-basal line succeeded beyond the cell by a broad diffuse brown line, which is retracted on the costa. This is followed by a very fine and distinct crenulate limbal line. Both the median and limbal lines of the primaries are continued across the secondaries. From a point a little before the apex in the primaries, a broad and obscurely defined reddish-brown band runs to the outer angle. Beyond this, just below the apex is a fine curved line running from the apex to the termination of vein four. The outer margin of the secondaries is clouded with dark brown. On the under side, the wings are paler than on the upper side, with the inner margins pale cinereous, and the outer margin of the primaries clouded with dark brown. The median and limbal lines of the upper side reappear, but are very fine and sharply defined. At the end of the cell in the primaries is a very minute black dot and at the end of the cell of the secondaries two similar dots.

♀. The female closely resembles the male. Expanse, ♂ and ♀, 38-40 mm.

104. *E. simplex*, sp. nov. ♂. Head, collar, and thorax obscure chestnut-brown. Upper side of abdomen paler fuscous. Lower side of abdomen pale fuscous-brown; legs darker brown; tarsi white, ringed with brown. On the upper side the primaries and secondaries are obscure chestnut-brown laved with pale cinereous on the outer margin of the primaries and on the base of the secondaries. There are two small white spots at the end of the cell in the primaries. In some specimens these are obsolete. The primaries and the secondaries are crossed a little beyond the middle by a dark limbal line, retracted at the costa of the primaries and defined outwardly by a paler cinereous line. In addition, the primaries are traversed by a fine zigzag sub-basal line and by a similarly fine median line, which is very abruptly retracted before the costa. There are in addition some obscure marginal lines and markings. The fringes are darker than the adjacent portions of the wing in the primaries. On the under side, the wings are dark fuscous with the costa of the primaries tinged with luteous and the inner margin of the primaries and the secondaries pale gray. The primaries are marked before the apex by some blackish cloudings. The transverse lines of the primaries and the secondaries reappear obscurely upon the lower side.

♀. The female does not materially differ from the male, save that most specimens are lighter in color, inclining to ochraceous on the upper side, and having the lower side of the wings somewhat profusely irrorated with dark scales. Expanse, ♂ and ♀, 38 mm.

GORNA, Walk.

105. *G. apicata*, sp. nov. ♂. The head, collar, thorax, and upper side of abdomen are dark chestnut-brown. The lower side of the thorax and abdomen are a trifle paler,

tinged with lilacine. The legs are dark brown with the tarsi white. The primaries are brown with the costal area tinged with lilacine-gray. At the end of the cell are two minute white spots. The apex near the costa is tinged with black, and there is a minute white spot upon the costa a short distance from the apex. The marginal area below the costa is covered by a broad whitish sublunulate spot, protracted downwardly along the outer margin, almost to the outer angle. A fine dark brown or blackish subbasal line runs diagonally from the costa outwardly to the lower edge of the cell, and then is sharply retracted, terminating upon the inner margin before the insertion of the wing. Beyond the cell is a sharply defined and curved black transverse line, convex inwardly and abruptly retracted before its termination on the costa. A similar fine black line crosses the disk from the minute white spot on the costa to the inner margin a little before the outer angle. This line is continued across the secondaries, terminating upon the inner margin just before the anal angle. On the under side, the wings are dark lilacine-gray. The inner margin of the primaries is stramineous shining. The costa is paler gray. In the cell of the primaries there is a round pale gray mark just beyond the base, on the middle of the cell a transverse linear mark of the same color, and at the end of the cell another transverse linear mark slightly curved and constricted at the middle. This is followed by a dark black transverse line retracted on the costa and terminating in the shining area, which borders the inner margin. The outer margin is marked by a broad black band swollen above the outer angle and defined inwardly by a pale gray line and outwardly by a chalky-white line. The apex is black and the white subapical mark, which appears on the upper surface, reappears upon the lower side. The secondaries have two small black dots at the end of the cell, a transverse median black line,

and a submarginal series of light dots upon the nervules. The fringes are black, very slightly margined externally with pale fuscous.

♀. The female does not differ materially from the male, except that the antennae are simple, whereas, in the male, they are heavily pectinated for the greater part of their length. The body of the female is short and stout and not clothed with a tuft of hair at the extremity as in the male. The wings, furthermore, are relatively broader, and in some specimens, the discal spot at the end of the cell of the primaries is large and conspicuous. Expanse, ♂, 45 mm.; ♀, 48 mm. Habitat Kangwé.

106. *G. partita*, Walk. ♀. The male of this species was described by Walker. The female is different upon the upper surface, as is revealed by the plate. On the under side of the wings, the markings of the female are identical with those of the male. The most noticeable difference in the case of the female is the absence of the dark black markings on the primaries and on the margin of the secondaries. This species, like the preceding, is found in the valley of the Ogové.

EUGORNA, gen. nov.

The palpi have the first joint short, the second longer, densely clothed with hairs, slightly curved upwardly, not quite reaching the level of the vertex. The third joint is a little more than half the length of the second, slender, smooth, and pointing directly forward. The antennae of the male are long, three-fourths the length of the costa of the primaries, evenly doubly ciliate from the base almost to the extremity. In the female the antennae are simple. The legs are moderately long; the tarsi naked, the femora and tibiae of the first and second pair being clothed with long hairs; of the last pair being only sparingly clothed with hair. The last pair have double median and double ter-

minal spurs. The primaries in the male are relatively narrow and produced. The costa is evenly rounded. The inner margin is nearly straight; the outer margin evenly rounded. The secondaries are relatively broad, somewhat produced opposite the end of the cell, with the costa nearly straight, and the anal angle rounded. The abdomen projects in the case of the male, for one-fourth of its length beyond the inner margin of the secondaries. The wings of the female are relatively broader. The abdomen is heavier and does not project beyond the inner margin of the secondaries. Type *Eugonia vidua*, Holland.

107. *E. vidua*, sp. nov. ♂. The palpi are dark brown, with the hairs fringing the anterior margin of the second joint bright orange-yellow. The front, collar, and upper side of the thorax and abdomen are dark brown. The lower side of the thorax and abdomen are whitish. The legs are white with the tibiae of the first pair clothed in front with dark brown hairs. On the upper side, the primaries and secondaries are dark brown. From the costa a little beyond the middle to the outer angle runs a sharply defined white band, enlarged about its middle. The secondaries have the outer margin from the apex to nearly the middle broadly fringed with white. The secondaries are furthermore crossed by an obscure limbal transverse line, running from the costa to the inner angle and punctuated externally by minute pale spots upon the nervules. On the under side, the primaries are fuscous, with the costa near the base and the inner margin cinereous. The costa just at the base is slightly tinged with ochreous. The outer margin is broadly whitish, the white area being interrupted by the dark extremities of the nervules. The white band, which crosses the primaries on the upper surface, reappears on the lower side. The fringes are dark brown. The secondaries for two-thirds of the distance from the base are broadly whitish and have the outer margin

clouded with pale fuscous. The white fringe at the outer angle of the secondaries is as on the upper surface. In addition, it may be noted that the secondaries have a transverse lunulate dark spot at the end of the cell.

♀. The female resembles the male upon the upper side, but the transverse white band is somewhat broader and the white margin of the apex of the secondaries more restricted. On the under side, both wings are evenly pale brown. The white band on the primaries and the white apical fringe of the secondaries reappear as on the upper surface. Expanse, ♂, 50 mm.; ♀, 55 mm.

AMPHIGONIDAE.

AMPHIGONIA, Guen.

108. *A. sinistra*, sp. nov. ♂. Palpi and head dark brown; upper side of thorax and abdomen dark fuscous, the collar and patagia having a purplish cast in certain lights. On the under side, the thorax and abdomen are obscure fuscous. The legs are darker. The primaries are crossed from the apex to the middle of the inner margin by a fine black line, convex inwardly and defined outwardly by a fine pale rufous line, the area within this line as far as the base of the wing is lilacine-fuscous. The area beyond it is rich chestnut-brown, except just on the margins where the wings are laved with pale lilacine. There is a minute white spot in the middle of the cell. The transverse line, which crosses the middle of the primaries, is continued across the secondaries, the area without and within being colored exactly as on the primaries. On the under side both wings are uniformly obscure fuscous with the inner margin of the secondaries, which are very densely clothed with hair, inclining to ochraceous. Expanse, 38 mm.

HERMINIIDAE.

DEINYPENA, gen. nov.

The palpi have the first joint short, the second joint very long, flattened laterally,

narrowly oblong. The third joint is lanceolate and erected. The palpi are not compressed, but are not widely separated, and project far beyond the front. The antennae in the male are very heavily doubly pectinate; in the case of the female simple. The first pair of legs in the case of the male and female have the femora and the tibiae heavily clothed with hairs. The second pair, in the case of the male, have the tibiae armed with two terminal spurs, and the outer margin covered with an enormous brush of hairs. In the case of the female, the second pair of legs are not armed with the spur and are very scantily clothed with hair. The third pair of legs in the case of the male are long, very scantily clothed with hairs, and armed with long double median and terminal spurs. In the case of the female, the third pair of legs are armed with double median and terminal spurs, but are devoid of hairy vestiture. The primaries are subtriangular, elongated, with the costa straight for three-fourths of its distance from the base, slightly rounded before the apex. The apex is truncate, the outer angle evenly rounded, the inner margin almost straight. The secondaries have the costa straight, or very slightly convex before the base. The inner margin is straight; the outer margin is evenly rounded to near the anal angle, which is truncate. Type *Deinyopena lacista*, Holland.

109. *D. lacista*, sp. nov. ♂. The palpi are very dark brown externally, internally pale yellowish. The antennae are black. The front is dark brown, or blackish. The collar and upper side of the thorax are dark chestnut-brown. The upper side of the abdomen is dark fuscous. The lower side of the thorax and the abdomen are dark brown. The legs are dark brown with the hairy fringes on the tibiae of the second pair of the male bright yellowish-chestnut. The spurs of the first and second pair in the male together with the upper ends of the tibiae are white. The tarsi are blackish,

very indistinctly annulated with pale brown. On the upper side both wings are dark brown. From the apex of the primaries a straight diagonal line of blackish runs to the middle of the inner margin and is continued across the secondaries. There is a narrow curved blackish sub-basal line on the primaries. There are one or two minute pale spots in the cell of the primaries, an obscure ochreous reniform spot, and in both primaries and secondaries an irregular curved series of obscure ochreous markings. The fringes are dark brown. On the under side both wings are dark sooty-fuscous with the apex and the outer margin of the primaries laved with obscure pale wood-brown or yellowish. There are minute pale discal spots at the end of the cell in both wings followed by an incomplete and obscure blackish transverse median band, beyond which are bright yellowish submarginal spots arranged in echelon. The fringes are dark brown.

♀. The female is marked like the male, but is prevalently bright chestnut-brown on the upper side of the wing, with the lower side of the wing paler and the spots nearly pure yellow. The tibiae of the first and second pair of legs, as well as the tarsi, in the female are marked with pure white bands. Expanse, ♂ and ♀, 60 mm. Habitat Benita and Kangwé.

110. *D. lathetica*, sp. nov. ♀. Palpi dark brown, front pale brown. Collar fawn. The upper side of the thorax fawn, with the tips of the patagia paler. The upper side of the abdomen pale fawn. The lower side of the thorax is obscure fuscous. The lower side of the abdomen is paler, inclined to whitish. The legs are fuscous. The tarsi are obscurely ringed with paler fuscous. The primaries on the upper side are obscure fawn with two pale circular spots about the middle of the cell, the uppermost slightly advanced beyond the lower, which latter is the larger. There is a large pale reniform spot at the end of

the cell. Beyond the base is an obscure sub-basal band of pale irregular maculations. From the costa before the apex to the inner margin before the middle extends a broad band of pale maculations, arranged in echelon, corresponding in location with the yellow spots forming a submarginal series on the lower side. The secondaries are colored like the primaries and are crossed from about the middle of the inner margin by a blackish transverse line, which does not quite reach the costa, and is defined outwardly by a fine paler shade. Before the anal angle are four velvety black spots, subquadrate in form, in some specimens subhastate, margined externally by whitish lines, varying in width in different specimens, and gradually increasing in size from the inner margin toward the apex. The fringes are concolorous. On the under side, both wings are uniformly fuscous with the costa of the primaries toward the apex very lightly touched with pale ochreous. Both are crossed beyond the cell by a curved transverse dark brown line. Both have a yellow lunate discal mark at the end of the cell. Both are adorned with a submarginal series of conspicuous festooned yellow marks. Expanse, 58 mm.

Unfortunately, I have never seen the male of this species. Mr. Good in his notes says, "As you might guess from its color, this moth tries to conceal itself by simply alighting with out-spread wings upon the dead leaves lying upon the ground in the forest."

111. *D. (?) ereboides*, sp. nov. ♂. The antennae minutely pectinated along their entire course. The palpi somewhat longer than in either of the preceding species, and somewhat more slender. Otherwise, this species is structurally very close to the two preceding, from which I am unwilling to separate it without further study. The palpi, the front, collar, and upper side of the thorax and abdomen are dark brown. The lower side of the thorax and abdomen are pale

ochreous. The legs are whitish heavily bordered with dark brown on the anterior margins of the tibiae of the first pair. The ends of the tibiae of the second and third pair are marked with blackish. The primaries on the upper side are rich chestnut-brown with the costa lightly laved with cinereous, especially toward the base. There is an obscure dark brown annular spot on the middle of the cell and two blackish spots at the end of the cell, one above the other. There are obscure blackish brown irregularly curved transverse sub-basal, median, limbal, and submarginal brown lines, and a profusion of minute dark brown spots and striae, speckling the wing, especially in the region of the costa near the apex. The secondaries are chestnut-brown crossed beyond the middle by an obscure and incomplete dark brown limbal band, which does not reach the costa, and is most distinct upon the inner margin. The outer area of the wing beyond this dark band is paler than the rest of the wing and is profusely speckled with dark brown striae. On the under side, both wings are bright fulvous; both are crossed by obscure transverse median, limbal, and submarginal darker lines, the submarginal lines being strongly produced outwardly opposite the end of the cell and scalloped between the nervules. The area beyond these submarginal lines is paler than the rest of the wing. The entire wing on the lower side is profusely irrorated with dark brown spots and striae, mingling with paler whitish spots. The under side of the wing somewhat suggests in its coloration the under side of some species of the genus *Erebus*.

♀. The female is like the male in coloration. The antennae are however simple. Expanse, ♂ and ♀, 60 mm.

112. *D. (?) margine-punctata*, sp. nov. ♂. Antennae heavily pectinated. The palpi have the first joint short; the second long, extended far beyond the vertex, tufted with ascending hairs on the upper edge. The

third joint is half as long as the second and likewise tufted with hair and not lanceolate as in the type of the genus. Save in the form of the second and third joints of the palpi, this insect is strictly congeneric with *D. lacista*. The palpi, the front, and vertex are dark brown. The upper side of the thorax and abdomen are pale brown. The lower side of the body is pale brown, inclining to rufous. The legs are concolorous with the tarsi ringed with whitish. The primaries on the upper side are dark brown with pale discal and reniform spots. The wing is crossed beyond the cell by a narrow dark line running from a little beyond the middle of the inner margin toward the apex, strongly retracted beyond the end of the cell and terminating on the costa a little beyond the middle. This line is defined outwardly by a fine purplish-gray line from the inner margin as far as the point where it is retracted toward the costa. Beyond these lines about the middle of the marginal area is a large irregular whitish spot, which is interrupted by a series of submarginal hastate markings, which extends from the apex to the inner margin about two-thirds of the distance from the base. These hastate markings are defined inwardly by paler hastate lines between the barbs of which are blackish points increasing in size toward the inner margin, where the last spot is large and conspicuous. The margin is punctuated at the extremity of the nervules by minute white subtriangular spots. The fringes are darker. The transverse limbal line of the primaries is continued across the secondaries as a transverse median line and the submarginal series of spots of the primaries is continued across the secondaries as a curved limbal series strongly produced outwardly on vein five. On the under side, both wings are bright fulvous. The primaries have the apex tinged with purplish-white and the outer margin broadly laved with dark brown. The transverse lines of the upper surface reappear upon the lower surface, but darker and more sharply defined.

♀. The female does not essentially differ from the male, except that in the specimens before me, the ground color of the wings is prevalently lighter, inclining to fulvous. Expanse, ♂ and ♀, 48 to 54 mm.

ORIXA, Walk.

113. *O. fascifera*, sp. nov. ♂. Allied to *O. filifera*, Walk., with the type of which it has been compared, but distinct. Palpi dark brown with the lower margin of the first joint yellowish. Front pure white. The upper side of the thorax and abdomen dark fuscous; lower side of thorax and abdomen pale yellow, the anal segment of the abdomen being fuscous. Legs concolorous, with the anterior margins of the tibiae dark brown. The primaries on the upper side are black, reflecting a brilliant blue sheen from the base almost to the outer margin, which is bordered with pale fuscous. A narrow whitish line runs from the costa just beyond the base diagonally to the inner margin, which it reaches about one-third of the distance from the base. This band in certain lights appears bright blue. A little beyond the middle is a broad white band with its inner margin nearly straight and its outer margin irregular. This band is broadest where it crosses the median nervules and diminishes rapidly toward the inner margin. Just beyond it on the inner margin is a small white spot. The secondaries on the upper side are uniformly blackish. On the under side the primaries and the secondaries are dark fuscous. The primaries at the base are narrowly marked with pale ochraceous. The secondaries at the base and along the inner margin are broadly laved with pale ochraceous. Expanse, 33 mm.

ELYRA, Walk.

114. *E. Gabunalis*, sp. nov. ♂. Allied to *E. cachusalis*, Walk., with the type of which it has been compared, but quite distinct. Antennae heavily pectinated. Front blackish. Collar and upper side of thorax dark

brown. The upper side of the abdomen pale brown, with a black tuft of hairs erected on the median line back of the metathorax. The under side of the thorax and abdomen is pale fuscous. The tibiae and the tarsi of the anterior pair of legs are dark brown ringed with paler brown. The other legs are concolorous with the tarsi ringed with lighter brown. The primaries on the upper side are vinous-brown, marked with dark spots and lines. Just beyond the base is a U-shaped black mark with its open end toward the base, followed by geminate curved sub-basal lines, which become heavier on the inner margin. Beyond these is a transverse median line, almost parallel to the sub-basal line, very heavy and dark. At the end of the cell there is an obscure reniform spot surmounted on the side of the base by a minute comma-shaped black dash. Beyond this is an irregular and very fine limbal line abruptly retracted toward the costa opposite the reniform. This is succeeded by a very fine and obscure submarginal line, or series of submarginal points, which fuse with a large subtriangular dark brown spot situated on the costa before the apex, and with a small brown spot near the outer angle. There are two subquadrate black spots just below the apex, the uppermost of which coalesces with a fine black line, running from the apex diagonally for a short distance into the wing. The margin is marked by a very fine pale line accentuated by minute transverse dashes on the interspaces. The fringes are brown obscurely checkered with darker brown at the ends of the nervules. The secondaries are dark fuscous, paler on the costa which at its base is inclined to stramineous. There are some incomplete transverse bands of dark brown running from the inner margin toward the costa, which none of them reach. The outer margin is clouded with very dark brown in the region of the median nervules. The margin is defined as in the primaries. The fringes are more distinctly checkered than

in the primaries. On the under side, both wings are obscure pale fuscous, darker toward their outer margins. The hairy fold situated below the costa near the base is dark fuscous. The primaries and the secondaries are crossed by a dark limbal and a much broader dark submarginal band, both of which are defined outwardly by obscure pale fuscous lines or bands. In addition, the secondaries have a dark transverse median band.

♀. The female is like the male, but the antennae are simple. Expanse, ♂ and ♀, 34 mm.

ADDENDA

ACONTIIDÆ.

ACONTIA, Hübn.

115. *A. briola*, sp. nov. ♂. Front and collar pale brown. Patagia, upper side of thorax and abdomen whitish; lower side of thorax and abdomen white with the anal extremity of the abdomen tipped on the under side with black. Legs obscure fuscous, with the anterior margins marked with dark brown. The primaries on the upper surface are chalky-white with a slight purplish reflection for two-thirds of the distance from the base. The costa is marked with dark brown, running inwardly at the end of the cell, where this dark brown tract is interrupted by a whitish reniform spot. The apical third of the wing is brown crossed by darker lines marked on the apex by a large chalky-white kidney-shaped spot, below which are a few ochreous markings. The fringes, which are dark brown, are regularly checkered with pale ochreous on the interspaces. The secondaries on the upper side are pale fuscous. On the under side, both wings are fuscous, the region of the cell and the discal area of the primaries being darker. The white subapical spot of the primaries reappears on the lower side and there are some paler obscure maculations on the outer margin near its middle. Expanse, 36 mm.

Habitat Bulé Country, near Campos River, Cameroons.

116. *A. chia*, sp. nov. ♂. Palpi on the upper side, front, collar and upper side of thorax pure white. Upper side of abdomen white with the segments at their base ringed with chocolate-brown. The palpi on the under side are black. The under side of the thorax and abdomen are pale chocolate. The legs are concolorous. The primaries on the upper side are chalky-white with a small triangular brown spot on the costa at the base, followed on the middle of the costa by a large triangular brown spot, succeeded before the apex on the costa by one or two minute brown spots. The outer margin below the apex is broadly laved with pale chocolate-brown, interrupted on the outer margin on the interspaces by small white spots. The fringes are pale chocolate, checkered with blackish on the interspaces. There is an obscure submarginal series of minute brown spots on the nervules. The secondaries are very pale fuscous, darker toward the apex. On the under side, both wings are pale fuscous. The secondaries have a lunate dark discal spot at the end of the cell. The primaries have a submarginal brown shade running from the costa before the apex to near the outer angle, which it does not quite reach. Expanse, 26 mm.

117. *A. (?) glaphyra*, sp. nov. ♂. Front and collar pale creamy. The anterior portion of the thorax and the patagia at their base are dark brown. The posterior portion of the thorax, the tips of the patagia, and the upper side of the abdomen are creamy-white. The lower side of the thorax and abdomen are very pale stramineous; legs concolorous. The primaries are whitish crossed before the middle by an oblique obscurely defined dark brown transverse median line, which slants outwardly from the costa and does not reach the inner margin, and terminates upon the origin of vein two in a large blackish spot.

A transverse line similar in color and equally obscurely defined runs from the apex inwardly and fuses with the transverse median line on the dark brown spot at its lower extremity. This line is swollen beyond the end of the cell. The secondaries are very pale fuscous. On the under side, the primaries and secondaries are pale shining fuscous, with the costal area of the primaries slightly darker. There is a pale ochreous spot on the costa before the apex of the primaries. Expanse, 16 mm. Habitat Kangwé.

TARACHE, Hübn.

118. *T. domina*, sp. nov. ♂. Palpi and upper side of thorax and abdomen brown. The lower side of thorax and abdomen paler brown. The primaries are dark brown, crossed beyond the cell by a broad transverse pale ochreous band, which is slightly enlarged and swollen about its middle. There is an obscurely defined dark brown subapical spot on the costa before the apex. The secondaries are dark chocolate-brown with the fringes pale ochreous. On the under side, both wings are chocolate-brown irrorated toward the base with minute darker scales; both have a small discal spot at the end of the cell; both are crossed by incomplete and obscure transverse median and submarginal lines, at the costal extremities of which upon the primaries are minute ochreous dots. Expanse, 17 mm.

119. *T. mesoleuca*, sp. nov. ♂. Front and collar pale fawn. Patagia and upper side of thorax pure white. The upper side of the abdomen pale fuscous with a small triangular spot of white on the median line upon the first segment after the thorax. On the under side, the thorax and abdomen are pale yellowish-white. The legs are concolorous, with the anterior pair margined with dark brown. The primaries on the upper side have the basal half pure white with the costa near the base broadly clouded

A PRELIMINARY LIST OF THE BUTTERFLIES OF NORTH-EASTERN MISSISSIPPI.

BY HOWARD EVARTS WEED, AGRICULTURAL COLLEGE, MISS.

The following list of fifty-three species of butterflies has been prepared by reference to the collection of the Miss. Agricultural Experiment Station, which has been collected by the writer during the past three seasons. No study of the food-plants of the species has been made, nor has an attempt been made to make the list complete, the species reported being those which have been collected at odd times in general collecting. However, the list is given here in the hope that it may interest those who may be especially interested in the subject, no list of the butterflies of this state having heretofore been presented.

In this connection I may say that the state of Mississippi presents five quite distinct faunal regions to the entomological eye.

(1) Extending along the western border of the state is the delta region or bottom lands of the Mississippi River where the country is quite level and the soil very rich. In some years this region is subject to overflow and on this account its fauna presents many things of interest, entomologically Hemiptera and Coleoptera predominating.

(2) Along the north-eastern border of the state near the Alabama line is the prairie region, which presents many

characters similar to the bottom lands of the Mississippi River, but is not subject to overflow.

(3) The southern and especially the south-eastern portion of the state is known as "the piney woods" region, and here, as would naturally be the case where the forest is of different nature from surrounding localities, the insect fauna is much different than in other localities.

(4) Along the extreme southern border at the Gulf coast is perhaps the richest entomological field where, as is generally the case along a coast line, many species are found which are not present a few miles in the interior.

(5) The central and northern portions of the state present the largest but not the richest faunal region and it is at the eastern border of this region in Oktibbeha county that the species listed below have been collected, although at some future time I may be able to list the species of the other regions, that of the Gulf coast especially.

It is thus seen that the state presents a varied fauna. I may say, however, that any given locality does not present a richness of species, but rather a great number of individuals of the species which are present. Many of the commoner species of butterflies are present the year round even in mid-

winter, when some of our bright days are too tempting for them to hibernate all the time.

The following is the list:—

1. *Danaüs archippus*, Fabr. While by no means rare, this species is not as abundant as in the northern states.

2. *Agraulis vanillae*, L. Not common.

3. *Euptoieta claudia*, Cram. Very common, especially in Sept.

4. *Phyciodes tharos*, Dru. This is perhaps our most common species.

5. *Grapta interrogationis*, Fabr. Quite common, on the College campus the larvae feeding upon a common climbing plant, the Cross Vine, *Bignonia capreolata*. This plant is quite common in the woods south of the Ohio River and it is probably the more common food-plant of *Grapta* in the South.

6. *Vanessa antiopa*, L. While often found, this species is rare here in comparison with its occurrence in the northern states. I have often taken specimens in January when they are found hibernating at the side of logs.

7. *Pyrameis huntera*, Fab. Somewhat abundant.

8. *P. cardui*, L. Rarer than the above.

9. *Junonia coenia*, Hbn. One of the most common species, being especially abundant in Sept. on the flowers of various species of *Aster*, of the *Compositae*.

10. *Limenitis disippus*, Gdt. Hardly as common as *D. archippus*.

11. *Apatura celtis*, Bd.-Lec. Rare.

12. *A. proserpina*, Scudd. Rare.

13. *Anaea andria*, Scudd. Rare.

14. *Neonympha gemma*, Hbn. Very common in the woods in Sept. and Oct.

15. *N. eurytris*, Fabr. Rare.

16. *N. sosybius*, Fabr. Very common in Sept. and Oct.

17. *Satyrus alope*, Fabr. Not common.

18. *Libythea bachmani*, Kirtl. Not common.

19. *Thecla halesus*, Cram. Not common.

20. *T. acadica*, Edw. Rather abundant.

21. *T. edwardsii*, Saund. Not common.

22. *T. poeas*, Hbn. Rather common in Sept.

23. *Lycaena pseudargiolus*, Bd.-Lec. Not common.

24. *L. comyntas*, Gdt. Very abundant.

25. *Pieris rapae*, L. Very abundant and one of our most injurious species. It may be seen the year round, except perhaps a few cold days in mid-winter.

26. *P. protodice*, Bd.-Lec. Not common. I have captured specimens only in April.

27. *Nathalis iole*, Bdv. While this species is not abundant here, it is more so than in the north.

28. *Catopsilia eubule*, L. Very common, especially in early Sept. when the species occurs in large numbers around flower beds. Also seen on bright days throughout the winter.

29. *Meganostoma caesonia*, Stoll. While this species is not common, it is more so than at the north.

30. *Colias eurytheme*, Bdv. Very abundant throughout the year, the variety *keewadin*, Edw. being the most common while several alba forms have been taken.

31. *C. philodice*, Gdt. Quite abundant but not as much so as the preceding.

32. *Terias nicippe*, Cram. Common in Sept.

33. *T. lisa*, Bd.-Lec. More common than the preceding.

34. *T. jucunda*, Bd.-Lec. Rarer than the two preceding.

35. *Papilio ajax*, L. More common than at the north.

36. *P. turnus*, L. Not so common as at the north.

37. *P. cresphontes*, Cram. Rather rare, at least much more so than in the southern portions of the state and in La.

38. *P. troilus*, L. Very common.

39. *P. philenor*, L. Much rarer than preceding.

40. *Ancyloxypha numitor*, Fabr. Not abundant, but more so than at the north.
41. *Pamphila campestris*, Bdv. Not common.
42. *P. phylaeus*, Dru. One of our most common species.
43. *P. cernes*, Edw. Abundant.
44. *P. accius*, S. and A. Abundant.
45. *P. pontiac*, Edw. Not common.
46. *P. eufala*, Edw. Not common.
47. *P. fusca*, G. and R. Rare.
48. *Pyrgus tessellata*, Scudd. A very common species.
49. *Nisoiades juvenalis*, Fab. Common.
50. *Pholisora catullus*, Fabr. Common.
51. *Eudamus pylades*, Scudd. Common.
52. *E. bathyllus*, S. & A. Very common.
53. *E. tityrus*, Fab. Common.

NOTES ON THE REARING OF *PLATYSAMIA CECROPIA*.

BY KATHARINE W. HUSTON, ROXBURY, MASS.

In the summer of 1892 the writer received twenty-nine eggs laid on June 30th by a *Cecropia* moth in captivity, in Roxbury, Mass. Thirteen of them were detached from the surface on which they had been deposited. On July 13th twenty-four eggs hatched, among them the thirteen just mentioned. Though the young larvae remained in the box with their egg-shells, and were carried in a satchel four hours without food, none of the shells were eaten.

One of the caterpillars died the next day, one was lost, and two were put into alcohol. Of the remaining twenty, all but one arrived at maturity after an exceedingly healthy life of six weeks and a half, during which they moulted four times. Two of them, however, when ready to spin, seemed unable to produce silk, and died. Seventeen made cocoons.

The larvae were reared in Bristol, Maine. The breeding cage was merely a pasteboard box covered with wire netting. All the caterpillars were kept in the same box. It stood in an open window, but not in the sun, and was thoroughly cleaned every day.

The caterpillars were fed on apple leaves, which were always dipped in water before being placed in the box. Only the young shoots of the trees were used, as these furnished a suitable series of leaves from the very young and tender to the mature. They

were taken from trees of widely different varieties.

The newly hatched caterpillars were about three-sixteenths of an inch long. The body was black with six rows of yellowish brown bristles extending its whole length. In a few hours the bristles also became black. On the fourth day the minute tubercles at the base of the bristles showed a decided yellow color, and on the sixth the bodies were an olive brown. On the eighth day, after having eaten nothing for about eighteen hours, the caterpillars moulted.

The color of the new skin was Indian yellow; the head, tubercles, and bristles were black; and the feet were yellow. Between the tubercles were rows of small black spots. Four caterpillars were much darker than the others. In less than an hour after their moult the Indian yellow changed to olive brown, which in turn gave place to black. Their bodies afterwards showed a yellowish tinge but were easily distinguishable from the others.

The largest ones now measured five-eighths of an inch. A few ate their cast-off skins, but the majority showed no disposition to do so, and the same was true after each successive moult.

The second moult occurred on the thirteenth day, after a fast of twenty-four hours.

The bodies and feet were now of a pale green. On the first five segments was an additional row of tubercles below the others. Of the two middle rows, all were yellow except those on the second and third segments, which were a bright coral red, and those on the first, which were light blue. All the other tubercles were light blue. The head was greenish yellow with a black stripe down each side. The average length of the caterpillars at this time was one and one-eighth inches, the largest measuring an inch and a half.

They moulted for the third time on the eighteenth day, having eaten nothing for the preceding forty-eight hours. The bodies were of a beautiful, clear, light blue on the back, changing to a pale green at the sides and under part. The coloring of the tubercles was the same as before. The black spots were fewer, smaller, and fainter. The head and the feet were pale green, the former marked with black at the sides. The greatest length was two and one-eighth inches, the average, an inch and a half.

On the twenty-seventh day the fourth and last moult took place. The caterpillars had not eaten for two days and a half. The skin was now entirely of a light green color, the black spots having disappeared. The two middle tubercles on the second and third segments were of a dull red with seven or eight very short black bristles; those on the fourth segment were orange-yellow, nearly as large as the red, and bore six bristles. On each of these tubercles was a row of black warts under the bristles.

When full-grown the caterpillars measured three inches and a half and were as thick as the forefinger. Two completed their growth in five weeks and a half; and on September first all the cocoons but one were either finished or partly made.

During the first eight days the caterpillars fed mostly at night and ate very little. Through the day they would lie motionless on the exposed surfaces of the leaves, in

groups, for hours at a time. Just before the second moult they developed vigorous appetites which constantly increased in voracity, both day and night, until the end.

In eating, they always began at the edge of the leaf, sometimes cutting away the part between two veins till the midrib was reached, sometimes eating directly across the veins. When half of the blade had been eaten they would often devour the entire midrib before beginning on the other half. They drank greedily whenever wet leaves were given to them.

In long periods of rest the head was drawn under the second segment, but in short periods it was merely withdrawn into the first segment, while the thoracic feet still retained their hold of the edge of the leaf, so that feeding could be resumed without change of position.

There was great unanimity in their movements. It was rare to find even one feeding while the others were resting; and after lying motionless for some minutes they would begin simultaneously to eat again, as suddenly as at the touch of an electric button.

They were social in their habits from the beginning, and even when full-grown as many as nine would lie close together on one branch, the head of one perhaps resting on the body of another. Two would sometimes feed from the same part of a leaf, their heads touching every time they returned to the starting point. They never showed any of that irritation at contact with each other so common with some caterpillars, nor did they pay any attention to the touch of a finger either on the skin or the tubercles; but if an aphid, introduced into the box on a leaf, crawled over one of them, the caterpillar tried by writhings and twistings to rid itself of its visitor.

Touching the larvae with the finger was an experiment made when they were well grown. Otherwise they were not handled at all during their entire development.

As late as August 19th there was one caterpillar whose length was only one inch. It had moulted but twice; and, as its mouth parts seemed to be defective, it was put into alcohol. The number was thus reduced to nineteen.

On August 22nd the first cocoon was begun in a corner of the box, and on the 23rd and 24th two other corners were utilized in the same way. After this the remaining caterpillars were removed from the box as fast as they were ready to spin, and placed under more favorable conditions.

Two spinning places were provided. The first consisted of small branches of an apple-tree standing in the sockets of a board, the whole enclosed in cotton netting. In the other the branches stood in a pitcher of water, the mouth of the pitcher being covered with paper to prevent death by drowning. These branches were not enclosed in any covering, but in no case did the caterpillars try to wander away.

In selecting a place for its cocoon the caterpillar, holding to the twig by its anal feet, sought, by reaching out in all directions to the full length of its body, to find points of attachment for what may be called its guy-ropes. The spinning of these was done very deliberately and occupied several hours. When the cocoon had been roughly shaped out the caterpillar rested for three or four hours, its work afterwards progressing rapidly.

All the caterpillars enclosed by netting made use of it in beginning their cocoons, while the others used the leaves and paper within their reach; so that many of the cocoons were partly concealed by a covering of foreign substance. In one instance three were grouped close together, and eight others were arranged in pairs.

In some cases the silk, when first spun, was beautifully white and lustrous, changing after exposure to the air to a rich reddish brown; in others it had a brown tinge from the first.

It has already been stated that two of the full-fed caterpillars died. One of them spun

a few threads on August 30th, and for the remaining four days of its life went through all the motions of attaching threads but without producing any more. The other died on the second day after it had selected a place for its cocoon. It produced no silk at all.

The cocoons were collected, put into a pasteboard box, and kept in a cold, dark closet until April 10th, when they were taken into a warm room. A cage was made by enclosing a small, deep-seated north window with netting, and the cocoons were pinned to the window frame. The glass itself was covered with netting stretched tightly over it.

During a period of nineteen days beginning May 24th, sixteen moths emerged, seven being males, and nine females. Two of them did not succeed in fully expanding their wings; the others were perfect insects. The seventeenth cocoon was found to contain only a dead caterpillar.

A few of the moths were given the freedom of the cage for several days, in the course of which five hundred and ten eggs were laid by two females, one depositing two hundred and forty-six, the other two hundred and sixty-four. A majority of the eggs hatched.

It will be seen that the conditions under which these moths were reared differ in several respects from the conditions considered essential by some entomologists, who say that the larvae should be kept in a damp cellar up to the time of the first moult; that not more than two or three should live in the same cage for fear of contagious disease; and that the atmosphere in which the cocoons are kept through the winter should be moist as well as cold.

My experience is not sufficient to enable me to decide whether my larvae escaped death merely by a happy chance, or whether the conditions just quoted are non-essential in all cases. I am inclined, however, to the latter opinion, in view of the many unsuccessful attempts to rear the larvae even when those conditions have been complied with.

BIBLIOGRAPHICAL NOTES.—VI.

BY SAMUEL HENSHAW.

BIOLOGIA CENTRALI-AMERICANA.—RHYNCOTA. HEMIPTERA—HETEROPTERA. Vol. I. By W. L. Distant.

- Pentatomidae, 1880, pt. 4, 5, 7, 8, p. 1-88; 1881, pt. 9, p. 89-103; 1884, pt. 34, p. 304; 1889, pt. 78, 81, p. 305-328; 1890, pt. 84, 85, 87, p. 329-351; 1893, pt. 109, p. 452-458. gen. sp.
104 377
- Coreidae, 1881, pt. 9-12, p. 103-168; 1882, pt. 15, p. 169-173; 1890, pt. 87, p. 351-352; 1892, pt. 105, p. 353-368; 1893, pt. 106, 109, p. 369-378, 458-461. 75 210
- Lygaeidae, 1882, pt. 15-17, 19, p. 173-220; 1893, pt. 106-108, p. 387-411. 54 176
- Pyrrocoridae, 1882, pt. 19, p. 220-224; 1883, pt. 21, 26, p. 225-234; 1893, pt. 108, 109, p. 411-415, 461-462. 10 33
- Capsidae, 1883, pt. 26, p. 234-264; 1884, pt. 28, 29, 34, p. 265-303; 1893, pt. 108, 109, p. 415-451, 462. 80 313
- Species of the following genera are figured:—
- Pentatomidae*.—*Acanthosoma*, 10. *Achates*, 30. *Aethus*, 3. *Agonosoma*, 30. *Agroecus*, 31. **Alkindus*, 30. **Architas*, 29. *Arocera*, 7, 30, 31. **Atizies*, 39. *Augocoris*, 1. *Banasa*, 7, 8, 30. *Berecynthus*, 6. **Beroaldus*, 29. *Boea*, 30. **Boterus*, 30. *Bothrocoris*, 8. *Brachystethus*, 8, 31. *Brochymena*, 5, 6, 31. *Camirus*, 2, 30. **Capivaccius*, 39. *Chlaenocoris*, 30. *Chloiochroa*, 6, 31. *Chlorocoris*, 5, 6, 7, 30, 31. *Coryzorhaphis*, 2. *Cosmopepla*, 5, 31. **Crato*, 39. *Cyrtaspis*, 4, 30. *Cyrtomenus*, 2. *Dichelops*, 31. *Dinidor*, 10. *Dinocoris*, 5, 6, 29, 31. *Discocephala*, 4, 5, 6. *Dryptocephala*, 4. *Dystus*, 2. *Edessa*, 8, 9, 10, 30, 31, 32. *Empicoris*, 6. *Eurystethus*, 6. *Euschistus*, 5, 6, 7, 31. *Euthyrhynchus*, 1. **Galeacius*, 29. *Galedanta*, 5. *Heteroscelis*, 3. *Homaemus*, 2, 30. *Hymenarcys*, 6. *Lobonotus*, 4. *Lobothyreus*, 29. *Loxa*, 5, 6. *Macropygium*, 5, 6. **Mathiolus*, 31. *Melanodermus*, 5. *Microporus*, 2, 4. *Mormidea*, 5, 6, 7. *Murgantia*, 7. *Mutyca*, 4. *Nezara*, 7, 31, 32. *Olbia*, 10. *Oplonus*, 1, 3, 4. *Orsilochus*, 1, 2, 30. *Pachycoris*, 1. *Padaeus*, 6. *Pallantia*, 30. *Pangaeus*, 2, 3. *Pantochlora*, 8. *Pelidnocoris*, 7. *Peribalus*, 6. *Perillus*, 1, 3, 4. *Peromatus*, 8, 10. *Phalaeus*, 7. *Pharypia*, 6. *Phineus*, 7. *Piezodorus*, 7, 31. *Podisus*, 1, 2, 3, 4, 7, 29, 30. **Priapismus*, 31. *Proxys*, 5. *Rhytidoporus*, 4. *Sibaria*, 5. *Sphyrocoris*, 2. **Stenocoris*, 4. *Stiretrus*, 1, 3, 30. **Supputius*, 4, 29. *Syllobus*, 3. *Symphylus*, 1, 2, 3, 29, 30. *Taurocerus*, 7, 8. *Tetyra*, 3. *Thyanta*, 5, 7, 30. *Thyreocoris*, 2, 3, 30. *Trichopepla*, 6, 31. *Tynacantha*, 29.
- Coreidae*.—*Acanthocephala*, 10, 11, 12. *Acidomeria*, 12. *Alydus*, 15. *Anasa*, 12, 13, 14, 33. *Anisoscelis*, 13. *Archimeris*, 11, 12, 33. *Aufeius*, 15. *Bactrodosoma*, 39. *Bardistus*, 33. *Capaneus*, 11, 12, 33. *Catorhintha*, 13. *Cebrenis*, 14. *Charisterus*, 13, 33. *Chelinidea*, 13. *Cimolus*, 13. *Colletia*, 14. *Corizus*, 15, 16. *Curupira*, 39. *Cydamus*, 15, 33. *Darmistus*, 15. *Dasycoris*, 15. *Diactor*, 33. *Ficana*, 14. *Flavius*, 10. **Galeottus*, 39. *Harmostes*, 15. *Hirilcus*, 10. *Hyalymenus*, 15. *Hypselotus*, 14, 16. *Jadera*, 15, 17. *Jalysus*, 16. *Laminiceps*, 33. *Leptoglossus*, 12. *Leptoscelis*, 13. *Lycambes*, 11. *Machtima*, 11. *Madura*, 13. *Mamurius*, 12. *Margus*, 13, 14. *Melucha*, 33. *Mozema*, 11, 12. *Namacus*, 14. *Narnia*, 13, 33. *Nematopus*, 11, 12. *Nirovecus*, 14. **Ojedana*, 33. *Pachylis*, 10. **Parajalysus*, 16. *Paryphes*, 15. *Plapigus*, 13. *Protenor*, 16. *Savius*, 15. *Scolopocerus*, 16. *Sephina*, 12, 13. *Spartocera*, 13, 33. *Sphictyrtus*, 15, 33. *Staluptus*, 13. *Stenoscelidea*, 12. *Thasus*, 10. *Trachelium*, 16, 33. *Vilga*, 14, 33. *Xenogenus*, 39. *Zicca*, 14.
- Lygaeidae*.—*Aclohwa*, 34. *Aeroleucus*, 17, 18, 34. **Balboa*, 35. **Bathycles*, 35. *Belonochilus*, 34. **Bubaces*, 36. **Caeneus*,

35. *Catenes, 35. *Cholula, 19, 35. *Cligenes, 35. Cymus, 34. *Davila, 35. *Dorachosa, 36. *Enciscoa, 34. Eremocoris, 20, 35. Erlacda, 35. Esuris, 36. Geocoris, 17, 18. *Gonatas, 20. Heraeus, 18, 19. Ischodemus, 19, 34. Ischnorhynchus, 19, 34. Ligyrocoris, 17, 18, 19. Lygaeus, 16, 17, 18, 34. *Mayana, 34. Myodocha, 17, 18. *Neocattarus, 19, 20, 35. *Neoninus, 19. *Nicuesa, 34. Ninus, 19. *Ninyas, 19, 34. Nysius, 34. Oncopeltus, 16, 17. Pachygrontha, 17, 34. Parema, 17, 19. Peliopelta, 36. Pèphysena, 18, 20. *Perigenes, 34. *Petissius, 35. Plociomeria, 17, 19, 35. *Prytanes, 35. *Pseudopamera, 20, 35. Rhaptus, 36. Rhyparochromus, 19. Salacia, 35. *Scythinus, 35. *Sisamnes, 35. *Toonglasa, 34. Trapezonotus, 20. *Trapezus, 20.

Pyrrhocoridae.—Arhaphè, 21. Dysderus, 21. Fibrenus, 20, 21. Japetus, 21. Largus, 20. *Phaeax, 36. Pyrrhocoris, 21. *Renodaëus, 39. Stenomacra, 20. Theraneis, 21, 22.

Capsidae.—*Admetus, 25. *Annona, 26, 27, 39. *Antias, 29. *Auchus, 39. *Bibaculus, 28. Calocoris, 22, 23, 25, 37. *Calocoricisa, 26, 27, 38. *Calondas, 23, 26. *Carmelus, 28, 38, 39. *Chius, 27. *Cimatlan, 27, 38. Compsocercocoris, 25, 37. Collaria, 24. *Creontiades, 23. Cylapus, 24, 36. Cyrtocapsus, 29. *Dermirata, 29, 39. Ecritotarsus, 22, 23, 26, 28, 38.

*Eioneus, 36. *Eubatas, 27. *Eurotas, 29. *Falconia, 29. *Ficinus, 39. *Florus, 29. Fulvius, 23, 27. *Fundanius, 28. *Fuscus, 29. Garganus, 25, 37. Hadromema, 22. Henicoenemis, 27. Herdonius, 36. *Horcias, 26, 27, 38. *Jacchinus, 37. *Jobertus, 36. *Jornandes, 29, 39. *Lampethusa, 29. Lopidea, 23, 37. *Lygdsus, 24, 36. Lygus, 23, 26, 37. *Mala, 26. Megacoelum, 23, 37. *Minytus, 24, 36. Miris, 23, 36. *Monalocoricisa, 28, 38. Monalonion, 23, 24. *Neoborus, 27, 38. *Neocapsus, 22, 38. *Neocarnus, 29. *Neofurius, 23, 28, 29. *Neoleucon, 26. *Neopropa, 26, 37. *Neosilia, 27, 29, 39. Neurocolpus, 23. Ofellus, 25. Orasus, 23. *Pandama, 26, 37. *Pappus, 25, 37. *Paracalocoris, 22, 25, 37. *Paracarnus, 28, 39. *Parachius, 27. *Parapropa, 26. *Piasus, 24. *Poeas, 37. Poecilocapsus, 22, 23, 26, 27, 37. *Proba, 25, 26. *Pseudobryocoris, 28. *Pseudocarnus, 28. *Ranzovius, 36. Resthenia, 22, 24, 25, 36, 37. *Rhasis, 38. *Spartacus, 26. *Sysinas, 23, 24, 25. *Taedia, 25. *Trygo, 29. *Vannius, 24. *Xenetus, 24. *Zacynthus, 24. *Zoilus, 25, 36. *Zosippus, 24, 36.

The figure following the name of the genus indicates the number of the plate; new genera are preceded by an (*). Of the 1109 species recorded from Central America, 49 Pentatomidae, 29 Coreidae, 22 Lygaeidae, 7 Pyrrhocoridae, and 7 Capsidae, a total of 114, are found in America north of Mexico.

NOTES ON BOMBYCID LARVAE.

BY HARRISON G. DYAR, NEW YORK.

PARORGYIA LEUCOPHAEA Abbot and Smith. 1797—A and S. Lep. ins. Ga. pl. 78.

clintonii Grote and Robinson. 1866—G and R. Proc. ent. soc. Phil., vi, 3. var. BASIFLAVA Packard.

1864—Pack., Proc. ent. soc. Phil., iii, 333. Larva (before last molt). Head shining black. Body pale yellowish, variegated with

black; a black dorsal line, interrupted on the summits of the posterior segments. Long silky white hairs, with a few black ones arise from the subventral warts. The lateral row (row iii) furnishes shorter bristly yellowish hairs; but on joints 2 and 13 gives a long pencil of black hairs. A few black hairs also overhang the head and extend from joint 13.

From the subdorsal warts on joints 2-4, 8-11 and 13 arise tufts of plumed white hairs appearing "mouldy" on the ends, intermixed with bristly yellow hairs. On joints 5, 6, 7 and 12 the warts of rows i and ii bear a series of large square black tufts, mixed with white plumed hairs especially at the sides of the tufts, where also a few bristly yellow hairs occur. The tuft on joint 7 is much less black than the others. Dorsally on joints 10 and 11 a median whitish retractile tubercle with flattened top.

Last stage.—Head black, whitish above the mouth. Body pale whitish with a yellowish tinge, shaded, marked diffusely with black; a dorsal and a stigmatal band indicated. Two long, black pencils of hairs on joints 2 and 13 as in the previous stage. Lateral hairs long, dirty whitish mixed with a few black ones. Dorsal tufts as before except that those on joints 5-8 are now large, square, brown ones, mixed at the sides with white plumed hairs; the tuft on joint 12 still remaining black as previously and contrasting with the others.

Cocoon composed of hair and silk.

Mature larvae on Hickory (*Carya*) at Rhinebeck, N. Y. June 6, 1887 and young ones on oak (*Quercus*) Aug. 9, 1887. My description agrees approximately with Smith and Abbot's figure; but this figure can hardly be very accurate as remarked by Prof. Riley (Proc. ent. soc. Wash. i, 88.). The brief description of the larva of "*Parorgyia clintonii*" by Mr. Coquillett (Can. ent. xii, 45) also agrees with my notes, except that the author remarks that the retractile tubercles are "reddish."

The moths bred from the larvae here described were of the form *basiflava* Pack.

PARORGYIA ACHATINA Abbot and Smith.

1797—A and S. Lep. ins. Ga., ii, pl. 77.
parallela Grote and Robinson.

1866—G. and R. Proc. ent. soc. Phil., vi, 5.
1872—Lintner, 26th rept. N. Y. state cab.

n. hist. 129.

1887—Seifert, Ent. amer. iii, 93
1890—Packard, 5th rept. U. S. ent. comm.
135.

var. OBLIQUATA Grote and Robinson.

1866—G. and R. Proc. ent. soc. Phil., vi, 4.

According to the observations of Mr. Seifert, this larva has eight stages, while Dr. Packard gives it but five.* Mr. Seifert's larvae did not hibernate, which is unusual for this latitude. I believe this species usually hibernates in the fourth and fifth larval stages.

Larva stage III.^o(?)—Head black, shining, mouth parts paler, sutures depressed; width 1.34 mm. Body nearly black, a little mottled with whitish at the sides. Subdorsal warts on joint 2 large, bearing a few plumed black hairs. From warts i and ii on joints 5 and 12 arises a square black tuft of plumed hairs. The other warts bear pale, sordid, whitish hairs; but from warts i and ii on joints 6-8

* Neither of these authors have given any measurements of the width of head, which would have enabled me to compare the stages observed by me directly with their descriptions. They have given measurements of the length of the larva, data which seem to me very variable and unsatisfactory. Nevertheless, the measurements of Mr. Seifert follow a series in geometrical progression fairly well, and, to judge Dr. Packard's work by Mr. Seifert's, using the length of larva as means of comparison, I conclude that Dr. Packard has failed to observe stages iv, vi and vii, as recorded by Mr. Seifert. Below, I give, comparatively, a calculated series and the lengths of larva as found by these gentlemen.

Calculated series, ratio 7-10: 3.1, 4.5, 6.4, 9.1, 13.0, 18.6, 26.6, 38 mm.

Mr. Seifert's measurements: 3.9, 5.1, 6.5, 9.0, 13, 19 25, 26-38 mm.

Dr. Packard's measurements: 2.5, 4.5, 7, —, 12-14, —, —, 35 mm.

It seems evident that Dr. Packard must have missed at least one stage; for it is not possible to make his measurements fit a calculated series. However, such is the uncertainty of these measurements, that it can be done by supposing that the larvae have sometimes only six stages, and that Dr. Packard missed stage v; e. g.,

Calculated series, ratio 6-10: 2.7, 4.5, 7.6, 13, 21, 35 mm.

Dr. Packard's figures: 2.5, 4.5, 7, 12-14, —, 35 mm.

they are gray, forming slight dorsal tufts. On joints 10 and 11 a medio-dorsal whitish retractile tubercles.

Stage IV. (?)—Width of head 1.65 mm. As before, but the hair pencils from joint 2 are more distinct and there is abundant gray hair from the dorsal warts of joints 3, 4, 6, 7 and 8. Some larvae hibernate in this stage.

Stage V. (?)—Head black, labrum and antennae whitish; width 2 mm. Dorsum covered by feathery gray hairs; but the whitish retractile tubercles are exposed. Black hair pencils on joint 2 and square tufts on joints 5 and 12 as before.

This is the hibernating stage.

Food plants.—Oak (*Quercus*), Hickory (*Carya*) and wild cherry (*Prunus serotina*).

Parorgyia achatina larva differs from that of *P. leucophaea* in lacking the pair of black hair pencils which are present in the latter on joint 13.

The synonymy given above for the two species of *Parorgyia* is the same as that given by Dr. Packard (5th rept. U. S. ent. comm. pp. 135-138) except that I regard *obliquata* as the form of *achatina* in which the longitudinal black bar is absent (see Seifert, Ent. Amer. iii, 96) and not as a synonym of *leucophaea*. Further, I regard *P. cinnamomea* G. and R. and *P. plagiata* Walk. as distinct species. In confirmation of this view, I have found a single larva on the hop-hornbeam in Ulster Co., N. Y., June 5, 1887, which differed from both those described above. It had two pair of black pencils and four tufts mixed with very feathery white hairs besides eight smaller dorsal tufts and a series of small lateral pencils. The retractile tubercles were red. Head black, body whitish, hair whitish gray. I was unable to obtain a moth from the larva, and have not met with it since. It seems likely that it may have been *Parorgyia cinnamomea*.

LEBENA OVILLA Grote.

I have observed two stages previous to the last one which has been described by Dr.

Packard (American Naturalist, xviii, 726). In these stages the larva is largely green and rests on the back of a leaf; in the last stage it is gray and hides by day in crevices in the bark. Its colors are well adapted to the surroundings which its habits lead it to choose at different periods of its life.

Stage II. (?)—Head pale yellowish, mouth darker; width 0.45 mm. Body light green, the wart i on joint 7 blackish brown with a small brown dorsal patch and faint, broad, greenish white dorsal band. Other warts pale; hairs mostly pale, a few stiff, dark ones. Length of larva about 4 mm.

Stage III.—Much the same. Width of head 0.60 mm.

Stage IV. (?)—Width of head 0.85 mm. Much as in the next stage, though still largely green. Markings brownish, clouded; dorsal line scarcely continuous. Warts pale, except wart i on joint 7 which is black.

Stage VI. ? (Last stage).—Head slightly bilobed, about as wide as high, full, well rounded; ground color white, shining, marked with dense black mottlings, forming a black patch over the vertex of each lobe, and largely covering the clypeus, leaving the sutures white; width 1.5 mm. Body flattened, projecting subventrally, abdominal feet present on joints 8-10 and 13 only. Three rows of warts on every joint, row i subdorsal, central; ii superstigmatal, anterior; iii substigmatal on a projecting base and iv smaller, on joints 3-11 subventrally. Hair fine, radiating, not abundant, but thickest and longest from the warts of row iii. Color sordid white with a black dorsal line and several irregular and confused, crinkled, blackish lines along the sides, giving a dark gray appearance. On joints 2-4, 7 and 11-12 the dark color predominates dorsally, forming diffuse, clouded patches, through which the dorsal line is less distinctly defined by white than elsewhere. Thoracic feet brownish. Warts all pale, some of row i tinged with black. Hair black and white mixed. Venter sordid white.

Cocoon.—Composed of little bits of leaf or other material. The larva builds up two parallel walls and unites them at the top. Cocoon elliptical, flat at base, size $7 \times 2\frac{1}{2}$ mm. The anterior end is a little higher and more pointed than the posterior.

Larvae on *Quercus macrocarpa* at Plattsburgh, N. Y.

ENTOMOLOGICAL NOTES.

A recent number of the Proc. Boston soc. nat. hist. contains a critical study and revision of the New England species of Spharagemon by Mr. A. P. Morse. The article is based on a large amount of material for the most part personally collected in various parts of the territory considered and upon examination of the type specimens whenever practicable, and is illustrated with drawings of the principal structural characteristics presented by several species of the genus. Three species are recognized as occurring in New England; another from Staten Id. will probably be found in Connecticut. The latter is described as new (*S. oculatum*) and has probably been confused with *S. col-*

lare. Of the former, one (*S. saxatile*) is new, having been hitherto confused with the remaining two (*S. aequale* and *bolli*). *S. balteatum* is reduced to a synonym, and the New England form of *aequale* is further distinguished by a trinomial (*scudderi*) for reasons which our space withholds. The cut, on a smaller scale, and its explanation are given herewith.

We are glad to commend and call the attention of entomologists to the author's practice of examining an abundance of material and distributing examples as one likely to materially advance the science by reducing errors and synonyms to a minimum.

The death is announced of Edward Norton at the age of 70, at his home in Farmington, Conn. Mr. Norton was one of the first naturalists of this country to devote himself to the exclusive study of a single family of Hymenoptera, choosing the Tenthredinidae. It is many years, however, since he took an active part in entomological pursuits. It may not be known to many that he is said to have been the first importer of Guernsey cattle to this country and that he established the first creamery in New England.

In an extended notice of the first volume of Kolbe's new Introduction to Entomology in a recent number of the Entomologische nachrichten, Verhoeff declares it to be for entomologists the most important literary work of the last decade.

Under the insufficient and over modest title "On certain grass-eating insects," Mr. E. P. Felt of Cornell University publishes a synopsis of the species of Crambus found about Ithaca, N. Y., treating the subject both systematically and economically, with exceptionally full accounts of the life histories of those little known moths and abundant and very varied illustrations. 26 species are included. It is an excellent exposition of the Cornell method.

Mr. C. H. Tyler Townsend has again changed his address to Las Cruces, N. Mex.

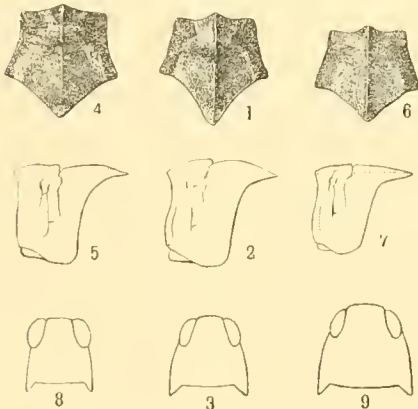


Fig. 1, 2, 3, *S. aequale scudderi*. Fig. 4, 5, *S. saxatile*. Fig. 6, 7, *S. bolli*. Fig. 8, *S. oculatum*. Fig. 9, *S. collare*. 2 diameters.

PROCEEDINGS OF THE CLUB.

10 Nov., 1893. The 181st meeting was held at 346 Marlborough St., Boston, Mr. J. H. Emerton in the chair.

Mr. A. P. Morse showed Professor Comstock's "Evolution and Taxonomy" and stated the conclusions of the author upon the classification of the Lepidoptera. The author remarked upon the probability of the elytra of Coleoptera and Euplexoptera being homologous with the tegulae of Hymenoptera and the patagia of Lepidoptera, calling attention to the papers bearing upon the subject by Meinert and by Hoffbauer.

Mr. F. C. Bowditch remarked on the unusual abundance of *Calosoma willcoxi*, *C. scrutator*, *C. frigidum* and *C. calidum* in Brookline during the past summer, the first two species never having been previously taken by him in this part of the state.

Mr. Morse spoke of the rarity of males of *Pelecinus polycerator*, and remarks followed with regard to the much greater abundance of that sex in various other insects, notably among various spiders and in the Coleoptera among the Cerambycidae and Stylopidae.

Mr. R. Hayward stated that he was engaged in the study of our species of *Bembidium* and remarked on some of the difficulties with which it was attended. He hoped to be able to revise our species and showed specimens of several groups. He also remarked on the habits of several species and gave a resumé of the work previously done on the genus and the various ways in which it had been divided by several of the older writers.

The club then proceeded to an examination of portions of the Secretary's collection of Coleoptera.

12 January, 1894.—The 182d regular and 17th annual meeting since incorporation was held at Mercer Circle. Mr. A. P. Morse was chosen chairman.

The reports of the secretary and treasurer were read. Messrs. Scudder and Hayward were appointed auditors. The following

officers were elected: President, T. E. Bean; secretary, R. Hayward; treasurer, Samuel Henshaw; librarian, S. H. Scudder; members at large of the executive committee, A. P. Morse and S. H. Scudder.

The secretary read the following resolutions prepared by the executive committee and they were passed.

Resolved: That in the death of Prof. Hermann August Hagen the Cambridge Entomological Club recognizes the loss of one whose reputation and whose many years of service have contributed largely to the honor and respect paid to entomology.

Resolved: That we hold in precious remembrance his worth and high scientific attainments.

Resolved: That a copy of these resolutions be sent to Mrs. Hagen with the respectful sympathies of the members of the Club.

The address of the retiring president, Mr. W. H. Ashmead, on "The habits of the aculeate Hymenoptera" was read by Mr. Henshaw.

Mr. A. P. Morse read a Check-list of the New England Acrididae (printed in full in the present number of *Psyche*). The list is based chiefly on material personally collected, Mr. Morse having taken in the field all but one of the species mentioned—one of the captures being unreported elsewhere from the country east of the Mississippi river. He proposed to use in the list, as a ready means of indicating the species and forms, a modification of the decimal system of numbering, believing it to be clear, concise, and sufficiently elastic to allow of necessary interpolations and additions. Details of the method were given with reference to the list.

The secretary read a paper by Mr. H. E. Weed entitled "A preliminary list of the butterflies of north-eastern Mississippi," in which the author divided the state into five districts and records the occurrence of 53 species in the region treated of.

Mr. A. P. Morse showed a collection of Coleoptera made by him at Winchendon, Mass., during the past summer.

THE SEVENTH VOLUME OF PSYCHE

Begins in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume, but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

Vols. 1-6, Complete, Unbound, - - Now sold for \$29.00.
 Vols. 1-6, and Subscription to Volume 7, - - - \$33.00.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

Vol. 1. Introduction; Nymphalidae.

Vol. 2. Remaining Families of Butterflies.

Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo, half levant, \$75.00 net.

HOUGHTON, MIFFLIN & CO.,

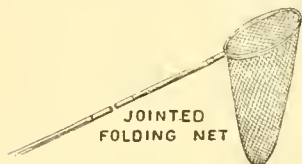
4 Park St., Boston, Mass.

A. SMITH & SONS, 121 NASSAU STREET, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.



JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

(Concluded from page 128.)

with chocolate-brown. The outer half of the wing is chocolate-brown, darker on the side toward the base, the outline of the darker area being produced inwardly just opposite the end of the cell. Opposite this inward indentation on the outer margin is a blackish spot. The fringes are whitish, checkered with pale fuscous. The secondaries are pale fuscous with the fringes paler. On the under side, both wings are fuscous, the primaries somewhat darker than the secondaries, having the costa near the apex laved with pale ochreous. Expanse, 17 to 20 mm.

PLUSHIDAE.

DEVA, Walk.

120. *D. speciosissima*, sp. nov. ♂. Palpi with the first joint white; the second joint black, marked with a circular white spot on the side; third joint white tipped with black. The front pure white; vertex tufted with dark brown in front. Posterior portion of vertex fawn. The collar is fawn, margined before and behind with dark brown. The patagia are brown with the extremities tipped with fawn. The upper side of the thorax is fawn, marked posteriorly with a V-shaped black mark. The upper side of the abdomen is pale plumbeous; the lower side of the thorax and the abdomen are pale ochraceous. Legs concolorous, with the tibiae of the first pair at their end tipped with dark brown. The primaries on the upper side are marked with an exceedingly intricate series of fine brown lines on the limbal area enclosing silvery triangular spots, five or six in number. Toward the base on the costa is a large silvery yellow spot separated from a similar smaller spot on the inner margin by a dark brown spot, which forms the nexus, or point of coalition of deep black geminate incomplete transverse sub-basal and submedian lines. Before the apex and near the outer angle are a number of deep black spots succeeded before the middle of the outer margin

by three chalky-white subhastate spots on a pale fawn ground, which is defined inwardly by two fine semi-lunate lines. The outer margin is punctuated with small triangular dark spots interpolated on the middle of the margin by two similar white spots. The secondaries are uniformly pale fuscous. On the under side, both wings are fuscous with the primaries darker. The inner margin of the primaries is shining stramineous. Expanse, 38 mm. Habitat Bulé Country, West Africa.

This exquisite moth is represented in my collection by a single male specimen in almost perfect preservation. It is the most beautiful insect of the genus.

EURHIPIDAE.

PENICILLARIA, Guén

121. *P. Menalcas*, sp. nov. ♀. Allied to *P. solitaria*, Holl. Palpi with the first joint brown; last two joints white; front and vertex very pale fawn. The collar cinereous, margined in front with black. Patagia and upper side of thorax very pale olivaceous-green. Metathorax dark brown. Upper side of abdomen pale olive-green. Lower side of thorax and abdomen obscure fuscous with a lilacine tint. On the side of the abdomen just back of the thorax is a dark brown lunate mark followed near the anal extremity by a dark brown lateral streak, from which three transverse brownish lines range upwardly along the sides of the last three segments. There are some exceedingly minute brown dots along the median line of the abdomen on the upper side. Legs whitish, with the tibiae of the anterior pair and the extremities of the tibiae of the last two pairs marked with dark brown. The primaries have the base pale olive-green, this green area being separated from the rest of the wing by a broad oblique sub-basal line of rich maroon, which runs from the costa a little before the middle inwardly to the inner margin just before the base. This broad line is defined inwardly

by a very narrow white line, and is diffuse outwardly. There is a minute black spot in the cell beyond this line followed by a moderately large reniform of pale green twice-pupilled with dark green. A transverse subapical dark brown line runs from the costa to the middle of the outer margin. This line is produced on the costa. Before the apex on the costa is a large subquadrate dark brown spot, between which and the subapical transverse line on the costa are three minute white dots. The outer two-thirds of the wing are pale lilacine, obscurely marbled with irregular transverse faint brown lines and markings margined by very pale lilacine. The margin is punctuated with minute brown dots. The fringes are pale fuscous. The secondaries are pale fuscous with the margin defined by a very fine dark brown line bordered by a very pale line. On the inner margin about the middle are some dark transverse cloudings and near the anal angle some obscure transverse incomplete pale bands. The costa is white, shining. On the under side, the primaries are fuscous with the inner margin white, immaculate, shining. There is an obscure discal spot at the end of the cell and a double submarginal series of dark brown dots on the interspaces, and a subtriangular white spot on the costa before the apex. The secondaries are laved with pink, have a distinct discal dot at the end of the cell, and are crossed beyond it by a sharply angulated transverse median band. The double submarginal series of brown spots is continued from the primaries across the secondaries parallel to the outer margin. Expanse, 27 mm.

EREBIIDAE.

GEOMETRIMIMA, gen. nov.

♀. The palpi broadly separated; the first joint short; the second moderately long, curved upward before the eyes; the first and second joints are densely clothed with hair; the third joint is naked, acuminate, pointing

upwardly and outwardly, the extremity being level with the vertex. The antennae are simple. The first pair of legs have the femora and the tibiae clothed with long hairs; the second have the tibiae clothed with long hair; the tarsi of the first and second pair are naked; the third pair have the tibiae densely clothed with long hair and armed with double median and terminal spurs; the tarsi of the third pair are clothed on their outer margin almost to the tips with long hair, forming a flattened brush. The primaries are elongated, subfalcate at the apex, with the costa gently rounded before the apex, and the outer angle evenly rounded. The secondaries are considerably produced about the middle of the outer margin, which is sharply scalloped, the apex being evenly rounded, the costa nearly straight. Type, *G. callista*, Holland.

122. *G. callista*, sp. nov. ♀. Palpi fuscous, genae whitish, vertex and collar chestnut-brown. Upper side of thorax fuscous. Upper side of abdomen fuscous. Lower side of thorax and abdomen fuscous with the anal extremity tipped with ferruginous. Legs concolorous. The upper side of the primaries is dark brown, crossed by a broad band of white from the middle of the costa to the outer angle. There are also some white subapical markings. The secondaries are uniformly dark brown with the fringes near the outer angle and the costa pale ochreous. On the under side the primaries are fuscous with the costa near the base margined with lilacine-gray, and the inner margin shining stramineous. The broad white band of the upper surface reappears upon the lower side, but is much broader, though less sharply defined, and reaches the outer angle. The apex is whitish. The white spots of the upper surface reappear upon the lower side and are confluent with the white apical area. Between them and the broad white band is a broad subtriangular dark brown shade. The outer margin is adorned below the apex with

minute hastate spots of dark brown upon the interspaces. The fringes, which are pale, are checkered with dark brown at the tips of the nervules. The secondaries are lilacine-brown with a short dark brown bar on the cell near the base, a longer dark brown bar on the middle of the cell, and a transverse discal line at its end. A broad obscurely defined median band of brown crosses the wing just beyond the cell, and is followed by a still broader dark brown band, running from a little beyond the middle of the costa inwardly to the origin of the median nervules, where it fuses with a broad brown shade, which does not quite reach the inner margin. A black discal line runs from the costa inwardly, gradually widening, and being curved outwardly in the region of the median nervules. This is succeeded by three black subquadrate spots, one located between veins five and six; the others on either side of vein two, the first and third being the largest. They are margined externally by white and the area of the wing immediately adjacent to them is irrorated with bluish scales. The outer margin between veins three and five is dark brown. The margin is indicated by fine geminate regularly curved lines. The fringes are concolorous, except at the outer angle, where they are ochreous. Expanse, 62 mm.

This beautiful moth is unfortunately represented in my collection by a single specimen, which is a female.

FACIDIA, Walk.

123. *F. horrida*, sp. nov. ♂. The entire body, both on the upper and under side, dark smoky-brown. The tarsi are ringed with paler brown. The primaries are dark brown, slightly paler on the outer margin. They are traversed by very obscure basal, median, and limbal ferruginous lines. The limbal line is evenly crenulate, running from the costa almost to vein one, where it forms a loop and returns in the direction of the costa

to the lower angle of the cell, where it coalesces with the median line, which is incomplete, running only from the lower angle of the cell to the inner margin. At the point where this loop is made above vein one, there is an obscure ocelliform spot tinged with bluish pupilled with blackish. There are some obscure whitish markings near the apex. In some specimens these are entirely wanting. The transverse lines, which have been described, are also almost obsolete in some specimens, which appear on the upper surface to be uniformly black, except when viewed in a strong light. The secondaries are of the same color as the primaries, marked by a faint and obscure zigzag transverse line which runs from the inner margin above the anal angle about to the middle of the wing. On the under side, the wings are dark brown or blackish, in some specimens almost jet black, laved with pale cinereous on the apex of the primaries, and touched with pale cinereous on the margin of the secondaries near the apex. Both wings are crossed by a curved limbal series of minute white dots located upon the nervules and in some specimens connected by a fine and obscure pale line. Expanse, 50 mm.

This species is allied to *F. nigrofusca*, Walk., described from Natal.

EXPLANATION OF PLATE I.*

- Fig. 1. *Plusiocalpe pallida*, sp. nov., 13.
 2. *Hypodeva barbata*, sp. nov., 11.
 3. *Plusiocalpe prosticta*, sp. nov., 14.
 4. *Periplusia nubillicosta*, sp. nov., 15.
 5. " *cinerascens*, sp. nov., 16.
 6. " *eclipsis* sp. nov., 17.
 8. *Caligatus Angasii*, Wing.
 = *Pacidara venustissima*, Walk.
 9. *Rhescipha siderosticta*, sp. nov., 22.
 10. " *hypocaloides*, sp. nov., 23.
 11. *Gonitis Benitensis*, sp. nov., 26.
 12. *Homoptera pulcherrima*, sp. nov., 30.

*The numbers appended to the names of the species refer to the serial numbers in the text.

- Fig. 13. *Gonitis marginata*, sp. nov., 25.
 14. *Catephia discistriga*, Walk.
 15. *Aedia costimacula*, sp. nov., 35.
 16. " *apicata*, sp. nov., 39.
 17. " *eremita*, sp. nov., 40.
 18. " *scotosa*, sp. nov., 41.
 19. *Symplusia frequens*, sp. nov., 12.
 20. *Acontia zelia*, Druce.
 21. *Eutelia* ? *strigula*, sp. nov., 19.
 22. *Penicillaria morosa*, sp. nov., 20.
 23. " *solitaria*, sp. nov., 21.
 24. *Tarache signifera*, Walk.
 25. *Hyblaea occidentalis*, sp. nov., ♂, 24.
 26. *Targalodes rufula*, sp. nov., 18.
 27. *Xanthodes canela*, Druce.
 28. *Panilla sex-maculata*, sp. nov., 32.
 29. *Hyblaea occidentalis*, sp. nov., ♀, 24.

EXPLANATION OF PLATE II.

- Fig. 1. *Eudrapa multiscripta*, sp. nov., 36.
 2. *Arcte maurus*, sp. nov., 37.
 3. *Deinypena lacista*, sp. nov., ♂, 109.
 4. " " " " ♀, 109.
 5. " *ereboides*, sp. nov., 111. ♀
 6. *Facidia horrida*, sp. nov., ♂, 123.
 7. *Eliocroea chloroptila*, sp. nov., 43.
 8. *Ercheia periploca*, sp. nov., 42.
 9. " *subsignata*, Walk.
 10. *Heterospila taeniata*, sp. nov., 95.
 11. " *sestia*, sp. nov., 93.
 12. " *umbrina*, sp. nov., 97.
 13. *Hecate*, sp. nov., 92.
 14. *Entomogramma pardus*, Guen.
 = *Remigia venusta*, Walk.
 15. *Panilla major*, sp. nov., 35.
 16. *Panilla quadrinaculata*, sp. nov., 33.
 17. " *octo-maculata*, sp. nov., 34.
 18. " *obscurissima*, sp. nov., 31.
 19. *Trigonodes inornata*, sp. nov., 62.
 20. *Minucia David*, sp. nov., 47.
 21. *Achaea faber*, sp. nov., 45.
 22. *Naxia multilineata*, sp. nov., 51.
 23. *Dysgonia humilis*, sp. nov., 58.
 24. *Trigonodes binaria*, sp. nov., 61.
 25. *Grammodes Benitensis*, sp. nov., 59.
 26. " *pusilla*, sp. nov., 60.

EXPLANATION OF PLATE III.

- Fig. 1. *Minucia despecta*, sp. nov., 46.
 2. " *producta*, sp. nov., 48.
 3. *Naxia xanthodera*, sp. nov., 49.
 4. " *debilis*, sp. nov., 50.
 5. " *infirmata*, sp. nov., 52.
 6. *Psimada Africana*, sp. nov., 53.
 7. " *imperatrix*, sp. nov., 54.
 8. *Dysgonia Camerunica*, sp. nov., 57.
 9. " *neptunia*, sp. nov., 55.
 10. " *plutonia*, sp. nov., 56.

- Fig. 11. *Fodina euclidicola*, Walk.
 12. *Baniana biangulata*, Walk.
 13. *Hyospila nigribasis*, sp. nov., 71.
 14. *Acantholipes triangulifera*, sp. nov., 63.
 15. *Toxocampa dedecora*, sp. nov., 74.
 16. *Bareia incidens*, Walk.
 17. " *tenebrosa*, sp. nov., Under side, 73.

EXPLANATION OF PLATE IV.

- Fig. 1. *Eugorna vidua*, ♂, sp. nov., 107.
 2. *Geometrimima callista*, ♀, sp. nov., 122.
 3. *Gorna apicata*, ♂, sp. nov., 105.
 4. " " ♀, sp. nov., 105.
 5. " *partita*, ♂, Walk., 106.
 6. " " ♀, Walk., 106.
 7. *Episparis lamprima*, ♀, sp. nov., 99.
 8. " *connubens*, ♂, sp. nov., 100.
 9. " *hieroglyphica*, ♂, sp. nov., 101.
 10. " *lunata*, ♀, sp. nov., 102.
 11. " *simplex*, ♀, sp. nov., 104.
 12. *Ricla expandens*, Walk.
 13. " *subpalescens*, ♂, sp. nov., 91.
 14. *Episparis complex*, ♀, sp. nov., 103.
 15. *Hyospila jaculifera*, ♀, sp. nov., 72.
 16. *Orixa fascifera*, ♀, sp. nov., 113.
 17. *Elyra Gabunalis*, ♂, sp. nov., 114.
 18. *Acantholipes argillacea*, ♀, sp. nov., 69.
 19. " *catoxantha*, ♀, sp. nov., 66.
 20. *Hyospila angulilinea*, ♂, sp. nov., 70.
 21. *Mestleta flavicostata*, ♂, sp. nov., 84.

EXPLANATION OF PLATE V.

- Fig. 1. *Deinypena lathetica*, ♀, sp. nov., 110.
 2. " *marginata*, ♂, sp. nov., 112.
 3. *Heterospila piperita*, ♂, sp. nov., 98.
 4. *Amphigonia sinistra*, ♂, sp. nov., 108.
 5. *Eucapnodes sex-maculata*, ♂, Walk.
 6. *Selenis limbata*, ♀, sp. nov., 83.
 7. " *puncticosta*, ♂, sp. nov., 82.
 8. *Thermesia aurantiaca*, ♀, sp. nov., 75.
 9. " *discipuncta*, ♂, sp. nov., 76.
 10. *Deva speciosissima*, ♂, sp. nov., 120.
 11. *Acontia hriola*, ♀, sp. nov., 115.
 12. *Heterospila calescens*, ♂, sp. nov., 96.
 13. *Tatorhinia Burrowsii*, ♂, Butl.
 14. " " ♀, Butl.
 15. *Tracta bilinea*, ♀, sp. nov., 90.
 16. *Tracta geometroides*, ♀, sp. nov., 89.
 17. *Tatorhinia fuscata*, ♂, sp. nov., 88.
 18. *Capnodes haematoëssa*, ♀, sp. nov., 78.
 19. *Penicillaria Menalcas*, ♂, sp. nov., 121.
 20. *Mestleta lithina*, ♂, sp. nov., 85.
 21. *Acontia chia*, ♂, sp. nov., 116.
 22. *Mestleta discifascia*, sp. nov., 86.
 23. *Tarache domina*, sp. nov., 118.
 24. *Acontia glaphyra*, sp. nov., 117.
 25. *Mestleta lathraea*, sp. nov., 87.
 26. *Tarache mesoleuca*, sp. nov., 119.



PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 222.

AUGUST, 1894.

CONTENTS:

NOTES ON THE ACRIDIDAE OF NEW ENGLAND.—I (Plate 6).— <i>A. P. Morse.</i>	147
POLYGAMY OF MOTHS.— <i>Caroline G. Soule, Ida M. Eliot.</i>	155
ENTOMOLOGICAL NOTES (Recent papers on N. A. Orthoptera; effect of elevation on eclosion of <i>Osmia</i> ; Edwards' Butterflies of N. A.; black female of <i>Euphœades glaucus</i> in New England).	155
PAPILIO PHILENOR AT NONQUITT.— <i>Caroline G. Soule.</i>	155

PUBLISHED BY THE
 CAMBRIDGE ENTOMOLOGICAL CLUB,
 CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]



PSYCHE.

NOTES ON THE ACRIDIDAE OF NEW ENGLAND.—I.

BY ALBERT P. MORSE, WELLESLEY, MASS.

The purpose of these notes on literature, morphology, habits, etc., is to add to the available knowledge of the species of locusts occurring in New England and enable others to more readily become acquainted with them. To this end the notes are accompanied by sketches illustrating many of the more important diagnostic characters, and keys for determining the species, which, it is hoped, will enable, so far as it is possible, even the novice to identify any specimen in hand.

The order of sequence of the various groups, if circumstances permit, will be that adopted by Brunner in his recent Revision.

PART I. TETTIGINAE.

Of this subfamily I have over nine hundred New England specimens in my collection, forming the basis of this

paper. To Mr. S. H. Scudder I am indebted for opportunity to examine other North American and several European species, and the types of the New England forms described by him.

In the bibliography references are given to the original descriptions and the more important and accessible literature only, with a view to clearly indicating the species to which reference is made. Unless otherwise stated I have accepted Scudder's determinations of the species described by Harris, Say, and Burmeister, as indicated in his "Materials." For the sake of brevity a list of works is given and reference is made in most cases to author and page only.

Under the head of measurements the extremes alone are given. "Total length" refers to the length of the insect from the front of the vertex or head to

EXPLANATION OF PLATE 6.

The drawings are numbered in accordance with the species.

Fig. 1. *Nomotettix cristatus*, side view of pronotum.

Fig. 1a. *Nomotettix cristatus*, var. *carinatus*, side view of pronotum.

Fig. 1b. *Nomotettix cristatus*, section.

" 1c. " " profile.

1d. " " head from above.

Fig. 2. *Tettix ornatus* and *triangularis*, pronotum and wings from above,—combination figure to show outlines of both forms.

Fig. 2a. *Tettix ornatus*, side view to show sinuses of lateral lobes.

Fig. 2b. *Tettix ornatus*, head from above.

" 2c. " " profile.

" 3. " *granulatus*, head from above.

" 3a. " " profile.

" 4. *Paratettix cucullatus*, head from above.

" 4a. " " profile.

" 5. *Tettigidea lateralis*, head from above.

the tip of the pronotum or wings, as the case may be.

"Pronotum > hind femora" means that the pronotum passes the end of the hind femora; if a quantity is preceded by a — sign, the pronotum fails to pass by that amount. All statements of a comparative character should be understood as having reference to New England species only.

BIBLIOGRAPHY.

Unless otherwise stated citations refer to the following works:—

BOLIVAR, IGN.—Essai sur les Acridiens de la tribu des Tettigidae, —*in* Ann. Soc. ent. Belgique, xxxi, 1887 (pp. 175-313). (This can be obtained in separate form.)

FERNALD, C. H.—The Orthoptera of New England, pp. 61; *same*, in 25th Report Mass. agric. college (pp. 85-145), Jan. 1888; *same*, in Report Sec. Board agric. Mass., 1887 (pp. 421-481). The pagination of the separate is used.

HARRIS, T. W.—A treatise on some of the insects injurious to vegetation, 3rd ed., 1862 (pp. 165-191). First ed. pub. 1841.

MORSE, A. P.—Wing-length in some New England Acrididae, —*in* Psyche, 1894, pp. 13, 14, 53-55.

A preliminary list of the Acrididae of New England, —*in* Psyche, 1894, pp. 102-108.

(Separates of these are obtainable.)

SCUDDER, S. H.—Materials for a monograph of the North American Orthoptera, including a Catalogue of the known New England species, —*in* Boston Journ. nat. hist., vol. vii, no. iii, 1862 (pp. 409-480).

THOMAS, CYRUS.—Synopsis of the Acrididae of North America. Rep't U. S. geol. surv. terr. (Hayden) vol. v., pt. 1, 1873, — pp. x, 262.

This group of locusts as found in New England comprises eight forms more or less distinct structurally and presenting great diversity in color and markings,—the latter are, however, of so comparatively little systematic value that I have not considered them in this paper, but hope to do so at some future time. The characters of most value in distinguishing the forms are the number of joints in the antennae, the form of the vertex and profile of the head, and of the pronotum, and the extent of the pronotum and wings.

The most recent work of a monographic character on this group is Bolivar's "Essay," which was based on the very large amount of material contained in several of the most important European collections. This excellent work is invaluable to the student and is likely to remain for some time the standard reference.

Bolivar divides the entire subfamily into seven sections, according to form of antennae, position of median ocellus, form of anterior femora, forking of frontal costa, form and direction of posterior angles of lateral lobes of pronotum, number of antennal joints, and relative length of proximal joints of posterior tarsi. New England affords representatives of but two of these—Tettigidae and Batrachideae.

To the Batrachideae belongs the genus Tettigidea with two forms—*T. lateralis* and *T. polymorpha*, while the remaining genera fall into the Tettigidae. These two sections may be

distinguished as follows: in the Tettigidae the anterior femora are carinate above, and the antennae are composed of 12-14 joints, while in the Batrachideae the anterior femora are sulcate above and the antennae are composed

of 16-22 joints, in our forms of 21-22. The number of joints frequently varies in the same species, sometimes being 13 in one specimen and 14 in another, or the same individual may have 13 in one antenna and 14 in the other.

KEY.

1. Pronotum normal, not covering abdomen; pulvilli present between the tarsal claws. Common locusts or "grasshoppers."
- 1¹. Pronotum covering all or nearly all of the abdomen; pulvilli wanting between the tarsal claws. "Grouse-locusts" or TETTIGINAE.
2. Antennae 12-14 jointed.
 3. Median carina high, crest-like, arched longitudinally. Superior lateral sinus of pronotum shallow, about one-half as deep as the inferior. (Gen. 1, *Nomotettix*.)
 4. Wings abortive, not equalling pronotum. Sp. 1, *N. cristatus*.
 - 4¹. Wings perfect, equalling or passing pronotum. Sp. 1, var. *carinatus*.
 - 3¹. Median carina low, dorsum rather flat. Superior lateral sinus nearly as deep as the inferior.
 5. Vertex of head projecting beyond eyes. (Gen. 2, *Tettix*.)
 6. Vertex rounded on front margin, and the median carina distinctly projecting. Profile rather deeply excavate opposite eyes. Sp. 2, *T. ornatus*.
 7. Wings large. Pronotum subulate behind. Sp. 2, type form, *ornatus*.
 - 7¹. Wings small, passing the hind thighs but little. Pronotum not subulate; sides of process nearly straight. Sp. 2, form *triangularis*.
 - 6¹. Vertex angulate on front margin. Profile shallowly excavate opposite eyes. Sp. 3, *T. granulatus*.
 - 5¹. Vertex of head not projecting beyond eyes. (Gen. 3, *Paratettix*) Sp. 4, *P. cucullatus*.
- 2¹. Antennae 21-22 jointed. (Gen. 4, Tettigidea.)
 8. Wings perfect, when closed passing the hind thighs. Sp. 5, *T. lateralis*.
 - 8¹. Wings abortive, not passing the hind thighs. Sp. 6, *T. polymorpha*.

I. TETTIGIAE.

The first species of this section to claim attention is that most widely

known as *Batrachidea cristata* Harr. Bolivar has shown that this is more nearly allied to the Tettigidae than to the genus *Batrachidea* or the section

containing it. I cannot agree with him, however, in considering it to belong to the same genus as *Tettix subulatus*, *granulatus*, etc., and propose for it a new generic appellation.

1. NOMOTETTIX gen. nov. (νομός, pasture; and τέτιξ).

Lateral lobes of the pronotum with the postero-dorsal sinus shallow, about one-half the depth of the antero-ventral sinus. Pronotum advanced upon the head, rather sharply tectiform. Occiput of head with a pair of nipple-like or mammillate protuberances between the posterior portion of the eyes and the median line. Type, *Tetrix cristata* Harris.

The type also differs from the group of species containing *Tettix granulatus* in having stouter hind femora and but 12, sometimes 13, joints in the antennae, instead of 14, frequently 13. It differs markedly in the character of its haunts, also, preferring dry soil to moist, upland pastures to meadows, whence the generic name.

1. *Nomotettix cristatus* Harr. Figs. 1, 1a, 1b, 1c, 1d.

Tetrix cristata Harr. Mss. } Scudder, 478.
Batrachidea cristata }
 " " Scudd. Thomas, 190.
 " " Harr. Fernald, 48.
Tettix cristatus Scudd. Bolivar, 257, 260.
Batrachidea cristata Harr. Morse, 54, 107.

Form *carinatus*.

Batrachidea carinata Scudder, 479.
 " " Scudd. Thomas, 190.
 " " " Fernald, 49.
 " " " = *Tettix cristatus* Scudd. Bolivar, 260.
Batrachidea carinata Scudder = *B. cristata* Harr. Morse, 54.
Batrachidea cristata carinata Scudd. Morse, 107.

The two forms here treated as belonging to one species were considered and perhaps are still by some as distinct species. Bolivar in his "Essay" united the two under *T. cristatus* Scudd. [more properly Harris], but judging from his description of *B. carinata* he had never seen it and failed to comprehend the characters distinguishing it, mistaking for it certain specimens of the *cristatus* form. He states that the pronotum is longer than the abdomen, extending a little beyond the hind femora, its posterior point being "*inflected and directed downward*" (the italics are mine), and the median carina less strongly arcuate. This fits such specimens exactly, but does not apply to *carinatus*. *Carinatus* is quite rare, but one or two occurring to the hundred of *cristatus*; specimens of the other form are common although less plentiful than those in which the pronotum fails to reach the tip of hind femora. A glance at figs. 1 and 1a will at once enable the relation of *cristatus* and *carinatus* to be understood, *carinatus* having the wings perfectly developed and the pronotum elongated and slightly *upturned* at the

end to receive them; otherwise it is identical with *cristatus*.

I have already indicated (Psyche, 1894, 53, 54) my opinion of the relation of these two forms: that *carinatus* is but a reversion to the earlier long-winged type of female, such cases being not uncommon. This conclusion was reached independently, from examination of my material, before becoming acquainted with Bolivar's work.

Blatchley states (Can. ent. 1892, 33) that he regards *carinatus* and *cristatus* as distinct as the two forms of Tettigidea. Typically they are, but specimens intermediate in structure are met with in both cases, and in addition the great proportional rarity of the long-winged form is to be considered in this case. The following measurements showing the relations of pronotum, hind femora and wings will be of interest in this connection. Those of *carinatus* are based on but seven specimens, those of *cristatus* on a very large number.

Cristatus form.

Total length. Pron. Pron. > Hind fem. Wing < Pron.

♂	7.7-9.	7.1-8.5	-1. - + .5	.5-1.3
♀	8.6-10.2	8. -9.5	-.5- +1.	.7-2.

Carinatus form.

Total length. Pron. Pron. > Hind fem. Wing > Pron.

♂	11.-11.5	9.5-10.7	2.-3.	.4- .5
♀	11.-12.5	9.8-11.5	1.-2.5	.5-1.

One female *carinatus* has the pronotum extending but 1 mm. beyond the hind femora and the wings but .3 mm. beyond the pronotum, thus being inter-

mediate in structure, although approaching *carinatus* more closely. Looked at from above it can scarcely be distinguished from *cristatus*, but a glance at the side reveals the fully developed wings. The markings are identical in character, both forms being either plain or spotted. No difference is perceptible in the proportions of the hind femora as would be likely in the case of a winged and wingless species, nor in the vertex or the occiput which vary characteristically in this group.

Description.—Antennae 12 to 13 jointed, usually 12; occiput bearing a pair of nipple-like protuberances, very small but not to be confused with the granulations of the surface, one on each side opposite the hinder part of the eyes. These are distinct in even young specimens. Vertex projecting, rounded; its median carina high, projecting considerably in advance of the margin; frontal costa sharply excised opposite the eyes. Pronotum with anterior margin advanced upon the head, the sides excavate. Median carina cristate, arched longitudinally, higher opposite shoulders, gradually becoming lower toward the rear; its outline sometimes a little flattened just behind the shoulders. Dorsal sinus of lateral lobe about $\frac{1}{2}$ as deep as the ventral sinus, its anterior margin only $\frac{1}{2}$ as long as the dorsal margin of the ventral sinus, its angle more or less obtuse or nearly right, the lobe between the two sinuses obtusely rounded. Hind thighs stout, the breadth contained $2\frac{1}{2}$ times in the length. Elytra longer and narrower than in our species of Tettix, acuminate at the apex.

Habits.—This curious little locust is the smallest Acridian and the commonest species of the subfamily occurring in New England and is widespread in distribution. It is common locally over

the larger part, at least, and probably occurs in the whole of the district. I have taken it at Fryeburg and Norway, Me., Jackson, N. H., and have received it from Brattleboro, Vt. (Mrs. J. B. Powers). In Mass. I have taken it at Beverly, Winchendon, Wellesley and several towns in its vicinity; in Connecticut at Thompson; and off shore on Martha's Vineyard, and Block Island, R. I. It is most plentiful in April, May and October, but I have taken it in every month in the year except November, in which also it can doubtless be found. I have taken young specimens in Mass. in October.—common, of small or medium size, and in June about half-grown; in northern Vermont in the middle of July—very small and one in the last stage.

The *carinatus* form is very rare. I have captured but nine specimens, at Beverly, April 24, and at Wellesley, Mass., April 10, 13, Oct. 6. These were in company with the *cristatus* form, five being secured in one afternoon in a locality where the latter was particularly abundant, and two in another locality under similar conditions.

Outside New England Blatchley reports the species as rare in Indiana; I have received it from western Penn'a; Bolivar reports it from Georgia, and I have recently seen a specimen from Florida.

It is found everywhere on light soils, but especially in dry pastures and other wild land sparsely covered with a scanty growth of curling tufts of *Danthonia* grass, scraps of *Cladonia* lichens

and the leathery leaves of *Antennaria*. It is perhaps somewhat more plentiful in the damper portions of such localities, but differs much from the other species of the subfamily in this particular, the others preferring soils perpetually moist or even the shores of lakes or streams. This difference in habits as well as structure lends weight to the argument for generic distinction, and the name proposed alludes to this preference.

Search in such situations in early spring and late fall is almost certain to result successfully. I have generally found it easiest to secure by sweeping as close to the ground as possible, dragging the net, as it were, rapidly along on the ground. Where abundant it is found advantageous to abandon the net and crouch or even to go over the ground on the hands and knees. In localities where it is plentiful it is practicable to capture 50-200 specimens in an afternoon within the area of a few square rods.

2. TETTIX Charp.

Tettix Charpentier 1841. Germar. Zeitschr. III. 315, equivalent to *Tetrix* Latreille. Hist. Nat. d. Crust. Ins. XII, 161-164.

2. *Tettix ornatus* Say. Figs. 2, 2a, 2b, 2c.

Acrydium ornatum Say, 1824. Amer. entom., i, pl. v.

Acrydium ornatum Say, 1859. Ent. N. A., ed. Lec., i, 10.

Tettix ornata Say. Scudder, 474.

“ “ Scudd. Thomas, 183.

“ *ornatus* Say. Fernald, 46.

“ “ Scudd. Bolivar, 258, 264.

“ “ Say. Morse, 54, 106.

Not *Tetrix arenosa* Burm. Scudder, 474.

Form *triangularis* Scudd.

<i>Tettix triangularis</i>	Scudder, 475.
"	" Scudd. Thomas, 185.
"	" " Fernald, 47.
"	" " Bolivar, 258, 265.
"	" " Morse, 54, 107.

This is a very variable species in both structure and ornamentation and has consequently been described under several names, while an unfortunate typographical or mechanical error has caused further confusion. Scudder, in the original description of *triangularis* gave the length of the pronotum as .17 inch; this has been copied by Thomas, Fernald, and Bolivar, and perhaps others. This is just one-half its usual length in that form, and the error was quite likely of mechanical origin. Bolivar evidently describes this form under the name of *ornatus* while doubting the specific distinctness of *triangularis* which was unknown to him! At least, this seems to be the only interpretation possible to place upon his table of species and the dimensions given under *T. ornatus*.

Description, etc.—The following measurements will be of interest in this connection. I believe that the two forms are but one species, as stated in Psyche, 1894, p. 54, since they are indistinguishable except in length of pronotum and wings, and intergrade in those particulars, and so have not attempted to keep their measurements separate.

Total length. Pron. Pron. > Hind fem. Wgs. vs. Pron.

♂ 8.3-12.5	7.5-10.8	0-3.4	-.5-+1.
♀ 9. -13.5	8. -12.	0.-3.5	-.5-+1.5

As is here shown the pronotum is very variable in length, in some only reaching the end of hind femora, in others passing it by 3.5 mm.; and the wings are equally variable, and usually least developed proportionally in those specimens with the shortest pronota. It is impossible to draw any line between the two forms *ornatus* and *triangularis*, although the typical forms are quite distinct. Of 124 specimens in my collection a little over two-fifths are nominally referred to the *triangularis* form, and the sexes are evenly divided in both forms. Nor is there any difference in seasons or haunts.

The species is readily recognizable from the characters of the vertex. This projects in front of the eyes, is somewhat rounded anteriorly and the mid-carina forms a distinct projecting tooth. The profile is rounded-angulate above, excavate opposite the eyes and protuberant opposite the antennae. Very rarely a specimen is met with in a dorsal or a profile view approaches *T. granulatus* closely, but any doubt of its identity is usually dispelled by an examination of it from both directions.

Habits, etc.—This species is found most commonly in moist sedgy meadows and swales, often in company with *T. granulatus*, but is also frequently met with in damp places on drier grounds, uplands, etc. At no time plentiful, it seems to be most common in spring and fall but I have captured it in every month from April to October. I have specimens from Fryeburg, Me., Aug. 20, Hanover, N. H., Sept. (C. M. Weed), Newport, and Jay, Vt., July 13, 15, Brattleboro, Vt., April 17—May 14 (Mrs. J. B. Powers), New Haven, Conn., Aug. 29, Beverly, Mass., April 24, Green Lodge Sta., June 14, Sher-

born, April and Sept., and from Wellesley in April, May, June, July, Sept., and Oct. I have but a few nymphs which were taken in July, Aug., and Sept.

It seems to be less active and alert than its congener *granulatus*. My specimens were secured by sweeping.

3. *Tettix granulatus* Kirby. Figs. 3, 3a.

Acrydium granulatum Kirby, 1837.
Faun. Bor. Am., Ins., 251.

Tettix granulata Kirby. Scudder, 474.

“ “ Scudd. Thomas, 182.

“ *granulatus* Kirby. Fernald, 46.

“ “ “ Bolivar, 259,

265.

Tettix granulatus Kirby. Morse, 54, 106.

Bolivar states that this species is very similar to *T. bipunctatus* L. of Europe. From a comparison with specimens of the latter species (determined by Brunner) in Mr. Scudder's collection this is a serious error. *T. bipunctatus* is closely allied to our *Nomotettix cristatus*, probably belonging to the same genus. Bolivar's descriptions, figure and localities lead me to think that possibly he has described this species as new under the name of *T. brunneri* and applied *granulatus* to *T. acadicus* Scudd.

Description, etc.—Anterior border of vertex considerably advanced in front of eyes, angulate, the apex very slightly rounded, or rarely with the mid-carina projecting a trifle. In profile the face is quite retreating, the vertex considerably advanced, sinuate opposite the eyes, and moderately protuberant opposite antennae. The eyes are the least prominent in this of any of our species, and

the body more slender. It is liable to be mistaken for *T. ornatus* only, but the outlines of profile and vertex, considered together, need leave no doubt of the species. It bears considerable resemblance to *T. subulatus* of Europe..

Measurements are as follows:—

Total length.		Pron.	Pron. > Hind fem.	Wgs. vs. Pron.
♂	9.7-13.5	8.6-11.5	1.2-3.5	—3-+1.
♀	13.5-15.3	12. -13.5	3. -4.3	—5-+1.

In one ♂ the pronotum is but 1.2 mm. longer than the hind femora and the wings are .3 mm. short of end of pronotum. This is extremely small but other examples from the same locality grade up to the usual size.

Habits, etc.—This is one of the most common and widely spread species of the group, sometimes locally plentiful. It is found over probably the whole of New England, and far west and north. While most plentiful in spring and fall, adults can probably be found every month in the season. I have specimens from New England as follows:—

Fryeburg, Me., Aug. 20, numerous.

Brattleboro, Vt., April 17, 1 spec. (Mrs. J. B. Powers).

Jay, Vt., July 16, several small and one half-grown young.

Beverly, Mass., April 24, numerous.

Newtonville, Mass., July 26, 1 young.

Provincetown, Mass., Sept. 4-8, 1 yg., 4 adults; scarce.

Sherborn, Mass., April and Sept., scarce.

Wellesley, Mass., April 4-30, plentiful.

May 19, 27, numerous. June 24, yg., half-grown. July 18, 1 ♂. Aug. 1, yg., half-grown. Sept., 1 ♀.

Winchendon, Mass., July 5, 1 ♂.

Block Island, R. I., Aug. 28, numerous.

(To be continued.)

POLYGAMY OF MOTHS.

Callosamia promethea.—This was confirmed in 1894 by two experiments. One ♀ was mated with four ♂♂, the first three being removed after twenty minutes each, and each succeeding ♂ mating eagerly. The second ♀ was even more eagerly sought, mated with four ♂♂, was left over night with the last one, and, on being put on the windowsill the following afternoon, drew more ♂♂ than on the first day.

Caroline G. Soule.

Anisota stigma.—On July 1st, 1894, two ♀♀ emerged, and were tied out that night. July 2nd, one was found *in coitu* at 8 A. M., and so remained until after 6.30 P. M., laying eggs that night. July 3rd, the two moths were again *in coitu*, but were disturbed and separated at about 10 A. M., the ♂ being put into a box containing the second ♀. July 4th, the ♂ and this ♀ were *in coitu* at 8 A. M. and so remained until between 8 and 11 P. M. July 6th, ♂ died. July 7th the ♀ died having laid no eggs, although they were fully formed in the body. The first ♀ laid many eggs, and died on July 9th.

Ida M. Eliot.

ENTOMOLOGICAL NOTES.

During the summer just passed an unusual number of papers dealing with N. A. Orthoptera have been published. Foremost in extent is Scudder's account of the group Ceuthophili (Proc. Amer. Acad.) in which more than fifty species are described in the genus Ceuthophilus alone. Morse has described in detail (Proc. Bost. Soc. Nat. Hist.) the New England species of Spharagemon, and contributes to this number of Psyche a similar account of N. E. Tettiginae. Beutenmüller has described several Gryllidae (Journal N. Y. Ent. Soc., Bull. Am. Mus. Nat. Hist.) and Scudder has given (Can. Ent.) a brief revision of the genera of N. A. Dectidae with tables. Blatchley has also (Can. Ent.) continued his account of the Acrididae of Indiana, and Garman has

published a list of the Kentucky Orthoptera.

Nicolas has been making some experiments upon the time of eclosion of a species of *Osmia* (Ass. franç. av. sc. 1893) by placing nests at five different elevations at Mont-Ventoux, France, varying from 860 to 1912 metres in altitude and finds a difference of two months at the extremes with a progressive difference at intermediate points.

Two species of *Argynnis* and three of *Chionobas* form the illustrative subjects of the last (xv) part of Edwards' Butterflies of North America, reproduced with a fidelity and grace which is scarcely short of perfection. Of two of the species details are given of the early stages, those of *C. semideca* being nearly complete and highly satisfactory. *A. astarte* is for the first time adequately figured after being known forty-six years, and the author's account of the same, drawn from Bean's unpublished observations, form a very interesting addition to our knowledge. A similar account of *A. alberta* is also drawn from the same source. There is less that is new in the fuller story of *C. semideca*, but the illustrations are far superior to any we have had and of special interest from the inclusion of forms regarded as the same from Pike's Peak and Hudson Strait. No less than thirteen species of this genus have now been figured in the last five parts of Edwards' work, seven of them with illustrations more or less full, generally very full, of the early stages. Considering how especially difficult they are to rear and from what inaccessible regions the material has to be procured, this is certainly an extraordinary showing.

Mr. A. P. Morse took at Stamford, Conn., on Aug. 22, in rather dilapidated condition, the black female of *Euphœades glaucus*; it has only once before been recorded from New England.

PAPILIO PHILENOR was found, for the first time, on *Aristolochia* in Nonquitt, Mass., in August. It is the first time I have seen these larvae or butterflies in Massachusetts.

C. G. Soule.

THE SEVENTH VOLUME OF PSYCHE

Began in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

Vols. 1-6, Complete, Unbound, - Now sold for **\$29.00.**
 Vols. 1-6, and Subscription to Volume 7, - - **\$33.00.**

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

Vol. 1. Introduction; Nymphalidae.

Vol. 2. Remaining Families of Butterflies.

Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo, half levant, \$75.00 *net*.

HOUGHTON, MIFFLIN & CO.,

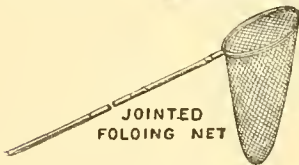
4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.



JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.



PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 223.

NOVEMBER, 1894.

CONTENTS:

THE AMERICAN SPECIES OF THE THYSANOURAN GENUS SEIRA.— <i>F. L. Harvey</i> (Illustrated).	159
A NEW FAMILY OF FOSSIL BEETLES.	162
NOTES ON THE ACRIDIDAE OF NEW ENGLAND.—I.— <i>A. P. Morse</i> :	163
POLYGAMY OF <i>ACTIAS LUNA</i> AND <i>CALLOSAMIA PROMETHEA</i> .— <i>Caroline G. Soule</i> . . .	167
PROCEEDINGS OF THE CAMBRIDGE ENTOMOLOGICAL CLUB (Ceuthophili of N. America; Coleoptera of Lower California).	168

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]



Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 10.
 Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE,
 Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " " "	1.25	1.00
Half " " " "	2.25	1.75
One " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
 Cambridge, Mass., U. S. A.

Subscriptions also received in Europe by
 R. FRIEDLÄNDER & SOHN,
 Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
 Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danais archippus</i> . Boston, 1880, 16 p., 2 plates.	1.00
Hitchcock, Edward. Technology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> . col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung, Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
 Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
 Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
 Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
 37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PAPILIO BUDDIA.

Finest specimens, each five shillings or 10 for £ 2.
 T. KRAPE, Missionary,
 Bethel, near Bielefeld, Germany.

PSYCHE.

THE AMERICAN SPECIES OF THE THYSANOURAN GENUS SEIRA.

BY F. L. HARVEY, ORONO, ME.

The only species of the genus *Seira* that have been reported from North America are *Seira buskii* Lubbock and *Seira purpurea* Schött. the former from New York and the latter from California. Below is given a description of a new species from Maine belonging to this genus and notes upon *S. buskii* Lubbock from specimens taken in Maine. There is another apparently undescribed species in this region which is related to *S. pruni* Nicolet, in having the head and first thoracic segment yellowish and the body purple. We withhold a description of it at present preferring to study it farther. The detailed notes on *S. buskii* Lubbock may aid in further defining this species, and the description of *S. purpurea* Schött may prove interesting to entomologists who have not access to Schött's paper.

Seira mimica, n. sp. *Body* fusiform. slightly broadest at the fourth segment. General color pale dirty yellow or grayish with silver reflections. A deep purple interrupted band extending along the sides of the body. Body armed with numerous long dark colored *plumose* bowed hairs, which are very conspicuous on the head and anterior part of the mesonotum giving a shaggy

appearance to the insect. These bowed hairs are arranged in transverse rows upon the middle of the dorsum of the mesonotum, metanotum, and on the first three body segments, the long fourth segment bearing about three or four rows.

Head broadly oblong, one-fifth longer than wide. A purple band along the anterior border, connecting the antennae, including the darker eye patches, and extending to the cheeks when it broadens and covers most of the anterior side of the head.

Antennae nearly two-thirds the length of the head and body; ratio 8:13 nearly, rather stout, purple, plumose hairy; basal joint and base of second joint pale, distal ends darker, third and fourth joints full purple; basal joint short about one-half second, second and third nearly equal, fourth slightly longer. Mesonotum bordered anteriorly and at the sides with purple which does not show plainly in the dorsal view as the dense fringe of hairs conceals the color which shows well in rubbed or balsam specimens.

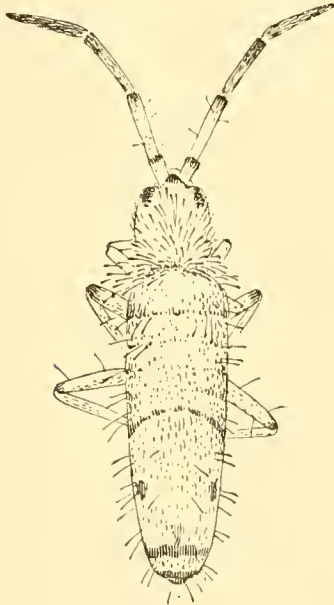
Metanotum and the first and second body segments unmarked on the dorsum, but purple spotted on the sides. Posterior border of the third, fourth and fifth body segments and the whole of the sixth purple. The fourth segment, which is as long as the five preceding together, bears a purple spot upon each side near the middle and outer edge of the dorsal view.

Elater long, slender, pale yellow, hairy. *Dentes* annulated, the ventral edges tubercled with about two tubercles to each ring,

ventral surface marked by fine transverse anastomosing reticulations. Mucrones ending in a curved claw which is armed with a prominent tooth near the end.

Legs rather long, purple, plumose hairy. Claws stout longitudinally, finely striate, and bearing three small teeth on the inner edge, and one on the outer edge. A single tenent hair clubbed at the end and extending nearly the length of the claw. Shorter claw plain.

Common about the windows of the college buildings where it has climbed to the fourth story in Coburn Hall



Seira mimica, $\times 30$.

which was built only four years ago. Found also about paper waste in the cellar and among books on library shelves. It loves warm, dry situations. Several spent the winter in the cracks

about a window, within a foot of a large steam coil and appeared to enjoy it. Very active, running by starts. Very restless in captivity. A good jumper. A large number observed and examined during 1890-94, Orono, Me., F. L. Harvey.

This insect is more like *Seira nigromaculata* Lubbock than any described species, agreeing in size, habit and numerous clubbed hairs, but differing in the color and arrangement of the color patches.

It may be known by its dirty yellow ground color and markings of dark purple, like that of a dark grape or



Seira mimica; scales, $\times 150$ and 250 .

plum, and by its long antennae, long fourth abdominal segment, and shaggy appearance. It is named *Seira mimica*, because the form of the four posterior segments of the body, the color markings and the bowed hairs combined suggest the head of a rat or squirrel.

The drawings of the insect ($\times 30$) were made by Mr. J. H. Emerton from

live specimens; those of the scales, from slides prepared by the writer, $\times 150$ and 250 . The head of the insect is more nearly round and more narrowed behind than shown in the drawing, and the body is too wide at the mesonotum, the body being widest at the beginning of the long fourth body segment and sloping gradually to the head.

Seira buskii Lubbock, Monograph Colem. p. 145; Fig. Pl. 22. Dark violet when mature. Younger specimens paler but the color disposed as in the adults. Dorsum of body and antennae violet. Head, proximal segments of antennae, upper part of femora, under surface of body and elater yellowish. Legs shaded with purple. Eyes eight on conspicuous dark patches which extend backward a little on the cheeks and are joined in front by a *wide* band.

Head conspicuous by its yellow color contrasting with the dark violet of the mesonotum. Nearly round or broadly oval slightly longer than broad.

Antennae purple or pale violet excepting the basal joint and base of the second joint which are yellowish brown. Second joint equal or shorter than the third. Fourth joint somewhat longer than the third. Basal joint short.

Body fusiform, broadest at the fifth segment. Sixth body segment longer than the three preceding. Thoracic bowed hairs conspicuous. Body clothed with scattered bowed hairs which are near the posterior part of the body and often 133μ long.

Elater long, hairy. Dentes annulated with numerous narrow rings. Hind legs longest. *Feet* all alike. Small claw plain. Large claw armed with three small teeth in the inner face and one on the outer margin. A single tenent hair from 30 to 40μ long and extending nearly to the end of the claw,

curved, swollen and beaked at the end on the side toward the claw.

Scales about 35μ long, variable in width, sometimes only half as broad as long, oblong, lanceolate to ovate, the widest part near the base. Pedicel rather short and stout, markings as shown in Lubbock's Monograph, Pl. 71 for *Seira buskii* Lubbock.

We give detailed measurements of two specimens which will show the variation.

No. 1. — Total length, exclusive of elater, 1.3 mm.; head, .29 mm. long, .23 mm. broad; antennae, .532 mm.; joints, .053, .133, .146, .2 mm. Body 1.01 mm. long, .27 mm. broad at the fifth segment; sixth segment, .319 mm. as long as three preceding; spring, .605 mm. long; manubrium, .339; dentes and mucrones together, .266 mm.

No. 2. — Total length, 1.72 mm.; head .319 x .319 mm.; antennae, .77 mm.; segment .05, .239, .239 and .25 mm. Body 1.4 mm.; sixth segment, .372 as long as the two preceding; spring, .64 mm.; manubrium, .239 mm.; dentes and mucrones, .399 mm.

If Lubbock's measurements of *S. buskii* (1-15 in.) express an average, then our specimens are smaller, but if the extreme size, then the size is about the same, as some specimens measured were 1.75 mm.

Habitat. Lubbock says his specimens were only found in greenhouses and hot-houses and he doubts whether the species is indigenous to Great Britain. Our specimens were found in the cellar of Coburn Hall at the Maine State College where boxes from foreign localities have been unpacked. The specimens are abundant under rubbish, among old papers and under boards on the floor and about the window sills. We have never taken it in the upper floors of the building where *S. mimica* n. sp. is common, though both species

occur in the cellar. We took one specimen of what appeared to be this species from under the bark of a dead maple tree which would indicate that it is possibly indigenous. It is reported from New York by Mr. Macgillivray (Canad. Ent. Dec. 1891, p. 272) but under what conditions is not mentioned.

Remarks. The meagre description given by Lubbock in his monograph permits us to make but few comparisons of the characters of our specimens with *S. buskii*, yet though our specimens differ in the shorter, basal, antennal joint and broader band between the eyes, we see no reason for separating our specimens, for they agree exactly in form and other color markings.

Seira purpurea Schött, Beiträge zur Kenntniss Kalifornischen Collembola. Bihang Kongl. Svensk. vet. akad. handl. bd. 17 afd. iv, no. 8, p. 17, Pl. IV. (fig. 1). Flava, signaturis purpureis quae in segmento thoracico tertio et in segmento abdominali primo secundoque fascias, totam aream segmenti non occupantes, formant. Segmenta abdominalia cetera purpurea. Long. 2-1, 5 mm.

Da die Gattungen Entomobrya Rondani und Sira Lubbock sich nur durch das Vorhandensein oder Nichtvorhandensein von Schuppen unterscheiden, so ist es natürlich unmöglich die Gattung der hierhergehörenden Formen zu bestimmen, da nur in Weingeist conserviertes Material vorliegt. Wenn ich aber nun obige Form zur ersten

Gattung führe, so geschieht dies nur wegen der Zeichnung derselben. Diese erinnert insofern an diejenige bei unseren Sira-arten, dass keine Fascien mit scharf markierten Konturen wie bei allen bisher bekannten zweifarbigen Entomobrya-formen vorhanden sind, sondern nur langgestreckte Flecke, die eine scharfe Begrenzung in die Grundfarbe übergehen.

Die Form ist ausnehmend schön und von den schwedischen Arten der Gattung Sira Lubbock wohl unterschieden. Das erste Thoracalsegment ist rotviolett, das zweite oben ganz hell, hat aber an der Kante einen dunklen Rand, welcher von dem ganz dunkel gefärbten Basalglied des zweiten Extremitätenpaares, das wie die übrigen dunkle Cozalglieder hat, nach der entgegengesetzten Seite verläuft. Das dritte Thoracalsegment und die beiden ersten Abdominalsegmente sind ungefähr gleich und mit violetten Querbändern versehen, die sich nur über die Dorsalfläche der Segmente erstrecken, wohingegen die Seiten gelbweiss sind. Das dritte und vierte Abdominalsegment sind völlig violett, das fünfte und sechste von gemischtem Colorit. Das Mannbrum der Gabel und ein kleinerer Teil der Dentes sind schwach violett, der übrige Teil und die Endsegmente ungefärbt. Der Kopf ist hell, die Augen stehen auf schwarzen Elecken mit einer dunklen Verbindungslinie zwischen sich. Die Autennenglieder sind schwach violett, heller nach den Spitzen hin. Die Abdominalsegmente, besonders die hintern, sind mit dichten Haaren versehen, die noch dichter auf den beiden Seiten sind und sich nach den Dentes furculae fortsetzen, auch in der Nackenregion befinden sich solche Haare.

A NEW FAMILY OF FOSSIL BEETLES.

In a recent paper on the fossil insects of Rott on the Rhine (Abb. naturf. ges. Halle, xx) Schlechtendahl establishes a new family

Palaeogyrinidae on a beetle showing a combination of the characters of Gyrinidae and Dytiscidae. Extinct types of insects of as high a grade as families are extremely rare in the tertiaries.

(Continued from page 154.)

Males are more numerous, or at least more are captured, than females, probably being readier to take wing and in consequence falling into the net in sweeping. The species prefers sedgy meadow-lands and swales on sandy soil occasionally flooded by rains or freshets and perpetually moist. The bulk of my specimens were taken on a boggy swamp which had been filled in with sand, and on which water stood more or less of the time.

3. PARATETTIX Bol.

Paratettix Bolivar 1887. Essai,—Ann. Soc. ent. Belg., xxxi, 195, 170.

4. *Paratettix cucullatus* Burm. Figs. 4, 4a.

Tettix cucullata Burm., 1838. Handb. d. ent., ii, 658.

Tettix cucullata Burm. Scudder, 475.

“ “ Scudd. Thomas, 185.

“ *cucullatus* “ Fernald, 47.

“ “ Burm. Bolivar, 259, 266.

“ “ “ Morse, 54, 107.

This species was unknown to Bolivar who left it in *Tettix*, being misled perhaps by Scudder's statement that it most resembles *T. granulatus* and failing to appreciate properly the characters given in Scudder's description, which he quotes. It belongs, without doubt, as shown by the structure of the vertex and spiculate character of pulvilli of proximal joint of hind tarsi, in Bolivar's genus *Paratettix* and seems to be fairly well described under the name of *P. mexicanus* Sauss.

Description, etc.—It is easily recognized by the form of the vertex [Figs. 4, 4a]. From above this appears about equal in width to one of the large and prominent eyes, and does not project in advance of them; its front margin is slightly hollowed, the concavity being divided by the mid-carina which projects a little. In profile the frontal costa is slightly sinuate opposite the eyes and strongly protuberant opposite the antennae. The crown of the head is channeled longitudinally on either side of the mid-carina, the sulci being stopped abruptly opposite the hinder portion of the eyes by a pair of transverse, sometimes slightly oblique, ridges. This character is found in several species of this genus and in this species appears at a very early stage, showing distinctly in specimens 3 mm. in length. The body is less compressed than in the preceding species, being, in truth, depressed rather than compressed. The pronotum is advanced upon the head to the eyes, and the median carina is obsolete on the anterior portion; the posterior process extends 2-3 mm. beyond the hind femora, exceeded by the wings, and is very constant in proportions.

Measurements of New England specimens are as follows:—

Total length.		Pron.	> Hind fem	Wings >	Pron.
♂	11, -13.5	9.5-11.	2, -2.5	.5-1.5	
♀	13.5-15.5	11, -13.	2.5-3.	1, -2.	

In color and ornamentation it is one of the least variable of our species, resembling closely its surroundings in tint and texture, varying from mottled yellowish-gray almost to dull black.

Habits, etc.—In distribution it appears to be somewhat southern, and very local. It prefers the immediate margin of lakes and streams, often alighting on the water when disturbed, and swimming well. I have taken it in

but three localities in New England, but it probably occurs over the whole of Connecticut and in central Massachusetts. A nymph in Mr. Scudder's collection is labeled "Vicinity of Boston."

My specimens are from Connecticut as follows:—

Canaan, Aug. 18, 1 ♀.

Thompson, July 13, 6 ♂, 3 ♀, scarce.

" Aug. 4-9, 7 ♀, very scarce.

New Haven, Aug 29, abundant; males, females and young in several stages, some scarcely more than 2 mm. in length being secured.

The Thompson and Canaan specimens were found on the sandy mud of a lake-shore, and were yellowish-gray; the others on the margin of a little stream strewn with fragments of blackened wood and other waste and were very dark.

I have taken it at Ithaca, N. Y., also, where it is common along the stony margins of the creeks and exactly matches in tint the fragments of slate-gray shale on which it delights to sun itself, becoming in consequence, almost invisible on alighting.

It is one of the most active and alert of our species, taking wing readily and flying several feet, or even a rod or more. It is readily captured, however, by sweeping the net rapidly over its haunts.

II. BATRACHIDEAE.

4. TETTIGIDEA Scudd. Fig. 5.

Tettigidea Scudder, 1862. Mater. monog. Orth. N. A.,—Boston Journ. nat. hist., vii, 476.

5. *Tettigidea lateralis* Say.

Acrydium laterale Say, 1824. Amer. ent., i, Pl. 5.

Acrydium laterale Say. Ent. N. A., Lec. ed., i, 10, 1859.

Tettigidea lateralis Harris, 187.

Tettigidea lateralis Say. Scudder, 477.

" " Scudd. Thomas, 187.

" " Say. Fernald, 48.

" " Scudd. Bolivar, 295, 298.

Tettigidea lateralis Say. Morse, 54, 107.

Measurements.

Total length. Pron. Pron. > Hind fem. Wings > Pron.

♂ 11.5-13. 9.8-11.5 -7-1.5 -7-1.5

♀ 15. -16.8 13.3-14.6 1.3-2.8 .5-1.8

6. *Tettigidea polymorpha* Burm.

Tetrix polymorpha Burmeister, 1838. Handbuch ii, 659.

Tetrix parvipennis. Harris, 187.

Tettigidea polymorpha Burm. Scudder, 477.

Tettigidea polymorpha Scudd. Thomas, 188.

Tettigidea polymorpha Burm. Fernald, 48.

Tettigidea polymorpha Burm. Bolivar, 295, 297.

Tettigidea polymorpha Burm. Morse, 54, 107.

Measurements.

Total length. Pron. Pron. > Hind fem. Wings < Pron.

♂ 8.4-11.5 8. -11. -1.-+ .5 1.3-3.5

♀ 11.5-14. 10.4-13. -1.-+1. 1. -3.5

The two New England members of this genus are readily distinguished from our other Tettiginae by the presence of twenty-two joints in the antennae (instead of 12-14), and by the shape of the crown of the head, which has a lobe on each side encroaching upon the dorsal portion of the eye.

The two forms differ only in the degree of development (or abortion) of wings and pronotum and for this reason are believed by some to be forms of one dimorphic species. For this reason I here treat them together.

Lateralis is distinguished from *polymorpha* by the presence of fully developed wings and usually by a somewhat longer pronotum. The variation in these structures and their relative proportions with regard to other parts of the body and to each other will be best observed in the measurements here given. I have one specimen, a ♂, in which the pronotum does not pass the hind femora but the wings extend 2.5 mm. beyond it, thus being intermediate in character between the two forms. This specimen may be regarded as either a *lateralis* with unusually short pronotum, or a reversional *polymorpha*.—I am disposed to think that the former view is the more correct in this case, for the reason that the pronotum is of very variable length in both forms, and its apex is frequently twisted or distorted in one way or another, while the wings seem to be relatively quite constant in length.

While I am by no means convinced that *lateralis* + *lateralis* will not produce *polymorpha*, or *polymorpha* + *polymorpha* will not produce *lateralis* (*i. e.*, that the two forms are not one species) I have given each specific rank here for the reason that, whether they are distinct species or dimorphic forms of one, both names will be retained, as they properly should be, to distinguish them. And as they have hitherto been

observed to mate true they may best be regarded for the present as incipient species.

The reasons pro and con may be summed up as follows, structural characters only being considered:—

1st, in favor of specific distinctness—

They have been observed many times to mate true and not cross with each other.

Intermediate specimens are very scarce.

Both forms are tolerably common.

2nd, in favor of dimorphism—

Cases of reversion are common in other species of the family, with or without intermediate forms.

Cases of dimorphism are very common in other species of the family.

Variations in length of tegmina and wings are usually of little or no importance in other members of the family.

Variations in length of pronotum in this subfamily correspond to variations in length of tegmina in others.

Cases of reversion occur in this subfamily.

Cases of dimorphism occur in this subfamily.

In such cases the wings are usually shortest proportionally in specimens with the shortest pronota and *vice versa*.

Intermediate forms occur, having pronotum of one form and wings of the other.

Similar forms occur in other species of the genus.

In the short-winged form *the end of the pronotum is especially subject to distortions of one sort or another.*

Specimens illustrative of the preceding statements have been examined in the preparation of this paper and with but one exception occur in my collection.

Bolivar makes use of the markings of the tegmina in his key to the species of this genus. Our forms usually have a white or flavescent spot near the apex of the tegmen, but in dry cabinet specimens this is not invariably present, either in *lateralis* or *polymorpha*.

Habits, etc.—Our members of this genus agree in habits with the species of *Tettix*, preferring moist, grassy and sedgy meadows, particularly on rather light soil. I have taken them in such situations in company with *Tettix granulatus* and *T. ornatius*, and even along roadside gutters on springy land, where the ground was moist and sandy. In New England *polymorpha* is about three times as common as *lateralis*. The sexes seem to be taken in about equal numbers except that where plentiful I have secured about twice as many ♂ as ♀ *polymorpha*.

Both forms probably occur throughout New England. I have specimens of *polymorpha* from Fryeburg and Norway, Me., Hanover and Keene, N. H. (C. M. Weed), Jackson, N. H., Brattleboro, Vt. (Mrs. J. B. Powers), Hartland, Vt. (C. M. Weed), Newport, Vt., Beverly, Wellesley and several towns in its vicinity, and Winchendon, Mass. (Also from Adams, but the specimen was afterward lost.) Canaan, North Haven, So. Kent, Stamford, and Thompson, Conn. The *lateralis* form

I have from Fryeburg, Me., Hanover, N. H. (C. M. Weed), Jay, Newport, and Stowe, Vt., Wellesley and Winchendon, Mass., and Block Id.. R. I. Both forms were common in a meadow in Fryeburg, Me., on Aug 20, and I secured about 30 *lateralis*, 60 *polymorpha* and 20 young in a couple of hours. The young varied much in size, some being but one-quarter grown, others in the last stage. Two years later at the same time of the month I found the young rather more common than the adults, in several localities in Conn.

Both forms, though widely spread, are rarely found in considerable numbers. I have seldom taken over half a dozen at a time. They seem to be more plentiful in the central states than in New England. I have found dragging or sweeping the net closely over the ground in the localities frequented by them to be the most successful method of capture.

The American naturalist (1894, pp. 483-487) contains an interesting account from the pen of Dr. J. L. Hancock, of observations on migratory flights of *lateralis* witnessed in Chicago, the insects being attracted to the electric lights in large numbers.

LIST.

TETTIGIÆ.

1. Nomotettix.

- | | | | |
|----|-----------|-----------|--------------|
| 1. | cristatus | Harr. | |
| .0 | " | " | type form. |
| .1 | " | carinatus | Scudd., var. |

2. Tettix.

2. ornatus Say.
 .0 " " type form.
 .1 " triangularis Scudd.
 3. granulatus Kirby.

3. Paratettix.

4. cucullatus Burm.

BATRACHIDEAE.

4. Tettigidea.

5. lateralis Say.
 6. polymorpha Burm.

[*Tettix harrisii* Packard,—Rep't. nat. hist. Maine, 1861, 375-376. is undescribed and consequently has no scientific standing.]

Errata.—I regret to say that several typographical errors in my "Preliminary List of the Acrididae of N.E." (*Psyche*, 1894, pp. 102-108) need correction as follows:—

- Page 105. G. 11, should read "Scirtetica."
 " 106. Sp. 33, " " "atlanis."
 " " G. 19, " " "Pezotettix."
 " 108, col. 1. line 4, " "Acyptera."

POLYGAMY OF *ACTIAS LUNA* AND *CALLOSAMIA PROMETHEA*.

On April 29th, 1894, a ♂ and ♀ *A. luna* emerged in my box, and on that night mated, remaining *in coitu* until after ten o'clock the next day. On April 30th, the ♀ was put into a box prepared for egg-laying, and a newly emerged ♀ was put into the cage with the ♂. That night, between ten and eleven they were found *in coitu*, and so remained until after ten o'clock the next day. Both females laid many eggs, and both sets of eggs gave larvae on May 21st and 22nd. The ♂ was kept for several days, but, as no other ♀

emerged, was then let out at the window and flew away almost as vigorously as a freshly emerged moth.

In 1893 a ♀ *C. promethea*, in a cage by an open window, attracted about forty ♂♂ twenty of which were caught and put into the cage. At first they all flew up and down the netting, with great excitement and much vibration of the wings, then six of them seized the abdomen of the ♀ with their claspers, and struggled for possession, nor did the others lose their hold when one was successful. After fifteen minutes this ♂ was removed and put into another cage, when a second took his place almost immediately, and was left for twenty minutes, then was removed and put into the second cage. In less than ten minutes a third ♂ had mated with the ♀, was later removed, and a fourth took his place. This was repeated until seven ♂♂ had mated with this one ♀.

Meanwhile these ♂♂ not caught were flying up and down the outside of the cage and finally dropped dead with exertion and excitement. They were kept two days to be sure that they would not revive.

So many ♂♂ were flying about the window that three cats spent an hour or more trying to catch them, and passers-by stopped to look.

When the seventh ♂ had been mated for an hour he was removed, and the ♀ taken outdoors and put on a low branch of an ash tree. There she attracted all the unmated ♂♂ and an eighth paired with her. The others flew about the tree, until dark, when observations ceased.

Eggs laid by this ♀ hatched in due time.

As all accounts of "attraction" which I have seen state that when the ♀ is mated the ♂♂ pay no further attention to her, it seems worth while to offer this experience, which was a surprise also. *Caroline G. Soule.*

* * * The note in the last number of *Psyche* was written subsequently to this and intended as a supplement to it.

PROCEEDINGS OF THE CLUB.

11 May, 1894. The 184th meeting was held at 136 Brattle St., Mr. S. Henshaw in the chair. Mr. A. P. Morse was chosen secretary pro tem.

Mr. S. H. Scudder stated that he had recently completed a study of the *Ceuthophilus* of N. America, and was surprised to find how large a number of species the genus *Ceuthophilus* contained. The other genera of the group (of which there was one that was new with three species) had only from one to three species each, while of *Ceuthophilus* more than fifty species had been found, much more than doubling the number previously described, and a considerable number of additional species were imperfectly known by single examples. Doubtless further collecting, especially in the south and west, would bring new forms to light. The range of no single species was very great. Considerable correction of synonymy had been made and all the species of *Ceutho-*

philus had been redescribed, excepting two described species unknown to him in nature.

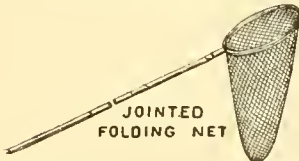
Dr. G. H. Horn spoke briefly on the Coleoptera of Lower California. After a few introductory remarks upon the position and physical geography of the country, he remarked that about 800 species were now known to him from the region, which may be divided into 4 faunal provinces:—(1) The San Diego fauna extends down the larger part of the west coast. (2) The fauna of the highlands (so far as collected, *i. e.*, north of the middle of the state) seems to be related to that of the central California valley. (3) The fauna of the east coast extends through Arizona northward, and eastward down the Rio Grande. (4) The fauna of the extreme southern end of the peninsula is truly tropical in character. Dr. Horn spoke briefly also on the distribution of *Platysyllus*, and mentioned that he had discovered good external sexual characters.

Mr. A. P. Morse exhibited three patterns of folding nets of his own design.

A. SMITH & SONS, 269 PEARL STREET, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,
Klaeger and Carlsbad Insect Pins, Setting
Boards, Folding Nets, Locality and
Special Labels, Forceps, Sheet Cork, Etc.
Other articles are being added, Send for List.



JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 224.

DECEMBER, 1894.

CONTENTS:

CONVERGENCE AND POECILOLOGY AMONG INSECTS. — <i>Alfred Giard</i> (Translation by <i>Herbert Osborn</i>).	171
THE BUTTERFLY HUNTERS IN THE CARRIBEES.	175
A CONE-LIKE CECIDOMYIID GALL ON <i>BIGELOVIA</i> . — <i>C. H. Tyler Townsend</i> .	176
THE ANATOMY OF LEPIDOPTERA IN THE KANSAS UNIVERSITY QUARTERLY.	176
PREPARATORY STAGES OF <i>SPHINX VASHTI</i> STRECKER. — <i>Harrison G. Dyar</i> .	177
A CHECK-LIST OF AFRICAN COCCIDAE. — <i>T. D. A. Cockerell</i> .	178
NOTES UPON <i>TOXONEURON</i> . — <i>William Hampton Patton</i> .	178
NOTES ON THE ORTHOPTERA OF PENIKESE AND CUTTYHUNK. — <i>A. P. Morse</i> .	179
ENTOMOLOGICAL NOTES (Insect Life; Moore's Lepidoptera Indica; Canadian spiders; Californian Collembola).	180

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

70573

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5 00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.
Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by
R. FRIEDLÄNDER & SOHN,

Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, Danais archippus. Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Technology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, Retinia frustrana. col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung, Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PAPILIO BUDDHA.

Finest specimens, each five shillings or 10 for £ 2.
T. KRAPF, Missionary,
Bethel, near Bielefeld, Germany.

PSYCHE.

CONVERGENCE AND POECILOLOGY AMONG INSECTS.

BY ALFRED GIARD, PARIS, FRANCE.

[Professor Alfred Giard in the *Annals of the Entomological Society of France** presents a careful discussion of convergence and poecilogony among insects and a resumé in the form of a rather free translation may be of interest to some who do not have access to this publication. HERBERT OSBORN.]

It is a well known fact to entomologists that certain insects which are very similar to each other in the adult state have larvae which are quite different. Many examples of this peculiarity have been indicated, principally among the Lepidoptera, the larvae of which are better known than those of other groups. But all insects with complete metamorphoses may present the same phenomena, and, if it is more rare among the ametabola, it is because, among these, the passage from the larval to the adult stage is gradual, by insensible steps, and the larvae and imago are subject to much the same conditions. One of the questions of much importance and at the same time a problem of much difficulty to solve is to determine if, in the recognition of the agreement between similar animals which present differences in

the earlier stages, we should attach more importance to the early dissimilarity than to the similarities of the adults. The question would be answered immediately in the affirmative if the principal of Fritz Mueller, the fundamental biogenetic law of Serres and Haeckel, were applicable in its exactitude. That is to say, if the various ontogenetic states of an animal repeated exactly the phylogeny or the successive ancestral forms. Were this so, embryology would indicate the true relation of the parents.

The more or less perfect resemblance of the adults in certain cases would be interpreted as the result of convergence due to similar ethology of these adult forms. But, among animals with metamorphosis, embryonic forms are subject during a long period to the modifying action of the surroundings and often, also, their evolution depends in a large measure upon the ethology of the adult. Accordingly, the principle of Fritz Mueller is applied with difficulty and singularly though actually the determination of the relation of the parents becomes more arduous the better we know the different phases of development. If it be true that partial knowledge happens thus to complicate

* Vol. 63, pp. 128-135.

the problem, we may hope that a more complete knowledge, that is a knowledge of the dynamic embryology of a large number of species, will give us the solution.

At present we may distinguish two principal categories of insects which are similar in adult stages and differ in earlier stages of development.

First: certain insects pertaining to the same genus or to distinct genera, sometimes even widely separated, which present in all cases larval stages which are quite different and in each case adult forms similar by convergence, a convergence due to the surrounding conditions (protective resemblance, mimicry direct and indirect, isotypy, etc.).

Second: among other insects the different generations of the same species considered at different points of their geographical distribution, at different seasons of the year, or in different conditions of nutrition, have larvae which are dissimilar while the adults are very similar to each other and present very slight modifications. It is to this form that we apply the term Poecilogony.* In this case the larvae have become divergent in adapting themselves to different ethological surroundings. The final result is the

same in all cases but from the point of view of consanguinity and therefore of natural classification the two categories are far from having the same signification.

The related species of poecilogenic origin have between them direct parentage and approach each other notwithstanding their embryonic divergencies. The species which resemble each other by convergence can on the contrary have only phylogenetic separation and must be considered as naturally distinct. From a practical point of view it is not always easy to decide if two similar forms are poecilogenic or convergent species. In certain cases, however, the distinction is easy and no doubt is permissible. When, for example, the species which by selection have become convergent, belong to genera sufficiently separated, the profound anatomic characters and the embryonic characters are not altered by convergence to the point of being unrecognizable. The resemblance is only superficial and if the older naturalists have been deceived by a similar aspect of the adults the error is not possible to-day. Mimicry, so perfect in *Leptalis* and *Ithomia*, of *Papilio paradoxa* and *Euplaea midamus*; imitation of *Danaides* or of the *Acraeides* by different species of *Papilio* or of *Diadema* do not impose upon any entomologist.

The resemblance although less exact in other respects of *Dichonia aprilina* and *Moma orion* is, nevertheless, an example of the same kind. Even when convergence of the adults takes place

*A. Giard, Sur le bourgeonnement des larves d'*Astellium* spongiforme Gd. et sur la poecilogonie chez les ascidies composées (C. R. de l'Académie des Sciences, 2 Février 1891).

A. Giard, Nouvelles remarques sur la poecilogonie (C. R. de l'Académie des Sciences, 27 Juin 1891).

among congeneric species, that which deprives us in great part of the advantage of indications of comparative anatomy, we can in most cases still recognize the origin as entirely distinct for the two species and establish the resemblance as due to the effect of the surroundings upon the imago.

It is this which occurs, for example, in the case of isotopy. Some related forms such as *Pieris brassicae* and *Pieris rapae*, the numerous Euplaeae, etc. The fact that these species frequent the same localities without mixing and without crossing indicates that the larval differences which they present in the midst of identical conditions are differences of ancestry. This is still more evident when it is applied to Hymenopterous parasites (Isotypes) of which the larvae have the same hosts or of parasites of plants of which the larvae feed side by side upon the same plant. *Hormomyia capraeae* Bremi is distinguished with difficulty in the adult state from another Cecidomyian living also very often upon the willow (*Salix capraea*).

The gall has been described by Schlechtendahl under No. 332.* But the larvae of these two Diptera remain distinct and produce very different galls upon the leaves of the same tree. There is here no doubt that the resemblance of the adults is simple convergence and does not indicate a closely related ancestry.

When, in the place of living in the same surroundings the larvae have a different habitat the question becomes more difficult to solve.

Guénée in a remarkable memoir upon some European bombyces † has considered as distinct species two types, *Bombyx spartii* Hb. and *Bombyx callunae* Palen, which represent one the southern and the other the northern form of *B. quercus* L.

If one examines an extensive collection of *B. quercus* such as that of our colleague M. J. Fallou he will easily see that it is almost impossible to separate the adults of these three species. Certain forms of *B. quercus* passing manifestly, as Guénée and Bellier de la Chavignerie already have recognized, in part to *B. spartii*, in part to *B. callunae*.

Guénée had discovered that the young caterpillar of *B. callunae* differs from that of *B. quercus*, but that the divergence diminishes after the first moult and finally disappears. One may attempt to see in this dissimilarity of the larvae in the early state a proof of the primitive separation of the two species. But the habitat differs sufficiently to explain this divergence. One of the two forms, without doubt *B. callunae*, represents the first ancestral larva which is modified in *B. quercus* and *B. spartii* and this species may truly be considered as a poecilogonic form slightly modified in the adult stage.

* Schlechtendahl, Die Gallbildungen (Zooecidien) 1891, p. 40.

† Annales Soc. ent. Fr. 1858, 435-442.

We have elsewhere direct proof of the existence of poecilogony among insects. In two very important memoirs published in Russian and of which we have a translation by our learned colleague C. R. von Osten Sacken, the Russian entomologist Portchinsky has demonstrated that the common *Musca corvina* presents two distinct forms in different parts of its wide habitat. In the north of Russia this coprophagous fly generally deposits 24 eggs of medium size from which arise larvae that present two very distinct phases of evolution. In the Crimea where coprophagous insects are more abundant and consequently the struggle for life more intense, the same Dipteron deposits only one large egg in which the metamorphosis is very rapid and condensed and recalls that of the Pupipara, the larva arriving almost immediately at its last phase of development. Analogous cases are known among different Lepidoptera and notably in the mulberry silk-worms (*Sericaria mori*). In the south of Europe this species furnishes an interesting race called *Trevoltini* which not only produces several generations annually but is distinguished from the type in that the caterpillars have only three moults in place of four. Cultivated in the north this race regains the ordinary characters of the species (the second or third year) as shown by Robinet.*

As the caterpillar of *Sericaria mori*

varies more or less the physiological peculiarity of the suppression of one moult attracts the eye, but in other cases structural modifications are more apparent.

Th. Goossens has indicated several very interesting examples of geographic poecilogony. *Deilephila euphorbiae* does not present in Ardache and in Var the ordinary yellow points and the rosy spots are replaced by spots of a pale yellow. The caterpillar of *Heliothis marginata*, light or green in the North is more often of an almost black brown in Provence. In the south of France the dorsal part of the caterpillar of *Zygaena fausta* is almost always tawny. At Paris this part is water green.†

When in cases of this kind the adults of two poecilogonic varieties come to differ but little at the two extremities of its habitat, we do not err if we establish two species, saying: Without doubt the perfect insects differ but little, but the larvae present differences so great as not to permit us to unite the two forms. This is certainly what occurs for a large number of species called representative for the old and the new world, *Triaena psi* and *T. occidentalis*, for example. Comparison of the monographs of Guénée and Abbot is very instructive in this respect.

Sometimes even the variation of the adults rests exclusively upon the anatomical characters of the genital apparatus of such a kind that the

* Robinet, Art d'élever les vers à soie; traduction du comte Dandolo, 1825, p. 317.

† Th. Goossens, Des variations sur les chenilles (Ann. Soc. ent. Fr., 1871, p. 118).

poecilogonic forms, while preserving a great resemblance in the adult state, cannot be crossed and this inability to cross facilitates the divergence of the two species even if they come in contact in some point of their habitat. It is thus, that, according to Grote and Smith, *Agrotis haruspica* and *A. rubifera* are the American representatives of the European *A. auger* and *A. rubi*, from which they differ only in the genital armature of the male; but that these modifications may be effective they should perhaps recede and determine the poecilogony instead of being caused by it or produced by it. This question is hard to solve at present and stands with the numerous problems that Romanes has stated in his work on physiological selection. In other circumstances poecilogony seems to be due to the varying nourishment of the larvae. If certain caterpillars are modified directly by the supporting plant as is known to be the case among a great number of species, we know also that some are adapted definitely to a determined plant and are protected by a permanent form, a different livery. Poulton has stated, as well as other authors, that many caterpillars die of hunger rather than touch nourishment

for which their race has lost the habit. Perhaps it is to poecilogony of nourishment that we should attribute the differences found in the caterpillars of *Cuculia verbasci* and *C. scrofulariae*, moths, the similarity of which in the adult state is not easily explained by convergence. Further, certain cases of resemblance among insects, in which the larvae differ but live in the same localities, sometimes upon the same plants, are difficult to interpret under one or the other of these alternatives which we have indicated (convergence or poecilogony). We cite for example *Lithosia complanana* and *L. lurideola*, *Deilephila euphorbiae* and *D. nicaea*.

Finally the only purpose in this short note is to state a very important problem of general biology, touching at once embryology, ethology and taxonomy. Perhaps on certain sides the problem is capable of experimental solution. In any case the question ought to receive light from our specialist friends, if they will study into the numerous cases of the kind enumerated above, which pass daily under their eyes, and of which they, better than any others, can state precisely the actual value.

In "The butterfly hunters in the Carribees" (N. Y., Scribner) Mr. E. M. Aaron, in the guise of a learned "Dr. Bartlett," takes two boys of a friend collecting in the Bahamas, Hayti and Jamaica, and brings them back laden with spoil and honors, culminating in their election into the Philadelphia Academy. What with history

and other matters butterflies themselves play a minor part, but there are some observations due to personal experience which lend a certain value to the book. It ought to interest boys, for it has the odor of the camp about it, but we could wish there had been less of the mercantile spirit in it. It is well printed.

A CONE-LIKE CECIDOMYIID GALL ON BIGELOVIA.

BY C. H. TYLER TOWNSEND, LAS CRUCES, N. MEX.

A cone-like cecidomyiid gall was found on *Bigelovia graveolens*, near Gallo Spring, N. M., June 21, 1892. They were also found west of Apache Spring and the Rio Apache, June 22. One of the latter, opened on that date, revealed three small larvae which were apparently cecidomyiidan. Both the above localities are in western Socorro County, New Mexico. This cecidomyiid may be known as *Cecidomyia bigeloviae-strobiloides*.

Gall.—Length, 8 to 10 mm.; width 3 to 6 mm. Rather elongate, subcylindrical in general form, but little narrower on apical than on basal portion. Borne on side of twig, to which it is attached by a short and narrow stem. Rather compact, formed of many narrowed overlapping stipules, but these are apparently united and grown together, forming a compact body, only the terminal elongate portions of the outer stipules free and showing as curled tips on the outside of the gall. The stipules arranged like the cone of a pine tree, all extending nearly upward but slightly outward from the central longitudinal cell. Outside of gall covered with a thin white woolly pubescence, the gall greenish beneath this, and the rather long narrow more or less curled free terminal ends of stipules protruding through the woolliness, and growing more numerous toward tip of gall. The central cell is from 4 to 5 mm. long, 1 mm. wide, quite cylindrical, its walls a

little hardened in texture. It does not extend to base of gall.

Described from three galls; one alcoholic and two dried specimens. About the middle of August, 1892, the pill box containing the two dried galls was opened and found to contain a metallic dark green microhymenopteron with an ovipositor as long as its body. It is a minute species. Upon opening one of the dried galls, several very minute transformed hymenopterous parasites were found in the terminal portion of the cell, and a well-formed cecidomyiid pupa with very long leg sheaths found in the basal portion. As several larvae appear to inhabit the single cell in each gall, the minute parasites probably developed in the other cecidomyiid larvae leaving one untouched to transform. The minute parasites were without ovipositor and are doubtless males of the above mentioned species. The other dried gall, which was the smallest one, contained the skin of a cecidomyiid pupa and transformed female of the above microhymenopteron. This hymenopterous parasite has been determined by Mr. Wm. H. Ashmead as *Torymus* sp. It is a little over 1 mm. in length (♀), with nearly clear wings. Ovipositor a little over 1 mm.

Recent numbers of the Kansas University Quarterly have contained valuable papers on the anatomy of Lepidoptera. Vernon L. Kellogg has discussed "the sclerites of the

head of *Danais archippus*," and "the taxonomic value of the scales in Lepidoptera," and now appears an excellent study of "the prothorax of butterflies," by May H. Wellman.

PREPARATORY STAGES OF SPHINX VASHTI STRECKER.

BY HARRISON G. DYAR, NEW YORK.

The eggs were obtained by Mr. C. A. Wiley at Miles City, Montana.

Egg. Elliptical, flattened above and below, smooth, green, slightly shining. Under a $\frac{1}{2}$ inch objective it appears slightly marked irregularly. Length 1.6 mm., width, 1.4 mm., height 1.0 mm.

First stage. Head round, sutures not distinct, ocelli nearly forming a circle; pale greenish, slightly reddish around the mouth, ocelli black; width 0.7 mm. Body cylindrical, the segments annulated; with minute setae; whitish green, not shining. Horn long, thick, black, not tapering and only slightly thickened at base, its length 1.1 mm., held nearly erect.

Second stage. Head rounded, higher than wide with some large white granules. Color yellowish green, the mouth pale; width 1.1 mm. Body annulate, dark green with large white granules; seven oblique whitish lateral lines. Feet green with reddish tips. Caudal horn 2 mm. long, heavily covered with short, stiff spinules, black, except at extreme base. The granules are slightly conical, without distinct setae.

Third stage. Head rather square, rounded, higher than wide, flattened in front and on the side, clypeus inconspicuous. Pale green with large white granules and a faint yellow line on each side, not reaching the vertex; ocelli black; width 1.9 mm. Body as before, but the back heavily frosted with white. Lateral oblique lines pale yellow, becoming white dorsally and continued backward in the general white shade. Feet paler than the body. Horn spinulose, pale brown, shaded with black before, behind and at tip, its length 3 mm.

Fourth stage. Head as before; the faint yellow stripe arises at base of antenna before ocelli and fades out before vertex; width 2.9

mm. Body leaf green, heavily covered with large conical white granules and frosted with white dorsally. Oblique lines pale yellow, marked with larger granules, obscurely continued along dorsal area by frosted white streaks. Horn with conical granules which are slightly more slender than those on the body and are each tipped by a minute seta. It tapers to tip and is marked as before. Spiracles white with brown center. Thoracic feet reddish, abdominal ones fleshy brown with black line at extreme tip.

Fifth stage. Head slightly depressed at median suture, rounded, clypeus sublanceolate. Shagreened, green, smooth with inconspicuous white dots and faint yellowish line not attaining the vertex, marked behind by a faint dark shade. Body smooth, annulated; on the posterior edge of joints 2 and 3 an elevated band, thickly studded with smooth white granulation filled in with blackish dorsally. General color soft whitish green, thickly but inconspicuously dotted with white or entirely uniform in color; becoming yellow in the fold of skin before and behind the granulated bands and in the suture between joints 4 and 5. Lateral oblique lines white, each bordered in front by a distinct, narrow, black line with a faint blue shade above and continued by a white shade to the middle of the dorsum, the last pair reaching the horn; but these shades disappear later. Horn greenish white; black above, below and at tip, smooth, shagreened, without setae. Thoracic feet whitish with red tinge; abdominal ones tipped with yellow and black. Spiracles brown centrally, with pale rim.

Pupa. Mahogany brown, shaded with blackish, a short, rounded, free tongue case, 8 mm. Cremaster large, flattened with a short furcation at tip.

Food plant. Snowberry (*Symphoricarpos racemosus*).

A CHECK-LIST OF AFRICAN COCCIDAE.

BY T. D. A. COCKERELL, N. MEX. AGR. EXP. STATION.

Although the entomology of Africa is at the present time receiving much attention, both here and in Europe, our knowledge of the Coccidae of that continent remains singularly deficient. The present list has been compiled for the convenience of those who may be able to add to it; and here it may be remarked that any non-entomologist can collect coccids without much trouble, simply by gathering infested leaves and twigs and putting them in boxes or envelopes. In this way important contributions may sometimes be made by residents in unworked localities.

GUERINIA Sign.

1. *G. serratulae* Fab.—Algeria.

MONOPHLEBUS Leach.

2. *M. raddoni* Westw.—W. Africa.

ORTONIA Sign.

3. *O. natalensis* Dougl.—Natal.

ICERYA Sign.

4. *I. purchasi* Mask.—S. Africa.5. *I. seychellarum* Westw.—Mauritius, Seychelles, Rodriguez, Bourbon, Madeira. Syn., *sacchari* Guér.6. *I. aegyptiaca* Dougl.—Cairo and Alexandria. Egypt.

GOSSYPARIA Sign.

7. *G. mannifera* Hardwick.—Algeria, Egypt. Syn., *manniparus* Sign.

DACTYLOPIUS Costa.

8. *D. bromeliae* "Bouché," Sign.—Zanzibar.9. *D. graminis* Mask.—Natal.

COCCUS Linn.

10. *C. cacti* Linn.—Algeria, Canaries, Madeira. Introduced by man.

ASTEROLECANIUM Targ.

11. *A. bambusae* Boisd.—Algeria.12. *A. miliaris* Boisd.—Algeria.

KERMES Auctt.

13. *K. quercus* Newst. ms.—Africa.

PULVINARIA Targ.

14. *P. gasteralpha* Icery — Mauritius. Syn., *iceryi* Guér.

VINSONIA Sign.

15. *V. stellifera* Westw.—Réunion.

CEROPLASTES Gray.

16. *C. mimosae* Sign.—Egypt.17. *C. vinsoni* Sign.—Mauritius, Réunion.18. *C. myricae* Linn.—Cape of Good Hope.

LECANIUM Illig.

19. *L. hesperidum* Linn.—S. Africa.20. *L. guerinii* Sign.—Mauritius.21. *L. asparagi* Giard.—Algeria.

ASPIDIOTUS Bouché.

22. *A. destructor* Sign.—Réunion.23. *A. lentisci* Sign.—Algeria.24. *A. ficus* Riley ms., Ashm.—Egypt, fide R. Newstead in litt.

DIASPIS Costa.

25. *D. asparagi* Giard.—Algeria.

PARLATORIA Sign.

26. *P. zizyphus* Lucas.—Algeria, Egypt.

AONIDIA Sign.

27. *A. blanchardi* Targ.—Sahara.

I think I have collected in this list the whole of the definitely recorded species; and yet the total is less than half that of the single Island of Jamaica, where these insects have been somewhat carefully sought for of late.

April 30, 1894.

NOTES UPON TOXONEURON.

The proper spelling of the name is here restored to the genus. Better sectional characters than those afforded by colour I have found to exist in the breadth of the head and in the length of the ovipositor.

Toxoneuron viator Say.—A female specimen from Lake Co., Calif. (O. T. Baron) shows variation from the typical form as

follows: space including ocelli, the ocelli, the eyes, the antennae, the edge of labrum, the maxillae and palpi black, head otherwise entirely reddish; spot on pleura below, spot on disc of metathorax surrounded by dusky area, and line on hind coxae above black, hind tarsi dusky, thorax and legs otherwise entirely reddish. The black ovipositor sheaths extend but a short distance beyond tip of the reddish abdomen. The head is wider than high.

Toxoneuron floridanum Ashm.—The ovipositor is fully one-half as long as the abdomen, the latter is longer and more narrow than in *viator*. The head is smaller and much more narrow. A female specimen from Florida received through the kindness of Mr. Ashmead. *Wm. Hampton Patton.*

NOTES ON THE ORTHOPTERA OF PENIKESE AND CUTTYHUNK.

These two islands are the outermost of the Elizabeth group which separates Buzzard's Bay from Vineyard Sound, Penikese being considerably the smaller, somewhat detached, and best known from its having been the site of the marine laboratory established by Louis Agassiz. The following lists of orthoptera are but records of the specimens obtained there while on a short excursion from the Marine Biological Laboratory at Wood's Holl on Aug. 9, 1893. While they cannot, of course, be considered complete, it may be worth while to record the species obtained there at this season.

The time spent on Cuttyhunk was but little over an hour—far too short to allow of even an attempt to cover the island. On Penikese, however, nearly two hours were spent, and the island quite well examined.

One noticeable feature is the apparent absence of *Trimerotropis maritima* from Penikese, where it was expected and sought for; this is perhaps due to the limited area of sandy beach on that island. Although not seen on Cuttyhunk I have little doubt that a longer search would have secured it.

A great difference was observed between the two islands in the abundance of individuals. On Cuttyhunk from twenty to fifty specimens could be secured as readily as one on Penikese. This was true particularly of *Stenobothrus aequalis*, *S. maculipennis*, and *Melanoplus femur-rubrum*, the fields fairly swarming with the young of the latter species. This difference was chiefly due, without doubt, to the large number of sheep and turkeys with which Penikese is stocked, which ramble over it at will, and by trampling and feeding upon the young locusts greatly reduce their numbers.

Nestling in the grass on Penikese were scores of young terns, some in the down and some nearly able to fly, while the air was filled with the clamor of the parent birds and elder offspring which circled overhead or perching whitened the shore.

Even here,—where they are to some extent shielded from the persecutions of their arch-destroyer, man—one was pained to witness fresh evidence of the inhuman human hand. Visitors of an earlier date had mutilated numbers of the young terns by severing the wing-tips, carrying them home as trophies, mementoes of their visit, leaving the crippled wretches to flutter helplessly about, doomed to a lingering death. Shade of Agassiz! Science is called cruel, but science was not guilty of this.

The shadow of a tern's wing is but slight, and its hue is that of the surf along the shore, yet it might well forever cloud the memory and darken the record of the heartless wretches who practised such devilish cruelty upon the helpless innocents of Penikese.

CUTTYHUNK.

ACRIDIDÆ.

- Stenobothrus aequalis* Scudd. Abundant.
 " *maculipennis* Scudd. "
Stenobothrus curtipennis Harr. Common.
Dissosteira carolina Linn. Common.

- Psinidia fenestralis* Serv. Common.
Melanoplus femur-rubrum DeG. Very abundant.
Melanoplus atlanis Riley. 1 specimen.

LOCUSTIDAE.

- Orchelimum vulgare* Harr. 1 specimen.
Niphidium fasciatum DeG. Common.

GRYLLIDAE.

- Nemobius vittatus* Harr. Common.

PENIKESE.

ACRIDIDAE.

- Stenobothrus aequalis* Scudd. Common.
 " *maculipennis* Scudd. "
Chortophaga viridifasciata DeG. Scarce.
Dissosteira carolina Linn. Common.
Psinidia fenestralis Serv. Scarce.
Melanoplus femur-rubrum DeG. Common.
Melanoplus atlanis Riley. Scarce.

LOCUSTIDAE.

- Niphidium fasciatum* DeG. Common.

GRYLLIDAE.

- Nemobius vittatus* Harr. Common.

A. P. Morse.

ENTOMOLOGICAL NOTES.

We congratulate Insect Life upon its greatly improved appearance. The last number is given up to an excellent report of the last meeting of the association of economic entomologists and about a third of it to the admirable address of the president, Mr. L. O. Howard, which will interest all entomologists.

Parts 18 and 19 of Moore's *Lepidoptera Indica* treat of the Elymniinae and begin the Amathusiinae, a new subfamily of eleven genera which Moore separates from the Morphinae: the light thrown on the matter by the early stages appears to be but slight and we question if the differences pointed out are of more than tribal importance.

Mr. J. H. Emerton has recently published in the Transactions of the Connecticut Academy with four plates a list of Canadian spiders, including descriptions of new or insufficiently known forms. It comprises about one hundred species but none are included from beyond the Rocky Mountains.

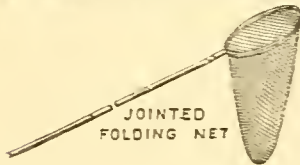
To the Bihang to the Swedish academy's *Handlingar* for 1892 only recently received in this country, Schött contributes a paper on Californian Collembola with four excellent plates: 18 species of 11 genera are discussed.

A. SMITH & SONS, 269 PEARL STREET, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.



JOINTED
FOLDING NET

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 225.

JANUARY, 1895.

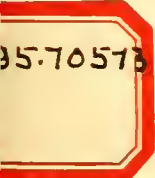
CONTENTS:

ON THE RHOPALOMERIDAE.— <i>S. W. Williston.</i>	183
A PSYLLID LEAF-GALL ON CELTIS. PROBABLY <i>PACHYPSYLLA CELTIDIS-PUBESCENS</i> RILEY.— <i>C. H. Tyler Townsend.</i>	187
PTHIRIA SULPHUREA LOEW.— <i>T. D. A. Cockerell.</i>	188
LIFE-HISTORY OF <i>CLISIOCAMPA FRAGILIS</i> STRETCH.— <i>Harrison G. Dyar</i>	189
UNCERTAINTY OF THE DURATION OF ANY STAGE IN THE LIFE-HISTORY OF MOTHS. — <i>Caroline G. Soule.</i>	191

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 50c.

[Entered as second class mail matter.]



Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.
Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . .	.75	.60
Quarter " " " " " " " " . . .	1.25	1.00
Half " " " " " " " "	2.25	1.75
One " " " " " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by
R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$20.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

- The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:
- Burgess, E. Contributions to the anatomy of the milk-weed butterfly, *Danaus archippus*. Boston, 1880, 16 p., 2 plates. 1.00
 - Hitchcock, Edward. Ichnology of New England. Boston, 1858 1.50
 - Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate .50
 - Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875. 1.00
 - Scudder, S. H. The pine-moth of Nantucket, *Retinia frustrana*. col. pl. Boston, 1883. .25
 - Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889 1.00
 - Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894. 2.00
 - Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883. 2.00
 - U. S. Entomological Commission.—Fourth Report, Washington, 1885 2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PAPILIO BUDDHA.

Finest specimens, each five shillings or 10 for £ 2.
T. KRAPP, Missionary,
Bethel, near Bielefeld, Germany.

PSYCHE.

ON THE RHOPALOMERIDÆ.

BY S. W. WILLISTON, LAWRENCE, KANSAS.

Seventy years ago Wiedemann described a genus of flies of peculiar structure under the name *Ropalomera*, which he placed in the vicinity of *Platystoma*. Latreille later included the genus among the Ephydriidæ, to which indeed the flies have a peculiar resemblance, but his example has not been followed by more recent writers. Macquart, Walker, and Rondani all agreed with Wiedemann in his views of their relationship. Loew at one time* located the genus with the Platystominae. Later† he wavered in his opinion whether it should be placed with the Sapromyzidæ or the Sciomyzidæ. Schiner‡ contended that *Rhopalomera*, and a new genus *Rhinotoria*, which he erected, should constitute a separate family. In this contention I think Schiner was right, and my opinion is based upon a critical study of several species of the group as well as of several hundred of those of the allied families.

After a careful examination of the literature, I find descriptions of the following species: *Rhopalomera clavipes*, *femorata*, *pleuropunctata*, and *strictica* Wiedemann. *maculipennis*

and *flaviceps* Macquart, *punctipennis*, *similis* and *vittifrons* Rondani, *tibialis*, *varipes*, and *?rufipes* Walker. Of these, I believe that only the first six represent valid species; the remainder are either identical with Wiedemann's and Macquart's species, or the descriptions are unrecognizable. *R. ?rufipes* Walker apparently does not belong in the genus, although it may possibly be a *Rhinotoria*.

With these species are included two species of *Rhinotoria* Schiner, neither of which is known to me, and possibly one or more known species of *Coelometopia* Macquart.

Of the genus *Rhopalomera*, in Wiedemann's sense, I have five species in my collection, which may be defined as follows:—

Eyes oval or subreniform in shape, bare, the frontal margins concave, and their greatest proximity just below the root of the antennae. Front excavated, flattened, broad; ocelli present; bristles short, two divaricate ones at the angles of the eyes above, the frontal and ocellar bristles absent or present. Antennae short; third joint oval, with a bare or plumose arista. Face broad, carinate or with a strong median tubercle; cheeks broad. Clypeus projecting; no vibrissae. Proboscis short, with thickened labella; palpi short, broadly spatulate. Occiput nearly plane. Thorax elongate; mesonotum nearly bare,

* Neue Beitr., vii, 2.

† Monographs, iii, 14.

‡ Reise der Novara, Dipt. 233.

the bristles short and confined to the sides and posterior margin. Scutellum with bristles. Abdomen shorter than the wings, flattened; ovipositor telescopic, projecting; hypopygium largely concealed. Legs stout; all the femora thickened. Auxiliary vein of the wings well-developed, elongate, reaching nearly to the middle; basal cells large; last section of the fourth vein oblique, the first posterior cell nearly closed before the tip of the wing. All the tibiae with a preapical bristle, the middle tibiae only, with spurs.

Among the five species from which these characters are derived, there is a considerable variation in other structural characters, of sufficient importance, I believe, to render the dismemberment of the genus *Rhopalomera* of Weidemann advisable, as follows:—

RHOPALOMERA Wiedemann, *Analecta Entom.* 1824.

A pair of posterior ocellar bristles present; no frontal bristles; face tuberculate; anten-

nae not inserted under a frontal projection; arista bare or plumose; scutellum pyramidal, directed obliquely upwards. Wings spotted (unspotted in *R. ciliata*).

RHOPALOMYIA, gen. nov.

Posterior ocellar bristles present; two short frontal bristles on each side; antennae inserted under a projection of the front; arista plumose; face carinate; scutellum oval, not prominent; hind tibiae dilated and with tubercles.

APOPHORHYNCHUS, gen. nov.

No ocellar or frontal bristles; antennae not inserted under an angle of the front; face tuberculate; arista plumose; scutellum oval; hind tibiae slender.

In the following table I have endeavored to include all the valid or recognizable species now known, belonging to these three genera, though it must be remembered that some of them are unknown to me.

- | | |
|---|---|
| 1. Wings brownish black | <i>Rhopalomera femorata</i> . |
| Wings with distinct markings | 2. |
| Wings without distinct markings | 4. |
| 2. Wings with numerous small spots | <i>Rhopalomera maculipennis</i> . |
| Wings with fewer, larger spots | 3. |
| 3. Wings clouded with brown along the veins | <i>Rhopalomera flaviceps</i> . |
| Wings brown and hyaline, spotted, with dark brown clouds on the cross-veins | <i>Rhopalomera clavipes, tibialis</i> . |
| Wings hyaline and yellowish, with brown clouds | <i>Rhopalomera stictica</i> . |
| 4. Antennae and palpi yellow; hind tibiae broad | <i>varipes</i> . |
| Not such species | 5. |
| 5. Scutellum pyramidal; hind tibiae densely ciliate; arista bare | <i>Rhopalomera ciliata</i> , n. sp. |
| Scutellum oval | 6. |
| 6. Hind tibiae dilated | <i>Rhopalomyia pleuropunctata</i> . |
| Hind tibiae slender, arcuate | <i>Apophorhynchus flavidus</i> , n. sp. |

Rhopalomera clavipes Fabricius, Syst. Antl. 329 (Dictya); Wiedemann, Analect. Entom. 17, fig. 12; Auss. Zw. Ins. ii, 571, pl. x, f. 9.—South America.

? *Ropalomera tibialis* Walker, Dipt. Saunders. 375, pl. viii, f. 8.

A true *Rhopalomera*, allied to the following species. Little can be made from Walker's description, but Westwood's figure, and such of the description as is not meaningless, seem to indicate that *clavipes* and *tibialis* are identical. Possibly, however, *tibialis* is synonymous* with *stictica*.

Rhopalomera stictica Wiedemann, Auss. Zw. Ins. ii, 573; Schiner, Reise der Novara, Dipt. 322.—Brazil.

The description of this species as given by Schiner applies well to two specimens before me.

Rhopalomera ?femorata Fabricius, Syst. Antl. 326; Wiedemann, Auss. Zw. Ins. ii, 571.—South America.

The position of this species cannot be determined from the description.

Rhopalomera maculipennis Macquart, Dipt. Exot. ii, 3, 203, pl. xxvii, fig. 3.—Brazil.

Ropalomera punctipennis Rondani, Esame, etc., 20; Schiner, Reise der Novara, Dipt. 232.—Brazil.

Ropalomera similis Rondani, l. c.—Brazil.

Front reddish yellow, brownish at the middle and blackish about the ocelli; a slender silvery line on each orbit. First two joints of the antennae reddish yellow, the third black, except at the immediate base; second joint with a small bristle above. Face opaque yellow; cheeks a little more reddish, with light yellow hair. Palpi yellow. Mesonotum ochraceous yellow, with similarly

colored pollen, beneath which there are seen three brown or blackish stripes. Pleurae for the most part like the mesonotum; a black spot below the humeri, and the metanotum in part pitchy brown. Abdomen black; each segment on its posterior part with four nearly contiguous silvery white spots. Legs reddish yellow, the femora and tibiae in large part, especially the posterior side of the four anterior femora, pitchy brown or blackish; all the metatarsi light yellow, the distal joints brownish; all the femora thickened, the hind pair much so, and all with rather long, light yellow pile below; tibiae on the inner side distally with black pile; hind tibiae considerably dilated and with four long bristles, each inserted on a conspicuous tubercle; the four posterior femora with spinous bristles on the outer side inferiorly. Wings yellowish hyaline, with numerous small, brown spots, the largest and deepest colored of which are situated, one nearly back of the tip of the auxiliary vein, one on the anterior cross-vein, and the third at the tip of the second vein. Length 11 mm.

Two specimens, Rio de Janeiro, H. H. Smith, Nov. This description does not fully agree with the original by Macquart, nevertheless I have but little doubt of the determination. Macquart says: "Thorax noirâtre, pointillé de blanchâtre; deux bandes jaunâtres, interrompues; flancs à bande testacée," etc., and describes the abdomen as simply "noirâtre." He represents the front in his figure as having long bristles, which it is needless to say do not exist. I feel equally confident that *R. punctipennis* Rondani is the same species.

Rondani also describes another species as *R. similis*, which he thought might be a variety of his *R. punctipennis*, in which opinion I fully agree.

Rhopalomera ciliata, n. sp.

♀. Front black, the sides behind and near the ocelli reddish, covered with golden pollen, variable in different lights. Antennae red, third joint large, broadly black on the upper side; arista black, quite bare. Face black, brown and reddish, in the middle above yellowish. Occiput broadly golden pollinose. Palpi black. Mesonotum brownish red, with a slender median stripe, a pair of broader, lateral ones, and the lateral margins golden pollinose. Abdomen yellowish red, shining; each segment with four spots of silvery pollen variable in different reflections. Legs yellowish red, the femora and tibiae in the middle more or less brown; tarsi, except the middle metatarsi, brown or black; hind tibiae extraordinarily dilated, on the inner posterior margin with five or six long bristles inserted on tubercles; on the outer posterior, produced, thin edge densely black ciliate; tarsi much flattened. Scutellum yellow, reddish above. Wings nearly uniformly yellowish; at the tip in front brownish. Length 12 mm.

One specimen, Chapada, Brazil, H. H. Smith.

?*Rhopalomera flaviceps* Macquart, Dipt. Exot. Suppl. i, 336, pl. xviii. f. 6.—New Grenada.

The position of this species cannot be made out from the brief description given.

Rhopalomyia pleuropunctata Wiedemann, Anal. Entom. 18; Auss. Zw. Ins. ii, 572 (*Ropalomera*).—Brazil.

Ropalomera vittifrons Rondani, Esame, etc., 20.—Brazil.

♂, ♀. Front brown, moderately shining, with irregularities; on the lower projecting margin more yellowish; the narrow orbits and a small stripe in the middle, when seen obliquely, silvery white. Face opaque yellow, with a median brown stripe over

the carina; cheeks below the eyes brown. Clypeus dark brown, shining; palpi brown, the immediate tip yellowish. Posterior orbits silvery white. The width of the cheeks is equal to about two-thirds the vertical diameter of the eyes. Antennae red, third joint oval; arista plumose. Mesonotum dark brown or reddish brown, opaque, with four whitish stripes, the inner ones continued on the sides of the scutellum, the outer ones punctulate in front; between the inner pair of stripes, there is a median, narrower, less conspicuous one. Pleuræ whitish pollinose, and, on the more prominent part, in well-preserved specimens, the ground-color shows through in small, round spots. Tegulae white; halteres light yellow. Abdomen more nearly black, opaque, with four rows of silvery white spots, those of the inner rows smaller; oviduct shining black. Legs pitchy black, the immediate base of the hind tibiae yellow, and in well-preserved specimens silvery white; all the metatarsi, save the extreme tip, light yellow; hind tibiae dilated, with four or five long bristles arising from tubercles. Wings light brownish yellowish, a little darker near the costa. Length 8-10 mm.

Twenty specimens, Chapada, Brazil, H. H. Smith. I have no doubt of the identity of this species. Wiedemann, it is true, in his generic description speaks of a tubercle on the face, but in his specific description calls the face convex, which applies. Rondani's description differs only in minor details. He makes no mention of a facial stripe, and calls the thorax blackish.

Apophorhynchus flavidus, n. sp.

♀. Front opaque yellowish red, the large, acutely pointed, depressed ocellar triangle whitish pollinose; orbits silvery pollinose. Face yellow, shining, the tubercle very

large. Cheeks not one-third the vertical diameter of the eyes. Antennae yellowish red. Palpi light yellow. Thorax dark reddish brown, opaque, the mesonotum with a pair of stripes and the lateral margins yellowish white pollinose. Pleuræ with a similar light colored stripe at about its middle. Abdomen deep reddish brown or black, opaque, with the lateral margins opaque light yellow; ovipositor yellow. Legs wholly light yellow; the four anterior femora only a little thickened; tip of hind

tibiae and the distal joints of all the tarsi brown; hind femora considerably thickened; hind tibiae arcuate, not dilated, with a few short bristles on the outer side; all the femora with spiny bristles on the under side distally. Wings brownish, lighter colored along the costa; first posterior cell elongate. Scutellum yellowish, whitish pollinose. Length 8-9 mm.

Two specimens. Chapada, Brazil, H. H. Smith.

A PSYLLID LEAF-GALL ON CELTIS, PROBABLY PACHYPSYLLA CELTIDIS-PUBESCENS RILEY.

BY C. H. TYLER TOWNSEND, LAS CRUCES, N. M.

On May 14, 1892, I found at Riley's water, at western base of the Organ Mountains, some small leaf-galls on *Celtis occidentalis*. The tree was determined by Mr. Walter H. Evans, who was with me at the time. The galls at that date showed on the upper side of the leaves as small swellings about 3 to 5 mm. in diameter, with a pit in the center, thus appearing like raised circles. On the under side they showed simply as smaller warts covered with fine rather long pubescence. Several galls occurred on the same leaf.

On Nov. 26, 1892, in the north end of the same range, south of San Augustine and part way up from the base of the mountains, there were found numerous fallen leaves of *Celtis* containing fully developed galls of this species. As many as 20 galls occurred on one small leaf. There were occasionally some double galls. The fallen leaves

were green in color, but nearly dry. This gall appears without much doubt to be that of *Pachypsylla celtidis-pubescons* Riley, as it agrees well with the description.

The dried galls on the leaves just mentioned measure 2 to 3 mm. in diameter on the lower globular portion. The upper circular rim-like portion is 3 to 4 mm. in diameter. Only galls from which the occupants had emerged were measured. The exit holes are in the side of the pit-like depression on upper surface of leaf. They are elongate openings, so as to allow the egress of the wide-bodied and flattened pupa. Occasionally a gall has a small circular opening, in one case this being in the globular portion of the gall on the under side of the leaf. These mark the exit of a small hymenopterous parasite.

Some of the above dried galls having no exit hole were opened, and some

dried pupae found within. These may be described as follows:—

Psyllid pupa.—Length (abdomen shrunken). 1.2 to 1.4 mm.; width, 1 to 1.2 mm. The wing pads in their naturally half-spread condition give an apparent width, equaling the somewhat shrunken length; they are distinctly longer than width of thorax. Pupa rather oval or rounded in outline, widest in middle of abdomen; finely and somewhat sparsely pubescent on body, wing-pads and antennae; abdomen long pubescent. Pale yellowish, eyes black; mesonotum, pronotum, and top of head roseate; anterior pair of wing-pads pale rosy yellowish, hind wing-pads paler. Abdomen pale greenish, with an anterior median rosy yellowish area, the terminal portion broadly brownish with a median row of small black spines ending in a spiny tubercle, 13 spines altogether in the row, and one on each side of row on posterior edge of abdomen. Spines are arranged thus: first (anteriorly) three in a triangle with apex posteriorly directed; then three more in a similar triangle; then the bunch of six in three pairs with a larger central one, giving the appearance of a spinigerous tubercle. These spines grow longer and stouter towards posterior end of row. On segment anterior to that bearing the first three above mentioned, there seem to be an additional hardly visible three. But in the larger specimen there is in place of these only one

quite conspicuous one of good size. Legs and under side of body pale greenish, sternal and anterior portions yellowish rosy, the legs more or less shaded with same color. Antennae greenish at base, more rosy or pale apically.

Described from two specimens, taken from dried galls found Nov. 26. The galls picked May 14 disclosed nothing.

The very small, elongate, whitish eggs of this psyllid were found on a cluster of young leaves, May 14. The eggs were quite thickly attached to the under surface of the leaf, adhering by one end, and slanted toward the tip of the leaf. A fewer number also occurred on the upper surface. But a considerable number of the just-hatched young were found on upper surface, where they were beginning to bury themselves in the substance of the leaf to form their galls.

The *Celtis* is probably the var. *reticulata*.

Two small hymenopterous parasites issued from the dried galls above mentioned. They have been determined by Mr. Wm. H. Ashmead as *Ceraphron* sp., and *Tetrastichus* sp.

PHTHIRIA SULPHUREA LOEW.

BY T. D. A. COCKERELL, N. MEX. AGR. EXP. STA.

Described from the female. About 3 mm. long; yellow, wings hyaline. Head dull chrome yellow, ocelli black, eyes dull purple; proboscis about twice as long as head; face with sparse fine whitish pubescence; antennae chrome yellow; third

joint more than twice as long as the other two combined, about twice as long as broad, pointed, but with a small tooth almost at the end, so as to appear bifurcate or deeply emarginate; without bristles.

Thorax pale delicate greenish-yellow, with

three pale longitudinal bands, evanescent posteriorly before reaching the scutellum. Halteres yellow, club large, somewhat longer than its pedicel. Abdomen shovel shaped, deep chrome yellow, thinly pubescent above with whitish hairs, which give it a sericeous appearance in certain lights.

Legs pale yellow, tibiae slightly dusky, tarsi blackish at their distal ends, otherwise brownish.

Wings clear, iridescent, veins dark brown, the first longitudinal paler.

Hab. On yellow flowers of Compositae, grounds of Agricultural College, Las Cruces, N. M., Sept. 1894 (*Miss F. Casad*).

A ♂ was taken at San Augustine, N. M., on flowers, Aug. 29, 1894 (*Ckll.*, 2260). It resembles the ♀, but the abdomen is narrower and the eyes are contiguous.

This species is interesting from its colour, which is exactly that of the flowers it frequents. It occurs on the same flowers as the similarly colored bee, *Perdita luteola* Ckll. ined. Prof. C. H. T. Townsend tells me that he remembers finding a similar species in Michigan, but it was not determined.

[This paper was received as the description of a new Dipteron and its true character learned only in time to change the title. ED.]

LIFE HISTORY OF CLISIOCAMPA FRAGILIS STRETCH.

BY HARRISON G. DYAR, A. M., NEW YORK.

C. FRAGILIS Stretch.

1881—*Stretch*, Papilio, i, 64.

incurva Hy. Edwards.

1882—Hy. Edw., Papilio, ii, 125.

discolorata Neumoegen.

1893—Neum., can. ent., xxv, 4.

var. PERLUTEA Neumoegen and Dyar.

1893—N. and D., Journ. N. Y. ent. soc., i, 31.

var. CONSTRICTINA Neumoegen and Dyar.

1893—N. and D., Journ. N. Y. ent. soc., i, 30.

lutescens Neumoegen and Dyar.

1893—N. and D., Journ. N. Y. ent. soc., i, 31.

var. MUS Neumoegen.

1893—Neum., Can. ent., xxv, 4.

var. AZTECA Neumoegen.

1893—Neum., Can. ent., xxv, 5.

Synopsis of Varieties.

Fore wings all pale luteous . . . *perlutea*.
 Fore wings partly brown . . . *constrictina*.
 Fore wings brown, the lines only pale or slightly spreading . . . *fragilis*.
 Fore wings dark gray brown . . . *mus*.
 Fore wings darker, blackish . . . *azteca*.

I know of the larva from Nevada (Prof. J. J. Rivers), Montana (Mr. C. A. Wiley), Colorado (Mr. H. W. Nash) and Wyoming. I feel satisfied from a comparison of bred and captured specimens from these and other localities that there is only this one species from the Rocky Mountains to the Sierras and from Canada (Mr. F. H. Wolley Dod) to Mexico. *C. fragilis* is the western representative of *americana*, and is in turn represented in the Pacific Northwest by *pluvialis*. *C. disstria* extends throughout the ranges of *americana* and *pluvialis* and also extends into California (*erosa* and *thoracica* are synonyms); but does not enter the range of *fragilis* to my knowledge.* The other species (*californica*, *constricta* and *ambisimilis*) appear to be confined to California, and are yet imperfectly worked out. The following life history is based on larvae bred from eggs kindly sent me by Mr. H. W. Nash of Pueblo, Col.

Eggs. Columnar, flat above, rounded below; upper surface round or elliptical

* Since the above was written, I have seen *disstria* from Guadalajara, Mexico.

with a concentric groove; white, smooth, stained by the brown covering froth in an angular marking, corresponding to the edges of the individual bubbles. Shell rather thick, opaque, pearly inside. Laid close together on the rounded end in a single layered columnar mass forming a band reaching half way round a twig or a patch on the side of a larger stem near the ground (Wiley). Froth rather light brown with shining continuous surface.

First stage. Head rounded, shining black; width 0.4 mm. Body black, not shining, marked by a double row of minute orange dots subdorsally. Hair nearly white, quite thick, curving forward dorsally and backward subventrally. A narrow subventral line and tips of abdominal feet pale. Later the subdorsal orange patches become large, distinct on joints 5 to 10. Each patch is narrowed centrally at the large wart i and is widest posteriorly in the middle of which is the small obscure wart ii. The warts bear several hairs but are not well marked.

Second stage. Head black; bases of antennae whitish; width 0.6–0.65 mm. Body black with a narrow, straight, reddish ad-dorsal line, slightly spreading at the anterior and posterior edge of each segment, absent at the extremities. A white subventral line and fainter substigmatal one. Dorsal hair reddish, subventral hair paler. Segmental incisures pale, giving a banded appearance when the body is bent. There are now some short hairs from the skin.

Third stage. Black, hair abundant, reddish dorsally, white subventrally. Width of head 1.1–1.15 mm. Red ad-dorsal line slight, rather broken; subventral pale line quite distinct, substigmatal line faint, venter grayish. No other marks at first, but later a series of narrow, elliptical, dorsal blue spots with pointed ends distinct only centrally, closely bordered by the pulverulent, narrow, red ad-dorsal line. In the subdorsal space traces of blue dots. The red marks are much more reduced than in the previous stage.

Fourth stage. Head powdery blue, black below, bases of antennae and line above the mouth white; width 1.8–2.0 mm. Body black, thickly covered with powdery blue up to and enclosing the position of the subdorsal blue dots, leaving a series of segmentary lateral black patches. Dorsal space black, containing a rather broad dorsal blue band, broken at incisures and the single crinkled and broken orange ad-dorsal line. Hair red, thickest dorsally and subventrally and paler subventrally. Joints 12 and 13 unornamented, powdery blue. There is considerable variation in the amount of blue laterally. In some, the lateral black spots form a continuous band, separating a blue band corresponding to the dots; some have this band broken into the ordinary spots and only streaks of blue below and then the orange is better developed, showing a little of its subdorsal portion as well as the ad-dorsal portion stronger than usual. The dorsal line is continuous in a few, paler blue than the lateral area. The other lines are obsolete.

Fifth stage. (Interpolated stage.*) Like the last stage, but the blue a little less whitish and not so confluent. Width of head 2.2–2.4 mm.

Fifth (or sixth) stage. Head powdery blue with black dots; antennae whitish at base; line above mouth pale; palpi and spinning organ pale, ringed with black;

* Most of the larvae had but five stages; but a few less vigorous ones had six stages. It appears from the widths of head that the larvae grow regularly on the basis of five stages up to the stage IV. It is then a matter of degree of nutrition whether they complete their growth in five stages or in six, in the latter case interpolating an extra stage with an intermediate width of head. This is probably true of all species of the genus and explains the large measurement which I obtained in the case of *C. erosa* (= *disstria*) in stage III (Psyche, V, 364). The calculated series for *C. fragilis* for the widths of head is .41, .59, 1.15, 1.92, (2.48), 3.2; ratios .50 and square root of .50 = .774.

width 3.2 mm. Body pale blue or blue-gray up to and including the blue band in subdorsal space leaving a few black dots and the row of lateral spots which indent the lower edge of the band. Dorsal space black, the blue dorsal line broken a little in middle of each segment or continuous. Red marks absent or a partly duplicated ad-dorsal line with a few subdorsal dots. Hair all red, thin dorsally, not obscuring the body, quite thick subventrally but not tufted. Venter gray at first, later black, often patched with blue.

Cocoon and pupa as in the other species of *Clisiocampa*.

Food plants. Willow and poplar (Nash), wild cherry and wild rose (Wiley) and wild gooseberry.

UNCERTAINTY OF THE DURATION OF ANY STAGE IN THE LIFE- HISTORY OF MOTHS.

BY CAROLINE G. SOULE,
BROOKLINE, MASS.

So much emphasis has been laid on the number of moults and the duration of each stage of larval life of our moths, that it seems to me worth while to show a few instances of the variation that occurs. I think that it cannot be stated positively that any species has a certain number of moults, or that any stage lasts a certain number of days.

I have had one brood of *H. caryae* moult four times, and another moult five times. The same difference occurred with *C. juglandis* larvae.

Owing to my arrangements of the larvae there is no—or the minimum—chance of mistake, the moults being always noted from the same boxful of larvae, and those always the first hatched.

The following tables show a few instances of variation among Spingid larvae.

Cressonia juglandis.

Stage.	1889.	Days.	1891.	Days.	Diff. in No. of Dys. 1891 less than 1889 by
Eggs laid	July 9		July 6		
Hatched	July 17	8	July 13	7	1
1st moult	" 21	4	" 16	3	1
2nd moult	" 27	6	" 20	4	2
3rd moult	Aug. 1	5	Aug. 24	4	1
4th moult	" 8	7	" 30	6	1
Stopped eating	" 29	21	no record		
Pupated	Sept. 7	9	" "		

Everys myron.

Stage.	1889.	Days.	1893.	Days.	Diff. in No. of Dys. 1893 less than 1889 by
Eggs laid	June 14		July 13		
Hatched	June 23	9	July 19	6	3
1st moult	" 29	6	" 23	4	2
2nd moult	July 4	5	" 27	4	1
3rd moult	" 8	4	" 30	3	1
4th moult	" 14	6	Aug. 3	4	2
Stopped eating	" 20	6	" 8	5	1
Pupated	" 27	7	" 12	4	3

Smerinthus astylus.

Stage.	1889.	Days.	1890.	Days.	Diff. in No. of Dys. 1890 less than 1889 by
Eggs laid	July 9		July 29		
Hatched	July 20	11	Aug. 8	10	1
1st moult	" 29	9	" 16	8	1
2nd moult	Aug. 4	6	" 22	6	0
3rd moult	" 12	8	" 29	7	1
4th moult	" 21	9	Sept. 5	7	2
Stopped eating	Sept. 5	15	" 14	8	7
Pupated	" 12	7	" 18	4	3

Hemaris diffinis.

Stage.	1891.	Days.	1891.	Days.	Diff. in No. of Dys. 1891 1st brood had
Eggs laid	no record		July 7		
Hatched	no record		July 14	7	
1st moult	no record		" 17	3	
2nd moult	May 30		" 20	3	
3rd moult	June 2	3	" 23	3	same
4th moult	" 13	11	" 27	4	7 more
Stopped eating	" 16	5	Aug. 2	6	1 less
Pupated	" 18	3	" 7	5	2 less than 2nd brood.

THE SEVENTH VOLUME OF PSYCHE.

Began in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

Vols. 1-6, Complete, Unbound, - Now sold for \$29.00.
 Vols. 1-6, and Subscription to Volume 7, - - \$33.00.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

Vol. 1. Introduction; Nymphalidae.

Vol. 2. Remaining Families of Butterflies.

Vol. 3. Appendix, Plates and Index.

The set. 3 vols., royal 8vo, half levant, \$75.00 net.

HOUGHTON, MIFFLIN & CO.,

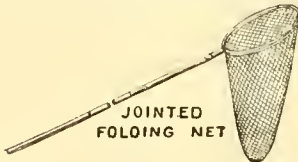
4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.



JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.



PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 226.

FEBRUARY, 1895.

CONTENTS:

REHABILITATION OF <i>PODISMA</i> LATREILLE.— <i>S. H. Scudder.</i>	195
TWO NEW SPECIES OF ENTOMOBRYA (Illustrated).— <i>F. L. Harvey.</i>	196
THE TIPULID GENERA <i>BITTACOMORPHA</i> AND <i>PEDICIA</i> (Illustrated).— <i>F. M. Aldrich.</i>	200
GALL OF <i>EURYTOMA</i> SP. ON THE CAT'S-CLAW THORN.— <i>C. H. Tyler Townsend.</i>	202
ENTOMOLOGICAL NOTES (<i>Limnitis arthemis</i> in August, <i>C. G. Soule</i> ; Dr. McCook's American spiders; Peckham on senses of spiders; the Entomologist's Daily Post Card; Packard on the fleas; new light on <i>Hemimerus</i>).	203

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

70573

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

PS Subscriptions not discontinued are considered renewed.

PS Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE,

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

PS Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by
R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danaus archippus</i> . Boston, 1880, 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichnology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> . col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FIVE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

REHABILITATION OF PODISMA LATREILLE.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

The Orthopteran genus *Podisma* was proposed in a Gallic form (*Podisme*) by Latreille in 1825 (Fam. nat., 415) for short-winged Acridians with a prosternal spine, without specification of species. Its next use was by the same author in 1829 (Cuvier, Regne an., v, 188) in its proper Latin form, and the European species now known as *Pezotettix pedestris* and *Platyphyma giornae* referred to it. The same two species and these only are again referred to *Podisma* by Serville in 1831 (Rev. méth. Orth., 98-99) and to the same as a subgenus of *Acridium* by the same writer in 1839 (Hist. nat. Orth., 679-681). Burmeister, however, in 1840 (Germ., Zeitschr. ent., ii, 51) refers these same species and these only to a new genus *Pezotettix* to which he gives as a synonym "*Podisma* Latr. ex parte." In Burmeister's view (cf. Handb. ent., ii, 650; 1838) the other portion of Latreille's genus included such species as *Stenobothrus parallelus*, and *Chrysochraon dispar*, where "*Podisma* Latr. ex parte" is given as the equivalent of some unnamed divisions. But these species are excluded by Latreille's definition, and in his writings he has never mentioned any other species as appertaining to the genus than the two first mentioned above.

The only other authors who had at this time employed the term were Brullé (Exp. Morée) in 1832 who (as quoted by Fischer) referred to it only species of *Stethophyma* and *Stenobothrus*; Heyer (Germ., Faun. Ins., fasc. 17) who in 1835 (?) employed it for *Chrysochraon dispar*; Stephens who in 1835 (Illustr., Mand., vi, 29) had referred *pedestris* only to it: and Costa who in 1836 (Faun. Reg. Nap., 43-48) had referred to it four supposed new species, *appulum*, *campanum*, *calabrum* and *communis*, the first two of which are now regarded as synonyms of *Acridium aegyptium* L., the third as probably a *Pamphagus* and the last as *giornae*. In view of the limitation of the genus by Serville (if Latreille ever intended its greater extension) this action of Brullé and Costa has no force, and hence, if the name *Pezotettix* can be retained at all, it must be by regarding one of the two original species as the type of *Pezotettix*, the other of *Podisma*.

So far as I can discover, the first author to refer the two species to distinct genera was Fieber who in June 1853 (Lotos, iii, 119) referred *giornae* to his new genus *Pelecyclus*, and *pedestris* to *Podisma*. Also in 1835, but later, his introduction being dated

November, Fischer (Orth. Eur., 369, 374) referred the former species to his new genus *Platyphyma* and the latter to *Pezotettix*. Fischer has been generally followed, but it is plain that *Platyphyma* must give way to *Pelecycclus*, which in its term must yield precedence to *Pezotettix*; of which *giornae* becomes the type, while *pedestris* becomes the type of *Podisma*. The numerous species, therefore, which in recent years, both in this country and in Europe have been referred to *Pezotettix* must be classed under *Podisma*.

The early use of the term *Podisma* previous to 1853 and after 1829 (other than we have given) also sufficiently confirms the appropriateness of restoring *Podisma* for the species now generally

included in *Pezotettix*; for Fischer de Waldheim in 1846 (Orth. Russ. 249-253) used it for six species of which the first three belong to *Pezotettix* of modern writers, the next two to *Chryochraon*, while the last is not recognizable. [The second species, *P. primnoa* Motsch., has also not been recognized by later writers but I possess specimens from different places in Transbaicalia]; Borck in 1848 (Skand. rätv. ins. nat. hist., 87-92) refers to it *pedestris*, and *frigida*; and finally H. Fischer himself first used it, in 1849 (15 Jahresb. Mannh. ver. nat., 38) for *frigida*. His reason for later (Orth. Eur., 365, note) supplanting *Podisma* by *Pezotettix* cannot be defended.

TWO NEW SPECIES OF ENTOMOBRYA.

BY F. L. HARVEY, ORONO, ME.

Entomobrya hexfasciata, n. sp.

Ground color greenish yellow. Body clothed with short, downy hairs and numerous long bowed plumose clubbed hairs, which give the insect a shaggy appearance. Head as long as broad. Square behind and widest in the posterior third. A small, dark spot at the base of each antenna joined by a narrow line of the same color, but *not* reaching the eye patches. Eye patches dark, narrow, three times as long as wide. Antennae stout, purplish. The terminal joint pale purple throughout. The other joints tipped with dark purple, while the bases are pale yellow. The purple tip is especially conspicuous on the basal joint. The very short basal ring is here ignored and the

antennae described as only four jointed. The basal joint shortest, the third slightly longer than the second and the terminal a half longer than the third. Body fusiform. Mesonotum as broad as the head. Body widest at the anterior suture of the fourth abdominal segment. The fourth abdominal segment not quite as long as the three preceding taken together. There is no dark band along the side of the body. Mesonotum, metanotum and second abdominal segment with broad fascia along the *anterior* border. First abdominal segment marked along the *anterior* border with a row of fine dots. Band on the third located in the *middle* and nearly as wide as the segment. Fourth segment with a band along the *posterior* margin, which connects with a triangular

patch at the sides and extends along the median line into an obtuse point. Fifth segment with a median, transverse, narrow band that arches backward or sometimes covers the segment. Terminal segment plain. Legs, under side of body and elater yellowish. Legs rather stout.

Elater long, slender. Manubrium a fourth shorter than the mucrones and dentes together. Mucrones annulated. The whole elater clothed with long hairs, a prominent one extending beyond the dentes.



Fig. 1.

Entomobrya hexfasciata

Measurements.—Total length, 1.52 mm.; head, .345 mm. x .345 mm.; antennae, .776 mm.; ratios of joints 9: 10: 11: 17; body 1.19 mm. long, .4 mm. broad at the fourth abdominal segment; ratios of segments 20: 10: 9: 12: 12: 25: 10: 5. Elater total, .81 mm.; manubrium, .345 mm.; mucrones and dentes, .465 mm.; long hairs on the legs, .112 mm.; clubbed bowed hairs on body often .230 mm.; eye patches, 69 μ x 25 μ .

Other specimens measured were 1.22 mm. and .93 mm., total length and the antennae .58 mm.; ratio 5: 6: 6: 9 and .366 mm.; ratio 4: 6: 8: 13. Though smaller the color patches were the same as on larger specimens.

Habitat.—Found during the fall in moss in the woods upon the ground or upon logs. Seems to prefer very moist situations. Several specimens examined in 1891 to 1894. Orono and Greenfield. Mr. F. L. Harvey.

Distinguishing characters.—Related in habits to *E. decmfasciata* Pack. but seeking more damp situations. We have never found them associated. It resembles in some respects *E. multifasciata*, var. *pulchella* Ridley, but the color bands are differently arranged. This species is readily distinguished by the smaller, thicker set body, which is widest at the fourth abdominal segment, the stouter legs and antennae, the nearly triangular head, which is square behind, the shorter antennae, the small eye patches, which are not joined to the patches at the base of the antennae, absence of markings on the side of the head and side of the body, the anterior position of the bands on the body segments, the row of dots on first abdominal segment and the absence of markings on the terminal abdominal segment.

Remarks.—The hairs on the body are brown by reflected light, especially upon the dark bands. The bands in balsam specimens show dark purple but in life appear deep brown or black.

The species is quite active and a good jumper. The antennae on one specimen had only three segments; a very short basal one and a terminal as long as the other two, which had the hairs arranged verticillately. This may have been a young specimen though the size was large and the color bands typical. This species has the short basal ring making really fine joints to the antennae. This basal ring is not shown in Emerton's drawing Fig. 1. Our species violates the generic description of Rondani by having the terminal joint of the antennae too long to be called subequal to the second and third. Also has the fourth body segment somewhat shorter than the three preceding. The drawing Fig. 1, enlarged 30 times, was made from a live specimen by Mr. J. H. Emerton; the head was modified and the elater drawn by the writer. The species is named *E. hexfasciata* on account of the six conspicuous bands upon the body segments.

Entomobrya pygmaea, n. sp.

Ground color pale yellow. Marked with purple bands. Body, antennae and elater clothed with long hairs. Body fusiform, broadest at the metanotum and much narrowed behind. Head oblong, a fifth longer than broad, rounded behind, widest at about the middle. The eye patches oblong, a third longer than wide and joined by a broad band that arches forward. Head not otherwise marked. Antennae stout, purple. Segments in the ratio of 5:6:6:9, nearly. Mesonotum broad, anterior edge, sides and posterior edge marked with a narrow band. Tendency to a median longitudinal stripe as shown by the projections on the anterior and posterior

bands. Metanotum and the first three abdominal segments bordered on the anterior margin, the color patches reaching to the band along the sides. Fourth segment with an interrupted longitudinal band which does not reach the anterior border or band along the sides. Fifth and sixth segments plain. The fourth segment of the abdomen nearly twice as long as the three preceding.



Fig. 2.

Entomobrya pygmaea.

Legs and elater light colored. The latter slender. Manubrium to mucrones and dentes as 11:15.

Measurements.—Total length, 1.11 mm.; ratio of parts, antennal joints 5:6:6:9; head 15:12; body segments 5:3:2½:2½:3½:15:3:2; elater 11:15.

Habitat.—Upon juniper wood in the yard during March and April, 1892. The wood was brought from a swamp in the fall and this species is probably arboreal in habit. Orono. Mr. F. L. Harvey.

Distinguishing characters.—The small size, the form of the body, so

broad in front and so very narrow behind, the broad band between and joining the eye patches, the absence of other markings on the head, the anterior position of the bands on the metonotum and first three abdominal segments, the anterior and posterior narrow bands of the mesonotum, the absence of markings on the fifth and sixth abdominal segments, the very long fourth abdominal segment and the comparatively short antennae.

Remarks.—The drawing of this species (Fig. 2) was made from a live specimen by Mr. J. H. Emerton and, as in most of his sketches of these soft insects, it is too broad, due to pressure needed to hold them still while drawing.

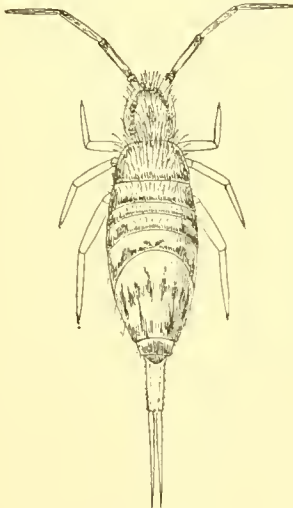


Fig. 3.

Entomobrya decemfasciata.

We have added Fig. 3 drawn by Emerton, which shows what we call *Degeeria decemfasciata* Packard,

which according to Brooks (Linn. Journ. Zoology, Vol. XVII, May, 1883, p. 275) = *Podura fasciata* Say = *Entomobrya multifasciata* Tullb.

Mr. Macgillivray in his catalogue of Thysanourans of North America (Can. ent. vol. XXIII, Dec. 1891, p. 273) makes this species and Tullberg's synonyms of *Podura fasciata* Say.

Mr. Brooks puts a question mark after both Packard's and Say's species, having we presume never examined the forms. We have never seen Tullberg's species, but Mr. Macgillivray kindly sent us alcoholic specimens of what he regarded Say's species and we would very reluctantly regard them the same as the species we figure as Packard's *D. 10-fasciata*. To try and settle the identity of our form with Packard's, we sent specimens to the author of the species but could not get him to express a *positive* opinion whether they were the same or not. When authors cannot recognize their own species from specimens, what can those who have only their descriptions to go by be expected to do?

We understand that Packard's types were deposited in the collections at Cambridge, and if still in condition and accessible we hope some time to look them over. Say may have drawn up his description from young specimens of Packard's species, but we doubt it, and would prefer to hold both as good species until the forms are thoroughly studied and also hold both distinct from *E. multifasciata* Tullberg until foreign and American specimens are carefully compared.

THE TIPULID GENERA BITTACOMORPHA AND PEDICIA.

BY J. M. ALDRICH, MOSCOW, IDAHO.

BITTACOMORPHA. Westwood, Lond. Edinb. philos. mag., vi, 281 (1835).

The only known species up to 1890 was *clavipes*, described by Fabricius in his "Species insectorum" in 1781 under the generic name of Tipula. In his "Systema Antliatorum" (1805) he referred it to the genus Ptychoptera, where it remained until Westwood erected for it the present genus in 1835.

In 1890 von Röder described the

second species, *sackenii*, from a single damaged specimen, captured in Nevada. This species and one described in the present article both occur in the neighborhood of Puget Sound. As von Röder's description is not readily accessible to American students, and does not include all the important characters, I redescribe the species.

Table of Species.

1. All the tibiae ringed with snow white near the base; all the metatarsi white at base. 2.
Tibiae not ringed, metatarsi white at tip, instead of base. *sackenii* v. Röder.
2. Dorsum of thorax deep velvety black with a white middle line; second submarginal cell one-third as long as the first posterior. . . . *clavipes* Fabr.
Dorsum of thorax shining black, no middle line of white; second submarginal cell half as long as first posterior. *occidentalis*, n. sp.

Bittacomorpha sackenii Von Röder, Wiener entom. zeit. ix, 230.—♂. Front infuscated, face yellow; both overlaid with a thin white sericeous coating; proboscis light yellow, palpi infuscated. Antennae 19-jointed, elongate, equalling the wing in length, uniform black in color. Thorax wholly pale yellow, except the dorsum which is shining black, the humeri, supralar area, and a spot before the scutellum, yellow; between the coxae at the sides there is a black spot in each interval, considerably expanded in fully-colored specimens; metanotum and knob of halteres infuscated. Abdomen long, strongly clavate, black, with short, scattered white pile; the first segment pale at base, all the segments

with a narrow pale distal band; second segment $1\frac{1}{4}$ times as long as the third, fourth and fifth each about equal to the third; claspers small, compact, black, with a pair of black palpi-like organs covered with black hairs. Femora pale at base, the apical half or more black, but in lighter specimens sometimes only an apical black ring; tibiae of the same color, not so light at base; metatarsi black, with white tip; second and third joints of tarsi white, the rest brown. Wings hyaline, along the apex distinctly hairy, venation as in *B. clavipes*.

Length, 11 mm; of wing, $7\frac{1}{2}$ mm.

♀. Antennae shorter, wings longer and wider, the latter scarcely exceeding half the length of the former.

Five males, two females, Seattle, Washington, at Lake Union, the last of August and first few days of September, 1894.

Bittacomorpha occidentalis, n. sp. ♀. Head wholly black, the front and the pointed face with a white sericeous covering; the antennae would extend about to the tip of the first abdominal segment, if bent back along the sides. Thorax black, the dorsum wholly shining; scutellum yellow; pleura white sericeous, a spot before the root of the wing and one above the base of the halteres yellowish-pollinose. Abdomen black, the posterior margins of the segments narrowly whitish. Femora pale at base gradually darker to the tip, which is black; tibiae ringed with white near the base; second and third tarsal joints, and the base of the metatarsi, white; the metatarsus is as long as the following joints taken together, and its black part is somewhat swollen. Wings hyaline, the second submarginal cell almost half as long as the first posterior.

♂. The antennae are broken off from my only specimen; abdomen less clavate than in *B. sackenti*, the appendages dark brown with pale hairs.

Length, 18-19 mm.; of wing ♂, 8½.
♀, 11½ mm.

One male, two females, Seattle, Wash. One specimen was collected the last of August, 1894, at Lake Union.

This is possibly the species referred to in Osten Sacken's note to *B. clavipes*, Catalogue, p. 36. where he says, "Specimens from California in Mr. Verrall's collection in London have a shining thorax and a shorter submarginal cell; they may belong to a different species." They could not belong to *occidentalis* unless the word "shorter" in the quotation were a slip of the pen for "longer."

Bittacomorpha clavipes Fabr.

One female Custer, S. D. (Black Hills, 5000 feet), August, 1892, in a moist meadow.

Comparing Osten Sacken's notes in "Western Diptera," p. 207, and in his catalogue, p. 36, it may reasonably be doubted whether the true *clavipes* has yet been found west of the Rocky Mountains.

PEDICIA. Latreille. Gen. Crust. Ins. iv, 255, 1809.

This genus is a somewhat difficult one to determine, from the fact that the palpi have the same structure as in the section *longipalpi*, while the venation and other characters make it out a member of the *brevipalpi*. In other words, it is a brevipalp Tipulid with long palpi. Several years ago I received from Mr. Chas. Palm a fine



Pedicia albivitta Walk. ♂. $\frac{3}{4}$

male of *P. albivitta* Walk., the only eastern species, a particularly handsome insect, which remained an enigma to me for a long time. In Baron Osten Sacken's monograph no figure of the wing is given, and as the venation is very peculiar, I annex a figure to facilitate the recognition of the genus. The genus *Amalopsis* Haliday is somewhat similar in venation, but has the brown coloring, if at all, in an entirely different pattern.

Pedicia obtusa Osten Sacken, Western Dipt., 205. — The description of this species given by Osten Sacken was only a provisional one, covering the salient features, owing to the fact that he did not have the specimen before him at the time, but depended upon Mr. Hy Edwards, the owner of the type, to write him the characters. As I have a specimen, I record the full description.

♂. Head small, grayish, the antennae yellow, palpi brown; frontal tubercle distinct, close to the antennae. Thorax grayish sericeous, ground color yellow, a double brown line on the dorsum and an abbreviated one each side of it, reaching to the transverse suture; on the pronotum a narrow median black line; a black stripe from the humerus to the base of the wing. Disk of metathorax and knobs of halteres infuscated. Abdomen light brown, darker along the

median line; the horny genital appendages are rather elongate, yellow, not infuscated. Legs brownish yellow, tips of femora and tibiae more infuscated, tarsi dark brown. Wings hyaline and brown, with almost the same pattern as in *P. albivitta*. The tip of the wing is not bent back so far as in the latter species. The brown color follows the fifth vein to the margin, differing in this respect from Mr. Edwards's specimen.

Length, 28 mm; of wing, 22 mm.

Lake Union, Seattle, Washington, the last of August.

The most important structural difference between this and *P. albivitta* is in the male lamellae, which are more than twice as large in the present species.

GALL OF EURYTOMA SP. ON THE CAT'S-CLAW THORN.

BY C. H. TYLER TOWNSEND, LAS CRUCES, N. MEX.

Specimens of a very hard rounded gall were found on branches and twigs of the cat's-claw thorn (*Acacia* sp.), which grows plentifully from near base to part way up the Organ Mts., at the north end of the range, about three miles southeast of San Augustine. These galls greatly resemble those of *Rhodites*. At the date on which they were found, Nov. 26, 1892, they appeared to be empty, the insects having mostly escaped through numbers of small holes in each gall. The galls were quite plentiful. From those containing exit holes, the following brief description is drawn.

Gall.—Length (measured on twig), 10 to 19 mm.; greatest width $8\frac{1}{2}$ to 16 mm.

Oblong-rounded or suboval, very hard, always formed on one side of the twig, the other side of the twig even with the surface of the gall and its bark left intact, the bark of the rest of the twig or branch being split by the growing of the gall and adhering to its surface in imperfect strips, being best preserved next the sides of twig. Smaller specimens do not show this. Color reddish brown, more or less grayish where covered with bark and in smaller galls. Bulged surface that is not covered by bark finely roughened, sometimes more or less split in process of swelling.

Four galls. The small ones show only from one to three holes each. A larger gall shows about twenty exit holes, and in addition numbers of very minute holes through which parasites of the gall flies must have escaped. The minute holes are about

one-eighth the diameter of the larger ones. Cutting into one side of this gall revealed a small live white hymenopterous larva, about 2 mm. in length and apparently full grown, resting in a small cell. Old galls show irregular small hollowed cavities and cells inside.

ENTOMOLOGICAL NOTES.

In August, 1894, a perfect, and evidently freshly emerged, specimen of *Limenitis arthemis* was caught at Nonquitt, Mass., in an exposed place close by the sea.

C. G. Soule.

Dr. McCook is to be warmly congratulated on the successful issue of the third and final volume of his "American spiders and their spinning work," which has appeared four years after the second volume. The author is more at home in his delineation of the out door world than in systematic work, with which this volume is mainly concerned, yet he has applied himself to this task with commendable zeal and success and describes 123 species and 30 genera. Apparently (as the table of contents curiously shows) he had intended to carry his work beyond the "orb weavers," but his courage or his time gave out as he saw his work grow to portentous dimensions. We have to thank him for thirty large and careful plates of spiders colored besides a mass of structural details; they will greatly facilitate future study. The price of the complete work is now justly advanced to \$50. Unhappily the title page is marked 1893, though the preface is dated July 1894, and the volume was not issued until December, 1894.

Mr. and Mrs. Peckham have given us (*Trans. Wisc. acad.*, x) a new series of their admirable experiments with spiders in a paper on their visual powers and color sense; they "prove conclusively that Attidae see their prey (which consists of small insects)

From a specimen which was bred from the galls, Mr. Wm. H. Ashmead determined the genus as above. It is possible, however, that the *Eurytoma* is not the gall-maker, but a parasite of the latter.

when it is motionless, up to a distance of five inches; that they see insects in motion at much greater distances; and that they see each other distinctly up to at least twelve inches"; they are guided by sight rather than by smell. The experimenters are further "of the opinion that all the experiments taken together strongly indicate that spiders have the power of distinguishing colors."

Certainly the "U. C." [Upper California?] entomological society has done a unique thing in issuing from Berkeley, Cal., as a Californian journal of entomology "The Entomologists' Daily Post Card" at \$2.00 a year. A card of regulation size and color is printed on both sides in clear type, leaving a meagre space for an address. The number before us contains an editorial on Note taking, part of a list of species in Edwards's last catalogue of butterflies, and a portion of a tabular key to the genera of Nymphalidae. It is a curious venture.

In a recent paper on the Siphonaptera (*Proc. Bost. soc. nat. hist.*, xxvi, 312-355) Dr. A. S. Packard gives an excellent resumé of published observations on the embryology, post-embryonic history and anatomy and the adult structure of the fleas, adding new data from his own preparations and numerous figures. He is led to regard them as forming a distinct order standing nearer the Diptera than any other, but with many points of relationship to the Coleoptera.

Hansen gives in English (*Ent. tidskr.*, xv, 65-89, pl. 2-3) an important paper on the structure and habits of *Hemimerus*, a

Platypsylla-like insect infesting rats in Africa, and which had previously been studied only from dried material. Saussure in particular had published a long memoir upon it, founding upon it a new order, Diploglossata, from its possessing, as he thought, a second labium. Hansen shows that this does not exist (it is difficult to

understand how the figures of Hansen and Saussure can have been taken from the same kind of insect) and he concludes that "Hemimerus belongs to the Orthoptera, constituting a separate family very closely allied to the Forficulina." He shows from his dissections that the insect is viviparous, bringing forth one young at a time.

THE SEVENTH VOLUME OF PSYCHE.

Began in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

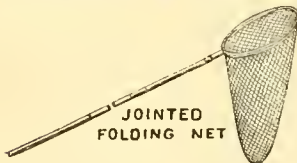
Vols. 1-6, Complete, Unbound, - Now sold for \$29.00.
 Vols. 1-6, and Subscription to Volume 7, - - \$33.00.

A. SMITH & SONS, 269 PEARL STREET, New York.

MANUFACTURERS AND IMPORTERS OF

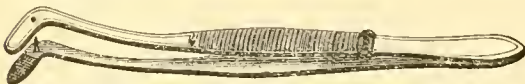
GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.



JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.
 78 Ashland Place,

BROOKLYN, N. Y.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 227.

MARCH, 1895.

CONTENTS:

NEW NORTH AMERICAN ODONATA.— <i>Albert P. Morse.</i>	207
DESCRIPTION OF SOME OF THE LARVAL STAGES OF AMPHION NESSUS.— <i>Caroline G. Soule.</i>	212
RHOPALOMERA XANTHOPS, SP. NOV.— <i>S. W. Williston.</i>	213
ENTOMOLOGICAL NOTES (A Permian caddis fly; Janet on structure of <i>Myrmica</i> ; Elwes on geographical distribution of butterflies; Bertkau's annual review of entomology; the chair of entomology at the Jardin des Plantes; losses through fire by entomologists; change of address).	213
PROCEEDINGS OF THE CAMBRIDGE ENTOMOLOGICAL CLUB (Officers for 1895; <i>Scapteriscus</i> in the U. S.; <i>Podisma</i> vs. <i>Pezotettix</i> ; derivation of pigments in <i>Lepidoptera</i> ; the ape's face in chrysalis of <i>Spalgis</i> ; northern captures of <i>Panchlora viridis</i> ; <i>Dana's archippus</i> at sea).	214

PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

70573

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5 00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH — STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " " "	1.25	1.00
Half " " " "	2.25	1.75
One " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, *Danaus archippus*. Boston, 1880, 16 p., 2 plates. 1.00

Hitchcock, Edward. Ichology of New England. Boston, 1858 1.50

Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate .50

Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875. 1.00

Scudder, S. H. The pine-moth of Nantucket, *Retinia frustrana*. col. pl. Boston, 1883. .25

Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889 1.00

Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894. 2.00

Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883. 2.00

U. S. Entomological Commission.—Fourth Report, Washington, 1885 2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

NEW NORTH AMERICAN ODONATA.

BY ALBERT P. MORSE, WELLESLEY, MASS.

Calvert, in his catalogue of the Odonata of Philadelphia, lists the following eight species of *Enallagma* from the northeastern States: *aspersum*, *civile*, *divagans*, *durum*, *exsulans*, *hageni*, *pollutum*, *signatum*. Other forms reported by various authors from this district are: *an-nexum*, *ebrium*, *traviatum*. To these Calvert (Ent. news, Oct. 1894) adds *doubledayi*; and in the following pages two more are added, making fourteen species of the genus to be found in New England. One of the latter (and two additional new species described here) is found in Nevada also. A note is added on the diagnostic differences of *aspersum* and *traviatum*. Descriptions are also presented of an *Ophiogomphus* from the eastern States, a *Tetragoneuria* from Massachusetts and a case of variation in venation in *Erythromma conditum*.

In consideration of the fact that the species of *Enallagma* approach each other so closely that sketches of anatomical details are almost imperatively demanded, the author intends to present in a subsequent paper diagnostic drawings of all the New England species and of as many other North American forms as it may be possible to obtain.

Being a firm believer in the desirability of assembling the types of closely allied species in order to facilitate comparative study, the writer proposes to ultimately present the types here described to the Hagen collection in the Museum of Comparative Zoology at Cambridge, Mass.

Enallagma minusculum, sp. nov.

Abd. 20 mm., hind wing, 14-15 mm. Cuneiform post-ocular spots small, more or less rounded. Posterior lobe of pronotum black, unspotted, margined with yellow; anterior lobe with pale transverse band. Thorax with the following black: a wide mid-dorsal stripe, widest in front; a wide humeral (wider than pale ante-humeral) stripe, widest below, expanded on and just behind its crossing of the humeral suture. Abdomen black as follows: dorsum of 1, divided by an apical spot of blue or purple; posterior half of 2, third of 3, two-fifths of 4, half of 5, three-fifths of 6, four-fifths of 7, and all of 10; 8 and 9 blue.

Superior appendages half as long as 10, in profile broader than long, equalling in depth (on expanded portion) one-half that of 10, very broadly bifid, the posterior margin shallowly excavate, the lower branch projecting a little beyond the upper, much expanded, laminate, directed downward and inward; the upper branch one-third as broad, directed slightly upward, and bent inward claw-like. Inferior appendages equal in length to the superior, broad at base, narrowed and tapering in the

middle portion, the upper margin of which runs directly backward, bent upward and slightly inward at the tip.

7 ♂, Sherborn, Mass., July 16. Collected by A. P. Morse.

Enallagma calverti, sp. nov.

Abd. 23-25 mm., hind wing 17-19.5 mm. Prothorax greenish black, the following pale (bluish): sides; a transverse line on anterior lobe; the hind margin and a cuneiform spot on each side of posterior lobe. Thorax with a rather narrow mid-dorsal stripe (sometimes divided by a mere line of blue, most distinct anteriorly) and a very narrow humeral stripe, wider in front, especially at the suture, and a spot on second lateral suture, black. A wide ante-humeral stripe, equal to or wider than the mid-dorsal black stripe, blue. Abdomen blue, the following black: a spot on base of 1; a transverse lunule (convex side forward, doubly concave behind) near apex and a narrow marginal band on 2; an apical spot connected with marginal band on 3 and 4; apical third of 5, two-thirds of 6, five-sixths of 7, and all of 10.

Superior appendages short, one-fourth to one-third as long as 10, blunt, with the apex directed downward and slightly notched in profile; the upper limb thick and rolled inward, the lower limb thin, rolled inward and upward, appearing like a small, rounded, inwardly projecting shelf on the lower edge of the apex of the appendage. In profile the upper apical angle is very obtusely rounded, the lower slightly notched. Inferior appendages longer, two-thirds as long as 10, rather slender, tapering, slightly curved upward, directed upward and backward, the lower margin convex throughout.

9 ♂, Franktown, Nev., June (coll. by S. W. Denton).

To this species I also refer 1 ♂, Wellesley, Mass., May 12; 1 ♂, prob-

ably from Wellesley, presented by S. F. Denton; and 1 ♂, eastern U. S., exact locality uncertain, the only difference apparent being that the inferior appendages in profile seem to be somewhat more slender and less strongly convex below.

I take pleasure in naming this species for Mr. P. P. Calvert, whose "Introduction" to this group of our fauna fills a long-felt want and will do much to promote the study of these interesting insects.

Enallagma carunculatum, sp. nov.

Abd., 22.5-27; hind wing, 17-20 mm. Prothorax with the anterior lobe transversely lineate with pale; posterior lobe with pale margins and cuneiform lateral spots; the latter are small, narrow, or even may be wanting. Thorax with the mid-carina black or lineate with pale; mid-dorsal dark stripe broad; humeral stripe of moderate width, variable, widest just behind suture; ante-humeral pale stripe moderate to narrow, varying from nearly twice as wide to only two-thirds as wide as the humeral dark stripe. Abdomen black as follows: a quadrate spot on base of 1; an apical orbicular spot broadly connected to posterior marginal band on 2; apical half to three-fifths of 3, 4, 5 with a longitudinal band, pointed anteriorly, widened before margin; two-thirds to three-fourths of 6; all of 7 except a narrow basal ring; all of 10, widest on basal and apical margins; 8 and 9 blue.

In profile the superior appendage, including the projecting tubercle, is half to two-thirds as long as 10, the inferior appendage shorter, equal to sup. app. without tubercle, stout, directed moderately upward, the upper margin concave, the lower strongly convex. Superior appendage as broad at base as the

inf. app., about as broad as long, the sides equal, nearly straight, the upper slightly convex, the lower slightly concave, the apical margin concave, bearing a large, yellow or brown tubercle, rounded apically, two-thirds as long as the appendage; the groove separating it from the end of the appendage is more distinct in the dorsal portion, appearing like a slight notch, recalling *E. civile*. Seen from above the superior appendages are somewhat divaricated, cylindrical, terminating apically in a rounded right-angle in the mid-line of the appendage; the tubercle projecting beyond, narrower, longer than broad, rounded apically; the inner margin of the appendage forms a minute tooth, very slightly recurved, at the obtuse inner apical angle. Seen from behind the dorsal and ventral edges of the superior appendage are seen to be rolled inward, the tubercle occupying this inner channel and (in dry specimens) slightly rolled, also, at its tip.

12 ♂ (1 headless, 1 teneral), Franktown, Nev., June. Collected by S. W. Denton.

Enallagma clausum, sp. nov.

Abdomen 25-28; hind wing, 19-21 mm. Prothorax with the anterior lobe transversely lineate with pale; posterior lobe greenish black, with pale margins and triangular or cuneiform lateral spots. Thorax with the mid-carina black or lineate with pale; mid dorsal dark stripe rather narrow; humeral stripe very narrow, widest and more or less broken at the suture. Pale ante-humeral stripe at least two-thirds as wide as mid-dorsal dark stripe. Abdomen black as follows: a quadrate spot on base of 1; a large apical orbicular spot, pointed anteriorly and broadly connected to narrow band on apical margin of 2; apical two-fifths to two-thirds of 3, 4, 5 with a longitudinal stripe narrowed submarginally (narrowest and pointed anteriorly on 3); apical two-thirds of 6, four-fifths of 7, and all of 10, on the latter

broadened marginally, especially on basal margin; 8 and 9 blue.

In profile the inferior appendage is the longer, two-thirds as long as 10, stout, directed nearly straight backward, the lower margin strongly convex, the upper strongly concave, the apex stout, upturned, about on a level with the upper part of the broadened base: the whole appendage very similar in shape to a cat's claw, but less acute at tip. Superior appendage two-thirds as long as inferior, directed downward, the lower margin slightly descending toward apex, the upper margin convex basally, slightly sinuate at apex, somewhat recalling that of *E. divagans* but less hollowed near apex and less convex toward base. In dorsal view the hind margin of 10 is deeply excised, with a deep depression in the middle between the dorsal border and the superior appendages. Superior appendages short, blunt, very broad, contiguous at base for nearly half their length, the line of separation often visible only with difficulty,—the contiguous portion with rugose inner margin terminating apically in a larger, slightly recurved tooth; beyond the tooth the appendage is suddenly narrowed on the inner margin for a third of its width, the re-entrant angle nearly square, the distal inner margins of the pair of appendages diverging moderately to the rounded apices; the outer margin is convex basally, nearly straight apically.

6 ♂, Franktown, Nev., June. Collected by S. W. Denton.

Ophiogomphus aspersus, sp. nov.

Abd., ♂, 30 mm.; ♀, 30-32. Hind wing, ♂, 24; ♀, 26-27. Hind fem., 7. Pter., 3-5, yellowish-brown, margined with black. Wings very slightly flavescent at base. Face yellowish-green. Vertex black, posteriorly brown and green. Occiput yellowish-green; back of head immediately behind eyes black above, on sides greenish-yellow, paler below. Occipital horns slender, brown. Thorax

yellowish-green, marked with brown as follows: a narrow mid-dorsal band, widest in the middle, narrowed at each end, in front barely wider than the mid-carina which may be partly pale, continuous behind with the brown of the ante-alary sinus; a very narrow humeral stripe, widest above, where it is partly divided by a pale streak on the suture; and an equally narrow ante-humeral stripe separated from the humeral by a green band of equal width which is continuous above with the green of the dorsum, thus separating the ante-humeral stripe from the sinus. Legs with the basal $\frac{3}{4}$ of femora green (sometimes fuscous above), otherwise black. Abdomen dark brown marked with yellow as follows: ♂, dorsum of 1 and 2; basal half to two-thirds of 3-8 with a triangular spot, produced apically; 9 with a quadrate or orbicular spot on basal third, with an apical tail; 10 with a lanceolate spot, its apex reaching the hind margin; ventral portions of sides of 8 and 9 and indications on the same portions of preceding segments. ♀ similar, more suffused. 10 one-half as long as 9 in both sexes. Vulvar lamina $\frac{2}{3}$ as long as 9, bifid for a little more than its apical half, the branches slightly divergent at first, then convergent, the tips contiguous, their apices rounded or with a minute tooth, the basal inner half of each branch somewhat thickened. Superior appendages of ♂ as long as 10 and $\frac{1}{2}$ of 9. Seen from above the basal half is $\frac{2}{3}$ as broad as long, the distal half smoothly tapering, with straight sides, acute, sharp; the inner margin of the basal half is deeply concave, the outer margin slightly so. Seen from the side the sup. app. is a little upturned at the tip, acute, almost acuminate; the dorsal margin strongly sinuate, being slightly concave at the basal fourth, strongly convex at the half, and distinctly concave on the distal third. Its lower margin is deeply excavate at the basal fourth, strongly convex and denticulated on the remaining portion; the distal $\frac{2}{3}$ of the outer ventral face of the

appendage is convex in both longitudinal and transverse section and thickly beset with black denticles; the narrowed basal part is a little stouter than the corresponding part of the inf. app. Inferior appendage $\frac{3}{4}$ as long as sup. app., the lower margin of the branch straight, slightly ascending, the upper margin concave on the basal $\frac{2}{3}$, straight and descending on the apical third, forming a tooth-like process at the two-thirds point and an acute apex.

2 ♂, 3 ♀, northeastern U. S. (probably Wellesley, Mass., but if not, then Ohio, Ind., or Ill.); one ♀ received from S. F. Denton, the remainder from S. W. Denton.

Tetragoneuria indistincta, sp. nov.

Very similar to *T. cynosura* Say, but somewhat larger and differing from it as follows: a black T spot on front above; pubescence of thorax deep brown, instead of somewhat hoary; wings slightly fumose and a little (2 mm.) longer, the basal part of median space and basal antecubital cell of each series fuscous; pterostigma slightly longer; abdomen longer (2 mm.), more slender, especially toward apex, ninth segment nearly as long as the width of its posterior margin, 10 also distinctly longer proportionally than in *cynosura*; superior appendages 2.7 mm. long, fusiform-cylindric, a little slenderer at base, their apices rounded (of *cynosura* 1.8 mm. long, and the apices sharply pointed).

Abdomen 29 mm.; hind wing, 31. 1 ♀. Winchendon, Mass., July 2.

This species has probably been confused with *T. cynosura* Say. In fact, much confusion has existed and perhaps still exists concerning the forms known as *cynosura*, *semiaquea*, and others closely allied to them. I regret to say that even the specimens in the Hagen collection arranged under these names are sadly mixed, the same

species occurring under two or three names, and two or three species occurring under one name. The species referred to here as *cynosura* is the one abundant in Massachusetts in June, and presents two forms, as follows: (1) that known as *cynosura*, having the fuscous marking of the hind wings restricted to the immediate base (♀), or basal and anal parts (♂) of wings; and (2) what has been called *semiaquea*, having the fuscous extending from the anal angle nearly to the nodus, with a slight nodal spot which is sometimes connected to the base; specimens with markings intermediate in character are not uncommon, varying from a mere fuscous bordering of the venules of the anal area up to the form described here. These two forms are doubtless one species, no structural differences being perceptible.

There is another species found in the southern States, having the fuscous of a more reddish hue, and even wider in extent, which presents differences in the abdominal appendages. This is perhaps the true *semiaquea*.

Erythromma conditum Hag.

A series of 3 ♂, 2 ♀, specimens of this species collected by Mr. S. W. Denton, probably at Wellesley, Mass., presents an interesting case of variation in venation. It is the more worthy of attention for the reason that the variation affects a character upon which analytical keys are often based.

In one female the lower sector of the triangle arises distinctly *before* the basal post-costal nervule, in the fore wings about twice as far as in the hind wings; in the other female it arises *at* the postcostal nervule on all wings. In two males the sector arises

just before it on the front wings and at it on the hind wings; in the other male at or almost imperceptibly before on one hind wing, very slightly before on the other, and distinctly before on the front wings.

Enallagma traviatum Selys vs. *E. aspersum* Hag.

Banks (Can. Ent., Mar. 1894) considers *traviatum* as "hardly more than a variety of *aspersum*." From this opinion I must dissent, regarding it entitled to full specific rank, a number of males collected last summer showing marked differences when compared with *aspersum*. These differences, in addition to the characters indicated in the original description of *traviatum* (Syn. d. Agr.), are as follows: 1st, side view, *traviatum*: Superior abdominal appendage with the upper branch slender, nearly equal throughout, slightly decurved, the apex equally rounded, not especially decurved. Inferior appendage projecting one-third its length beyond the lower branch of the sup. app., the upper margin nearly straight, the lower margin deeply excavated, the excavation dividing the app. into a broad base and a slender tip, the base being about four times as broad and one-half as long as the tip, which is slender, equal, straight, and directed nearly straight backward. Side view, *aspersum*: Sup. app. with upper branch rather stout, its apex noticeably decurved. Inf. app. projecting about as far as the lower branch of the sup. app., its upper margin concave, lower margin strongly convex. 2nd, top view, *traviatum*: Sup. app. as long as 10; its upper branch slender, one-fourth to one-third as wide at base as long, cylindrical, nearly straight, the equally rounded tip very slightly incurved. Top view, *aspersum*: Sup. app. shorter than the side of 10; the upper branch rather broad, its width at base nearly or quite one-half its length, tapering, the tip slightly expanded inwardly, forming an inner apical tooth; inner apical margin truncate, oblique; outer apical angle rounded.

DESCRIPTION OF SOME OF THE LARVAL STAGES OF *AMPHION NESSUS*.

BY CAROLINE G. SOULE, BROOKLINE, MASS.

This description is taken from two larvae found feeding on *Ampelopsis Veitchii*, in Brookline, on June 20th, 1894.

Length of larva one-half inch. Head rather flat, and held with the mouth parts far forward instead of downward, giving a great slant to the head. It was green with a faint yellow line on each side, and a deep median suture. Body green, smooth, with sparse hairs hardly to be seen without a glass. It had a darker green dorsal line, and on each side a yellow subdorsal line extending from the head to the base of the caudal horn. Pale obliques were faintly indicated. Feet and props green. Caudal horn long, slender, pink, paler beneath.

June 25th.—Moulted. Three-fourths inch in length. The head was slightly bilobed, and all the marks were more distinct except the obliques. Feet and props green. Caudal horn shorter, stouter, dark at tip, and slightly rough.

June 29th.—Moulted. Length one and one-eighth inches. Head very round, bilobed, granulated on the sides; suture greener and deeper; face-lines opaque yellow white, the space between them being without granulations. Body green with yellow white granulations, and a dark green dorsal line. The subdorsal lines were yellow white edged above with dark green, and were not lines of granules. On the thoracic segments were faint indications of lateral and stigmatal yellowish lines. The granules on the body were arranged in transverse lines. The obliques were clearer, yellowish with dark green above, the last pair extending up the sides of the caudal horn. There were still a few hairs near the mouth, on the feet, and near the subventral line of the thoracic segments. The feet and anal props were green. The

abdominal props were green with a pink band near the tip. Anal shield edged with yellow white. Caudal horn short, stout, rough,—almost triangular in shape,—red above, pink beneath, with a deeper red line from the dark dorsal line to the tip of the horn. The third and fourth segments were a trifle larger than the others.

July 2nd.—Moulted. One and one-half inches long. General effect pale brown granulated with yellow, each granule having a black dot in the centre. Head bilobed, dark brown between the face lines and there granulated with black and a few yellow granules. Outside the face lines the granules were all yellow. Body pale brown with numerous black spots and yellow granules. Dorsal, subdorsal, lateral, and stigmatal lines on the thoracic segments. On the abdominal segments the dorsal line was represented by a black patch at the juncture of every two segments. The obliques were very dark, almost black, each ending, at the upper end, in a spot not quite round. There were nine obliques, beginning on the third segment; the eighth extending up the caudal horn, and the ninth crossing the spiracle under the caudal horn. Caudal horn short, stout, black, rough, very small. Spiracles black with a slight yellow encircling line, and a tiny yellow dot at each end. Anal shield darker brown than the body, and with the dorsal line extending to its tip, and the sublateral lines indicated. Edge yellowish. Feet and props brown. Anal props darker brown. The third and fourth segments were very slightly enlarged, suggesting *A. Myron*, while the larvae, in this stage, twitched and jerked from side to side when disturbed, as violently as *T. Abbotii*.

July 10th.—The larvae measured three

inches in length. The granules had disappeared, leaving only minute spots of brown paler than the body. The third and fourth segments were still so little enlarged as to be noticed only by an entomologist. All the other marks were as before.

July 12th.—The larvae grew to look dusty on the back, and stopped eating.

July 15th.—Pupated. Pupa one and one-half inches long, neither stout nor slender; very dark brown, and coffee-colored between the abdominal segments. Segments honey-combed; wing covers slightly rough; eye covers well defined. There was a slight pointed tubercle at the base of each antenna, close to the eye. Anal hook long, slender, with a bifid tip.

The second larva differed from this description in having much clearer and darker markings, and in being a trifle smaller. In the last moult it was at first bright green with dark green markings, but became brown twenty-four hours later. This one also spun a few threads fastening a leaf to the tin, while the first one did not spin at all. The pupa was a trifle smaller than the first one, and on January 14th, 1895, at 2 P. M., gave a fine ♂ *Amphion nessus*.

RHOPALOMERA XANTHOPS, SP. NOV.

BY S. W. WILLISTON, LAWRENCE, KANS.

♂, ♀. Face wholly light yellow, with a small rounded tubercle near the middle. Palpi yellow, blackish at the proximal extremity. Antennae reddish yellow, the first two joints largely, and the third on the upper border, blackish. Front yellow, black or blackish on the anterior margin; no lateral frontal bristles; a pair of minute proclinate ocellar bristles present. Mesonotum reddish brown; when seen from in front with two distinct stripes reaching from the anterior border to about midway on the scutellum; a less distinct, median stripe, a narrow stripe on either side behind the

suture, and the lateral margins in front, all opaque light yellow. Pleurae pitchy brown, mostly shining; a single mesopleural bristle present. Scutellum gently sulcate above, the distal half shining mahogany-colored. Abdomen black or deep reddish black; second, third, fourth and fifth segments each with the sides silvery white; between these spots there are two rows of similarly colored spots, becoming successively smaller, those of the second segment more or less coalescent with the lateral ones. Hypopygium black or pitchy black, shining. Legs pitchy black, the upper part of the femora more reddish; the immediate base of all the tibiae and the first two joints of all the tarsi light yellow; hind tibiae dilated and ciliated, the row of bristles not very strong and not implanted on tubercles. Wings strongly tinged with brown, which is more intense distally in front and about the cross-veins. Length 10–11 mm.

Ten specimens, Yucatan, G. F. Gaumer, Coll. Univ. of Kans. It is possible that this species may be identical with the insufficiently described *R. flaviceps* of Macquart, from New Grenada, but not probable, as there are positive discrepancies in the description of the head, thorax and abdomen. In several specimens the face is for the greater part blackish, probably the result of desiccation.

ENTOMOLOGICAL NOTES.

In a paper read to the K. böhm. gesellschaft der wissenschaften on November 23d last, Dr. Anton Fritsch, of Prag, announced the discovery in the Permian beds of Bohemia of the larval cases of a caddis-fly. This is the first indication of the existence of insects with a complete metamorphosis in paleozoic times, unless the doubtful fragments found by Dathe in Silesian culm are to be regarded as shards of beetles, or the passages found in certain carboniferous woods are to be credited

to coleopterous larvae. It is to be hoped that Dr. Fritsch will amply illustrate these remains in his great work now in progress on the Fauna der gaskohle Böhmens.

It is well to draw attention to two admirable brief illustrated papers published last year by Ch. Janet on *Myrmica rubra*, one on the morphology of the skeleton and especially of the postthoracic segment (Mém. soc. acad. de l'Oise, xv), the other on the anatomy of the petiole (Mém. soc. zool. France, 1894). We regret we have not space for a full analysis of each, but they will be found of great interest to morphologists and hymenopterists. The clear illustrations are pretty sure to find their way into text books.

The annual presidential address before the Entomological society of London by Capt. H. J. Elwes is on the geographical distribution of butterflies and deals largely with those of North America.

Dr. Ph. Bertkau announces that his health obliges him to give up the admirable annual review of entomology which has appeared in the Archiv für naturgeschichte since 1838 under different editors — Erichson, Schaum, Gerstaecker, Brauer and Bertkau. Entomologists are under great obligations to Dr. Bertkau for the excellence of his summaries, their completeness and the promptness with which they have appeared. A still prompter method of rapid publication in all branches of biology is now being planned which is at the same time a practical combination of all the current reviews — a consummation devoutly to be wished and helped forward.

M. Emile Blanchard was retired November last from the chair of entomology at the Jardin des Plantes, on account of age; his first entomological paper was published nearly seventy years ago; his successor has not yet been announced.

Fire has committed ravages with our entomologists this winter. Mr. J. G. Jack lost his library and collection in Jamaica Plain by the destruction of the building in which they were kept; Prof. C. H. Tyler Townsend lost his valuable dipterological library

(nearly complete for America and very full for Europe) by the burning of the warehouse at Las Cruces, N. Mex., while he was absent for a few weeks at Washington; and now comes news that Rev. C. J. S. Bethune's school at Port Hope, Ont., has been burnt to the ground; his loss is estimated at eighty thousand dollars.

Prof. C. H. T. Townsend's address is changed to Brownsville, Texas, where he is working for the entomological division of the U. S. Department of Agriculture. His correspondents should send him new sets of their publications.

PROCEEDINGS OF THE CLUB.

11 January, 1895. The 185th regular and 18th annual meeting (since incorporation) was held at 156 Brattle St. Mr. S. H. Scudder in the chair.

The annual reports of the officers were read and accepted.

In accordance with the recommendation of the executive committee it was voted that the treasurer be authorized to sell all the non-entomological and duplicate books now in the library, and such as may hereafter be acquired and apply the proceeds to the payment of the deficit on vol. 5 of Psyche until the same shall have been paid.

The following officers for 1895 were elected: President, C. M. Weed of Durham, N. H.; secretary, R. Hayward; treasurer, S. Henshaw; librarian, S. H. Scudder; members at large of the executive committee, A. P. Morse and S. H. Scudder.

Mr. S. H. Scudder exhibited specimens of the cat-flea taken in Cambridge and two species of Scapteriscus taken in southern Florida by Mrs. A. T. Slosson and the late Mr. Morrison. It is the first time this genus of mole crickets has been recognized within the limits of the United States; the species appeared to be closely allied to, but apparently distinct from *S. mexicanum* (Burm.) and *S. abbreviatus* Scudd., the latter a Brazilian species.

Mr. Scudder also made some remarks upon the orthopteran genus *Podisma* Latr., going to show that it should supplant *Pezotettix* as now used, and that *Pezotettix* should take the place of *Platyphyma*.

Mr. A. G. Mayer remarked that he had treated the dark greenish fluid of the alimentary tract of the pupae of *Telega polyphemus* with nitric acid which had reacted upon it, changing its color to dull red, about the same shade as the ground color of the wings of *Danais archippus*; when treated with a strong alkali, such as caustic potash, its color changed to dark brown. His enquiry if it was known whether any of the pigments were derived from this fluid led to some discussion.

Mr. Scudder recalled to the club the enlarged figure of the chrysalis of a species of *Spalgis* from Africa published by Dr. Holland in the last volume of *Psyche*, which bore a striking resemblance to an ape's face; and in connection therewith he exhibited a plate of an Indian species of the same genus since figured by Aitken in the *Journal of the Bombay Natural History Society* in which

the resemblance was even more remarkable. This *Spalgis* was also aphidivorous in the larval stage.

Mr. A. P. Morse showed a specimen of *Panchlora viridis* taken at Wellesley, Mass., on Dec. 12, 1894, and also specimens of a species of *Scirtes* which he had taken abundantly on grape vines at Sherborn, Mass., in July last.

Mr. Scudder stated that he had received this cockroach many years ago from the late Dr. S. Kneeland, taken flying in a Boston store on Dec. 26, 1878; he had also recorded its capture with the young in the bath room of a house on Lafayette Sq., Salem, Mass., Aug. 1, 1890, through Prof. E. S. Morse; and as indicating how it reached such northern localities it is worth recording that it was taken in March, 1891, by Prof. Roland Thaxter on the steamship *Adirondack* while on her passage from Jamaica to New York.

Mr. Mayer said that a single specimen of *Danais archippus* came on shipboard about Sept. 20, 1894, while he was cruising on the banks near Sable Island.

Just Published, by Henry Holt & Co., New York.

Scudder's Brief Guide to the Commoner Butterflies.

By SAMUEL H. SCUDDER. xi + 206 pp. 12mo. \$1.25.

An introduction, for the young student, to the names and something of the relationship and lives of our commoner butterflies. The author has selected for treatment the butterflies, less than one hundred in number, which would be almost surely met with by an industrious collector in a course of a year's or two year's work in our Northern States east of the Great Plains, and in Canada. While all the apparatus necessary to identify these butterflies, in their earlier as well as perfect stage, is supplied, it is far from the author's purpose to treat them as if they were so many mere postage-stamps to be classified and arranged in a cabinet. He has accordingly added to the descriptions of the different species, their most obvious stages, some of the curious facts concerning their periodicity and their habits of life.

Scudder's The Life of a Butterfly. A Chapter in Natural History for the General Reader.

By SAMUEL H. SCUDDER. 186 pp. 16mo. \$1.00.

In this book the author has tried to present in untechnical language the story of the life of one of our most conspicuous American butterflies. At the same time, by introducing into the account of its anatomy, development, distribution, enemies, and seasonal changes some comparisons with the more or less dissimilar structure and life of other butterflies, and particularly of our native forms, he has endeavored to give, in some fashion and in brief space, a general account of the lives of the whole tribe. By using a single butterfly as a special text, one may discourse at pleasure of many; and in the limited field which our native butterflies cover, this method has a certain advantage from its simplicity and directness.

THE SEVENTH VOLUME OF PSYCHE

Began in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

Vols. 1-6, Complete, Unbound, - Now sold for \$29.00.
 Vols. 1-6, and Subscription to Volume 7, - - \$33.00.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

Vol. 1. Introduction; Nymphalidae.

Vol. 2. Remaining Families of Butterflies.

Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo, half levant, \$75.00 net.

HOUGHTON, MIFFLIN & CO.,

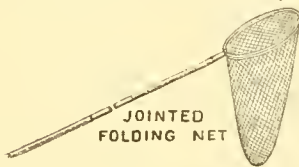
4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.



JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 228.

APRIL, 1895.

CONTENTS:

A COMPARISON OF COLIAS HECLA WITH COLIAS MEADII AND COLIAS ELIS.— <i>Thomas E. Bean.</i>	219
WESTERN PEDICIAE, BITTACOMORPHAE AND TRICHOCERAE.— <i>C. R. Osten Sacken.</i>	229
FAILURE TO EMERGE OF ACTIAS LUNA.— <i>Caroline G. Soule.</i>	231
ENTOMOLOGICAL NOTES (A promised work on N. A. Diptera; Lemnicki on pleis- tocene insects of Galicia).	231

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

5.70513

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by
R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danaus archippus</i> . Boston, 1880, 16 p., 2 plates.	1.00
Hitchcock, Edward. Technology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> . col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

A COMPARISON OF COLIAS HECLA WITH C. MEADII AND C. ELIS.

BY THOMAS E. BEAN, LAGGAN, ALBERTA PROVINCE, CANADA.

[Annual address of the retiring president of the Cambridge Entomological Club, 8 March, 1895.]

THE MALES.

As the males of *Meadii* and *Elis* are but narrowly separate, I have made a series of measurements from which to derive numerical averages in the two species, as to total expanse of the front pair of wings, as to breadth of dark border of primary at middle of outer margin, and particularly as to the proportion between this breadth of dark border and the expanse of the corresponding wing. These tests were also applied to *Hecla*, although there scarcely of equal significance on account of the small number of examples at my command. Mr. David Bruce very kindly sent me a large series of *Meadii* for examination, so that I have been enabled to compare 42 ♂, 23 ♀ *Meadii* with 7 ♂, 5 ♀ *Hecla* and 56 ♂, 75 ♀ *Elis*. The males were individually measured, and the data reduced to general averages, with following results.

Average total expanse (sum of the length of the two primaries plus breadth of body): *Meadii*, nearly 47 mm.; *Hecla*, nearly 45 mm.; *Elis*, nearly 50 mm.

Average breadth of dark border of primary, at middle of outer margin: *Meadii*, $4\frac{1}{4}$ mm.; *Hecla*, $2\frac{5}{7}$ mm.; *Elis*, $3\frac{2}{7}$ mm.

Proportion between average breadth of dark border of primary and average length of primary (measured from apex to center of base of wing): in *Meadii* the breadth of dark border proved to be slightly over $19\frac{1}{3}$ per cent of length of primary, in *Hecla* 13 per cent, in *Elis* slightly over 14 per cent.

These are significant averages. The individual measurements from which they were obtained show that in regard to expanse of wing, as in other respects, *Meadii* is in considerable degree less subject to variation than *Elis*. *Meadii*, in its extreme terms of expanse, only varies to 4 mm. below its average figure and to 3 mm. above its average. *Elis* ranges to 10 mm. below and to 6 mm. above its own average term. The extremes in *Meadii* are only 7 mm. apart, but in *Hecla* they are 10 mm. apart, and *Elis* has a range of 16 mm. of variation in this dimension, or 11 mm. if one extremely abnormal example be omitted from the comparison. The uniformity of expanse in

Meadii is remarkable. Omitting two examples, the largest (50 mm.) and the smallest (43 mm.), the remaining forty show a variation in expanse of only 4 mm., from 45 to 49 mm. In *Elis*, leaving out the lowest term (one specimen of 40 mm.) and the highest term (two of 56 mm.), the pendulum of variation still swings between 45 and 54 mm., a range more than double that of *Meadii*. *Hecla*, also, is evidently far more variable in expanse than *Meadii*, as shown even by this small series.

A comparison of the shape of dark border of fore-wing furnishes a valid distinction, parting *Hecla* from *Elis* and even more emphatically from *Meadii*, while it separates less decisively *Elis* from *Meadii*. In a very large majority of the *Meadii*, the dark border of fore-wing extends a considerable projection toward base of wing, both at internal angle and at apex. Owing to this salient projection the fore-wing is rendered extremely broad on costa. The curvature of inner edge of border, however, is so great that the costal excess of breadth is rapidly parted with in the backward course of the border. From a point of fore-wing nearly opposite the cell-spot, to a point a little back of posterior median nervule, the dark border of *Meadii* ♂ in a large majority of the specimens examined maintains closely an equal breadth. This is plainly the case in 39 of the 42. In the other 3 the border narrows very slightly from the front to the back of this median part; in one of

them on both fore wings, in the other two on right wing only. The rule then in *Meadii*, and a rule of almost universal application, is that the dark border of fore-wing is disproportionately broad on costa, loses this excess of breadth anterior to a point nearly opposite the discal spot, and throughout the median portion of the wing maintains closely an equal breadth. In a considerable proportion of individuals the border abruptly narrows more or less a little anterior to the submedian nerve, the disk color encroaching upon the marginal border in a broad irregular sinus whose deepest extension usually occurs at the submedian nerve.

The seven males of *Hecla* present a radically differing pattern of fore-wing border from that displayed by *Meadii*. The excess of breadth at costa, instead of being quickly dissipated in the backward progress of the border (as in *Meadii*), is parted with very gradually and evenly, so that *Hecla's* dark border becomes progressively narrower from costa to internal angle. This general method is plain in all the seven, though in two of them a part of the median extent of the border shows but a slight narrowing within itself. In all the seven a gradual reduction of breadth from costa to internal angle is a systematic detail, and it would effectively part them from all these *Meadii* males were there no other distinction. The differing shape of the fore-wing dark border is a far more decisive distinction between the two species than is the difference merely in breadth of border.

Hecla in these specimens differs from *Meadii* by exhibiting less tendency to extension of the dark border inward at costa and at internal angle: in *Meadii*, the color-pattern is salient and aggressive; in *Hecla*, stationary or retrograde.

The color on veins crossing dark border of primary seems to be a fluctuating and indecisive character. A tendency to show yellow scales on the veins of anterior part of border is somewhat prevalent in *Meadii*, while in *Hecla* more commonly than in *Meadii* the posterior part of wing also exhibits yellow veining on the border. The present material indicates that when the yellow veining occurs in *Hecla* it will generally be somewhat uniformly presented throughout the border, but in *Meadii* usually predominant toward apex.

The male of *Elis* approaches that of *Meadii* so closely that individuals of the former can be found which scarcely seem to differ tangibly from the latter: by a vague contrast in general appearance they part from *Meadii* and identify themselves with *Elis*. This somewhat elusive difference between closely similar individuals of contiguous species is difficult of analysis. Adjoining species are most readily discriminated as unities, by the opposition or unlikeness of the entire systems or combinations of pattern, containing in part closely similar or identical elements, and in part alien elements. A large series of each tends to manifest the entire amount of alienation separating each species from its nearest allies. Single

individuals are at best imperfectly representative; being themselves specialized fragments, they merely represent what the species would be if similarly specialized throughout. In estimating the relation between adjacent species adequate series should be examined. Safe conclusions cannot be drawn from comparison of isolated examples until the representative value of those examples has been ascertained. Individuals are typical or divergent: in the latter case, if divergent in the direction of the proximate species they express in relation to that species less than a typical amount of alienation; if divergent in a direction leading away from the proximate species, they exhibit relatively to it a degree of alienation (biological estrangement) which is greater than the typical contrast. From this it follows that individuals which have a more than typical degree of divergence from each other, representing adjacent species, will over-contrast those species, and on the other hand, unusually approximate examples in contiguous species will under-contrast the two species. In species so near of kin as *Elis* and *Meadii*, the most closely resemblant examples are exactly those which are least representative of the characters peculiar to their respective species, and most highly representative of characters common to the several closely allied species. *Elis* being greatly more variable than *Meadii*, the closest approximation between them is on the part of exceptional males of *Elis*. It may be said that *Meadii* as

a species is very close to certain exceptional males of *Elis*, and conversely that some *Elis* males are very near to the species *Meadii*. The approximation is on the part of occasional conservatively divergent *Elis* males. These divergent individuals of *Elis*, when isolated from their fellows and brought into comparison with *Meadii*, seem closer to the latter than they really are: the cause of this is, that the resemblance to *Meadii* is made conspicuous on account of the attention being attracted to it by the presence of examples of *Meadii*, the greater resemblance to the species *Elis* being overlooked by lack of a proper representation of *Elis* for comparison.

THE FEMALES.

In these three species the females compare very differently from the males. *Elis* and *Meadii*, which sometimes approach closely in the male, manifest in the female only a moderate general affinity, offset by a striking antagonism of pattern rarely found between such close allies in this genus. *Hecla* and *Meadii*, however, whose males differ widely, are parted in the female sex chiefly by fluctuating averages, so that their contrast in that sex is comparatively vague and informal, and in occasional individuals is found resemblance to the allied species in a degree which has sometimes proved confusing.

In the border of primary in *Meadii* the yellow spots are ordinarily irregular

in the extreme in size and outline; and they are sometimes hazy or nebulous, and extremely pallid, — two such examples are in this series. The variance between individuals as to degree of development of the yellow spots is great. There is a decided tendency to total eclipse of the spots, a tendency so influential that in seven specimens of this small lot the border is almost entirely solid black. This species exhibits great eccentricity in the presentation of the maculae, which are frequently of irregular shapes, often indeed peculiarly erratic in outline. It is the far rarer instances, with tolerably neat and comparatively even-sized spots, which closely resemble some *Hecla*; but such *Meadii* are not at all representative examples. The eccentricity of maculation spoken of is foreign to the method of *Elis*, and it is a peculiarity of which my small series of *Hecla* contains no suggestion. In the maculation of *Hecla*, as compared with that of *Meadii*, the spots are more equal in the same individual, and more uniform, taking one example with another.

In both *Meadii* and *Hecla* the yellow spots on dark border of primary are unequally developed, the mid-wing spot being often obsolete, and almost invariably at least feeble in development. This is the established method in both species.

Elis is remarkable for its symmetry of pattern, the maculation being in general conspicuously harmonic in the individual, and the middle spot having

approximate equality with the others. Examples of *Elis* in which the border spots of primary are not pretty uniform in size and shape, and those in which the mid-wing spot is not at least moderately well developed, are exceptional. The most informal in this series of *Elis* have the spots more neatly regular than in the most formal *Meadii* in the lot. Those *Meadii* with the spots largest are not nearer to *Elis* on that account, but rather show stronger contrast, as the diverse system of maculation in the two species is thereby rendered more obvious.

An occasional *Meadii*, having the spots on primary border more symmetrical than is usual, closely resembles some *Hecla*, so that in a large series of both a small percentage of the *Meadii* might prove difficult to part from a few of the *Hecla* by this test solely. In a large majority of cases, however, the two females differ widely in character of dark border of hind-wing; 18 out of 23 of these *Meadii* have a practically solid black hind-wing border, and 3 of these 5 *Hecla* have a most distinctly maculated border with the yellow spots large and conspicuous. *Meadii* with hind-wing border partly maculated, and *Hecla* with maculation of hind-wing border partly obscured, might not readily separate on this character alone. It follows then, that among the small number not distinguishable by characters of fore-wing border, one individual in many may also fall in the small proportion with hind-wing border of ambiguous char-

acter: that is to say, a percentage of a percentage occurs wherein the maculation of dark border of both primary and secondary is liable to prove too approximate or too obscure to rely upon in determining the position of the individual. Even these rare instances of close approximation should not defeat a student familiar with the two species. Other specialties of pattern are in some degree indicative, and it rarely indeed occurs that all significant distinctions lapse in a single individual. There remains also that indefinite but obvious fact known as "the general appearance," which furnishes an experienced observer with the most reliable and satisfactory guide in distinguishing one species from another.

In a general view of the three species, the most obvious fact is that *Hecla* male is distinct from the respective males of *Meadii* and *Elis*. Also, properly representative material makes conspicuously evident the divergence of the female of *Elis* from the females of *Hecla* and *Meadii*. The close approximation occurs between *Hecla* and *Meadii* in the female, between *Elis* and *Meadii* in the male. This complex of relationship is perhaps partly capable of explanation. *Hecla* may safely be considered the oldest of the three species, and *Elis* the youngest. In *Colias* the law of the agency of sex in race progress appears to be that the male is the conservative and the female the progressive sex. Accordingly, in the alliance under consideration, *Hecla* being the oldest

species, its male should be the most conservative element in the alliance; and *Elis* being the youngest species, its female should prove to be the most progressive element. *Hecla* male and *Elis* female occupy outposts as to race progress, and are thus of necessity more completely differentiated than the other elements of the alliance.

The comparison so far is from notes made several years ago. Having lately re-examined all descriptions and figures of *Hecla* available to me here in the wilderness, I am inclined to think my analysis of the figure-pattern accurate. In order to amplify my knowledge of *Hecla*, I applied to Dr. Strecker for details in regard to the *Hecla* males in his collection, making very specific enquiry as to shape of dark border of primary. In response three pen sketches were sent me, representing the range of variation observed in the Lapland and Greenland examples. These drawings show a method of border corresponding to that found in my own series and described in the present analysis. Another sketch represented the border of primary of *Meadii*, delineating precisely the style of dark border I have described as practically the constant fashion in that species.

In print, as also in correspondence, Mr. W. H. Edwards refers to the general ground color of some *Meadii* as indistinguishable from that of *Hecla*, or of some *Hecla*. and hales this resemblance into court as a witness to prove *Meadii* and *Hecla* one species. *Hecla*

was already well known when Mr. Edwards named *Meadii*, and if there is now no valid distinction between *Meadii* and *Hecla* there was none then, and in that case *Meadii* should not have been described. In Butterflies N. A., 1st series, Mr. Edwards closes thus his *Meadii* text: "This *Colias* bears close resemblance to *Hecla*, but may be readily distinguished by the glandular spot before spoken of (see Plate), a character not found in *Hecla*, and so decisive that it is not necessary to point out minor points of difference." At this late day Mr. Edwards seems to find but one item of difference between the two species, — the "glandular spot" — and it is as evident an embarrassment to him at present as it was convenient formerly. Probably it is not unfair to say that *Meadii* when named was concluded distinct from *Hecla* simply on account of two circumstances: one being the presence of the "glandular spot," the other the fact that the original catch of *Meadii* consisted of specimens colored a redder orange than *Hecla* ordinarily displays. Mr. Edwards is open to criticism in both his earlier and later attitudes in regard to *Meadii*. Considering *Meadii* distinct from *Hecla* because the original material of *Meadii* was of a redder orange than that customary in *Hecla* was the initial error. The acceptance of this color fact as a proof of distinctness was incorrect in two ways: first, because dependent on the violent assumption that all other *Meadii* would prove of as red an orange

as those first under view, — an assumption contrary to analogy; second, as involving the assumption that a degree of redness is a definitive character. Color difference, particularly a mere difference in degree of the same color, though a valuable descriptive character, is in *Colias* far from definitive or demonstrative. It is a character which itself requires examination before it can serve as an interpreter. Used blindly it may divide one species as readily as it separates two. After discovery of the fact that two species present, as to ground color, a difference which although not universal is general and consistent, this color difference becomes a valid descriptive character in contrasting the two as species, but it cannot be used definitively. Nor is it necessarily effective in assorting individuals. Individuals usually do not represent the species as to every detail of the species' character. It is indeed probably true that an individual need not represent in obvious degree any element or quality peculiar to the species. Its participation in the species' character may be limited to biological identity. But as previously suggested, for all the significant characters to lapse in one individual must be an extremely rare incident. Latterly, Mr. Edwards has lost confidence in *Meadii*. Having in the first instance adopted it as a good species partly on the merits of a considerable catch of well-behaved examples conspicuously redder than *Hecla*, he lately inclines to consider *Meadii* identical with *Hecla*

because some few admittedly exceptional examples have been found which are *not* of a redder orange than that *Hecla* wears in its northern summer resorts. The later opinion rests upon an assumption as untenable as that involved in the earlier view. If *Meadii* and *Hecla* could be shown to be absolutely lacking in color-difference as species, — that is to say, if in like conditions like color effects invariably resulted, — it would not prove the two identical, but would merely show the stated color effect to be without value as a means of distinguishing the two species. As an undeniable matter of fact, the ground color in the species *Meadii* is not the same as in the species *Hecla*, but the difference occurs as a general chromatic average, applying to *Meadii* as a species, under usual conditions, and not necessarily effective in individuals subjected to exceptional environments. If all *Meadii* were *Hecla*-colored, or if all *Heclas* were of the degree of redness customary in *Meadii*, the loss of the chromatic contrast would render the two species less readily distinguishable. But the permanent elements of figure-pattern, which have resulted from the long continued biological estrangement of the two species, and which are reliable evidences of the species' diversity, are efficient not only to define but also to distinguish the two species. The scientific comparison between *Meadii* and *Hecla* as to color does not consist in bringing two or three exceptionally pale *Meadii* into direct contrast with a

lot of *Heclas*; and it is not a legitimate conclusion that because one or two *Meadii* in a hundred are of about the same shade of orange usual in *Hecla*, therefore *Meadii* and *Hecla* constitute one species. Comparing *Meadii* as a species with *Hecla* as a species we find, as might be expected, the color difference not a definite character. But we also find that the two species show very different averages as to color, and that it is descriptively accurate to call *Meadii* a red-orange species, and *Hecla* a pale-orange species. That one is in general a red species, and the other a paler species, is no proof that they are distinct. Equally, the fact that some *Meadii* are not so red as others does not prove that all *Meadii* are *Hecla*, nor even that some *Meadii* are *Hecla*.

In *Meadii* male the basal patch of erected and densely crowded scales near costa above secondary wing, — the "gland," the "mealy spot," etc. — is well developed. It is moderately variable in shape and size. In color it varies from pallid yellow (nearly white) to orange, and is often partially tinged with red. *Hecla* lacks this peculiar cluster of metamorphosed scales, and its absence proves a difficult fact alike to those who incline to consider *Elis* nearer to *Hecla* than to *Meadii*, and to those who do not perceive any other distinction between *Hecla* and *Meadii*. *Elis* presents this structure about as in *Meadii*, as to form, size, and color. One *Elis* male partly approaching *Christina* in general markings has the scale-patch especially feeble, not nearly

of the usual size and definiteness: this specimen is decidedly abnormal in appearance, and it is almost the only *Colias* example I have seen with characters suggestive of hybrid origin. From correspondents I learn that of late diligent search has been made for specimens of *Hecla* male endowed with the cluster of modified scales. This is expecting too much of *Hecla*. Being the older form, and having long lived under the present restrictive conditions, it is not likely to develop progressive variations. More plausible would be a search for occasional retrogressive variations in *Meadii* or *Elis* affecting this structure. Premising the descent of *Meadii* from the earlier stock resembling *Hecla*, we may infer that the initial development of this peculiar scale structure occurred as an early incident in the differentiation of the new species. Should an occasional *Meadii* or *Elis* occur lacking this structure such finds would be of great interest as indicating the present degree of mobility of the species' character. But occurrences like those would not be of the slightest force as proving *Hecla* and *Meadii* identical. Quite the reverse, for the extreme infrequency of the exceptions would emphasize the relative universality of the normal tendency. No examples of *Elis* or *Meadii* males lacking this structure have as yet been detected. *Meadii*, being exceedingly stable in its averages, is probably no longer subject to so decisive a reversion. Should a reversionary *Meadii* be found with this

character lacking, we may most reasonably interpret the incident on its merits, and not in the manner of the people who seek after a sign. The occurrence will simply be an extremely unusual fact, contrasting with an almost universal occurrence of the directly contrary fact.

Colias has few species for so dominant a genus, a wide range of variation being retained within the limits of a species. Consequently, species which are closely allied contrast very unequally in dissimilar comparisons, a great or a small contrast resulting according as typical or approximate specimens are compared. Hence it is, the species differ somewhat vaguely, so that superficial students are easily convinced that we have far too many species of *Colias*. The general unity of pattern-method throughout the genus, combined with the wide species-content as to variation, causes a profuse diversity within the species, accompanied sometimes by an almost bewildering resemblance between one species and another. Even species not adjoining may show an approximation sufficient to render difficult an estimate of their degree of alliance. In the case under consideration this applies. It appears to me somewhat probable that the approximation between *Hecla* and *Meadii* may be merely an extreme instance of what for want of a better term I will call diffusive resemblance, and not in reality a result of contiguous alliance. Until the larva of *Hecla* is known we cannot be quite certain of the degree

of relationship existing between *Hecla* and its two Rocky Mountain allies. It is easily known to be a different species from the other two. The view that the three species are directly related, although highly plausible on geographical grounds, is preliminary rather than final. It is not especially improbable that the closer alliance of *Hecla* is with *Chrysothome* and *Thisoa*. The larva of *Elis* is greatly similar to that of the untypical form of *Colias nastes* which occurs in the Bow Valley above timber. The distinction between them is that *Nastes* is smaller, darker, and apparently far more primitive than *Elis*. The imagos indicate still more plainly the linear gap between the two species. The larva of *Hecla* is a desideratum, to assist in determining whether that species is more closely allied to *Chrysothome* or is one of the intermediate terms between the early stock of *Nastes* and the modern forms *Meadii* and *Elis*.

In Proceedings of the Acad. of Nat. Sciences of Philadelphia, page 156, 1892, Dr. Skinner describes "*Colias hecla pallida* N. var. ♀," from a single instance, and a figure of this example is published in Entomological News, Vol. 3, plate 2. Both the description and the figure suggest *Nastes* rather than *Hecla*. The figure indeed admirably represents the form of *Nastes* female which is found on the mountains about Laggan, larger than the Labrador type, and nearer to the form *Werdandi* of northern Europe. I make this note hoping it

may cause Dr. Skinner to compare his example with *Nastes* of the Rocky Mts. *Nastes* at Laggan is an exceedingly variable species, and the published figure of *Pallida* inclines me to think the original may be a somewhat untypical ♀ *Nastes*, instead of a *Hecla*. Analogy in *Meadii* and *Elis* does not favor the probability of a white ♀ in *Hecla*.

Since my earlier account of *Colias Elis*, in the Canadian Entomologist, July 1890, little further knowledge of its geographical distribution has been obtained. Mr. H. H. Lyman found one ♀ at Banff, 36 miles east of Laggan, in 1890, and Mr. H. K. Burrison collected several specimens there in the same season. I am not aware of any other observations outside the original district extending from Laggan to Hector. *Meadii*, as distinct from *Elis*, does not occur at Laggan, and there is no separation of *Elis* into two forms, one of them more closely approaching *Meadii*. The publication of *Meadii* by Capt. Geddes as occurring in Kicking Horse Pass is probably to be understood as cancelled by his later announcement of *Elis* from the same locality. Up to the present time *Meadii* seems not to have been found north of the international boundary, and *Hecla* has, I think, not yet been reported from points nearer this district than Hudson's Bay and Alaska. *Elis* thus retains its vague geographical isolation.

I am now able to speak definitely in regard to the supposed "albino ♀" of

Elis. Mr. Strecker's determination proves to have been based upon several ♀ examples of a Laggan butterfly closely allied to *Pelidne*, which I have in correspondence designated by the MS. name *Colias minisui*, — of which perhaps further hereafter. Having sent Mr. Strecker fine examples of this pale female *Colias*, and also of its appropriate male, he distinctly recognizes the ♀ as the original of his *Elis* albino ♀, and the latter determination is to be considered recalled.

My series of *Elis* now represents the result of eight seasons' collecting. During that time every specimen collected has been critically examined, and every example requisite for an understanding of the species has been embodied in my collection. The representation is now so complete that probably no element of the variation is lacking, and the species stands confessed in all its multiform simplicity. I find that in proportion as the material becomes more fully representative so the individuality of *Elis* as a distinct species grows, with the effect that occasional instances partly shading toward *Meadii* have become at length more evidently absorbed into *Elis* by the presence of intermediate steps of variation which unite the extremes with the more typical elements of the species. Complete material supplies a fuller presentation of the consecutive variation, and results in a more accurate identification and explanation of the imperfectly typical examples. This

perfected series of *Elis* does not appear to bring the species as a whole nearer to *Meadii*, but has rather a contrary effect. While it renders increasingly plain the fact that the neutral ground between *Meadii* and *Elis* is but narrow, measured for instance by the relative unlikeness of any two closely approximate males in the two species, yet it makes more appreciable than before the systematic alienation, and the consequent diversity of averages, distinguishing the two closely allied kinds. Species so closely related as these cannot be satisfactorily estimated from scrutiny of a few isolated examples. In critical cases, before a doubtful specimen can aid in a final determination of the limits and position of the species, the dubious

example must itself be identified by comparison with the species. If two males of *Elis*, one highly typical and one extremely divergent in the conservative direction, are brought into contrast with the adjacent species *Meadii*, the very obvious hiatus between the two *Elis* (resulting from absence of perhaps a dozen usual intergrades) may impress an observer as a far more momentous separation than the narrow interval parting the off-type individual of *Elis* from the species *Meadii*. But when the missing intergrades are procured, and the vacuum (which Nature abhors) is filled, the resemblance of the untypical example to *Meadii* at once takes secondary place, and its affinity for the species *Elis* becomes the prominent fact.

WESTERN PEDICIAE, BITTACOMORPHAE AND TRICHOCERAE.

BY C. R. OSTEN SACKEN, HEIDELBERG, GERMANY.

The perusal of J. M. Aldrich's paper in *Psyche*, February 1895, aroused my recollections of twenty years ago, and made me examine old manuscript notes of mine. What I found in them may be of some use in connection with the three above-named genera.

Pedicia obtusa. Since I described this species in 1877, I have received from Mr. James Behrens of San Francisco a pair of it, taken in Siskiyou Co., Cal., on Sept. 27 and Oct. 6. Both specimens agree with the one

described by me in *not* having the brown pattern of the wings prolonged towards the posterior margin. The female has the usual double stripe in the middle of the thorax of a saturate yellow, longitudinally bisected by a brown line, which is the prolongation of the narrow median black line of the pronotum (or collar), and reaches backwards the tip of the scutellum. The male is a somewhat immature specimen, paler yellow in coloring; the thoracic brown line is perceptible

on the front part of the thorax only. The male forceps is rather large, as described by Aldrich.

In Bigot's collection I noticed a specimen from Washington State (at that time a Territory), collected by Morrison. The brown pattern is prolonged to the posterior margin, as in Aldrich's specimen. I have no doubt that all these specimens belong to the same species.

But in the same collection I saw a *Pedicia* from Mt. Hood (Morrison) with a very extraordinary modification in the coloration of the wings. To the pattern of *P. obtusa* is added a broad brown border, running along the posterior margin of the wing, from the root to the apex, where it is bounded by the posterior branch of the fork of the third vein; the breadth of the fork itself remains hyaline. The second posterior cell, in the specimen, was remarkably small. The abdomen was broken, and therefore a comparison with that of *P. obtusa* not possible. Was this a different species, or also a mere variety?

Bittacomorpha occidentalis Aldr. The detailed description of this species is a very interesting addition to our knowledge, and I have no doubt that the Californian specimens, which I saw in Verrall's collection, and suspected as belonging to a species different from the eastern *B. clavipes* (O. S., Cat. N. Am. Dipt. p. 36), really belong to *B. occidentalis*.

Trichocera trichoptera O. S., Western Dipt., p. 204. This was the only specimen of the genus *Trichocera*

which I captured during a seven months' residence in California. It is distinguished from the other *Trichocerae* by the distinct pubescence of its wing-veins; in other respects, and especially in the venation, there is no reason, according to my statement, to distinguish it from a true *Trichocera*. During my visit to Bigot I discovered three female specimens of a *Trichocera* with pubescent wing-veins in his collection, brought from Washington State by Morrison, and about which I took down the following notice: "They are larger than *T. trichoptera* O. S. and have distinct stripes on the thoracic dorsum. They differ from typical *Trichocerae* in having the seventh longitudinal vein *concave*, and not *convex*; the ovipositor has not the shape characteristic of that genus (with the convexity turned upwards); it consists of a pair of oval, finely pubescent, closely approximate valvules." For the detailed character of *Trichocera* I refer to Monogr. N. Am. Dipt. iv, p. 233, and for the convex seventh vein to tab. ii, f. 13 of the same volume. Now the three females from Washington, with their pubescent venation and their *concave* seventh vein, come very near to European *T. hirtipennis* Siebke, for which the new genus *Diazoma* Wallengr. (name preoccupied) was established. To those who will come across the species from Washington it will belong to determine whether they are, in all respects, generically identical with *Diazoma*. The literature on the subject they will find in my Studies on Tip. ii, p. 281

(Berl. Ent. Z. 1887). I would recommend them, at the same time, to have my type specimen of *T. trichoptera* in the Mus. Comp. Zool. in Cambridge, Mass., carefully examined in order to ascertain whether my description is correct. I wrote and published the Western Diptera in a great hurry

between my return from California in the autumn of 1876 and my final departure for Europe in the spring of 1877, and I would in this case not trust my own statement without further verification.

Heidelberg, Germany,
Feb. 12, 1895.

FAILURE TO EMERGE OF ACTIAS LUNA.

In looking over a box of cocoons to-day, I came upon five, of *A. luna*, which felt suspiciously light. I cut them open, and in each I found an undeveloped imago which had crawled out of the pupa-skin and had not been able to force its way out of the cocoon.

Each one lay with its head against the anal end of the empty pupa-skin, and the cocoon was filled with "fluff" made by the scales of the moth rubbed off in its struggle to get free.

Four days ago I received a large cocoon of *A. luna*, sent by mail, and one end of which was so wet that I expected the moth to emerge at any time. Instead, the wet spot dried, and two days later I cut open the cocoon, and found the moth with head and thorax out of the pupa-skin, and apparently dead. Taking the pupa out of the cocoon I began to cut away the skin, when the imago moved feebly. By the time I had removed all the pupa-skin the moth was sufficiently revived to cling to my finger, and was placed in a cage, where it hung for twelve hours without expanding the wings at all.

The next morning, however, the wings were fully spread, and the moth is now the largest ♀ I have ever seen. The pupa-skin was perfectly dry, and there has not been one drop of meconium discharged.

In the five cocoons first mentioned there was no meconium, and no evidence of the ends having been moistened.

This may be an experience common to entomologists, but it is entirely new to me.

Caroline G. Soule.

Brookline, Mass.,
June 2, 1894.

ENTOMOLOGICAL NOTES.

Dr. S. W. Williston of Lawrence, Kansas, has in press a work, entirely rewritten, on the classification and structure of North American Diptera. It will contain tables of all the North American genera, including those from Central America and the West Indies, together with descriptions of larvae, habits, anatomy, etc. It will appear next autumn. In its preparation he has had the assistance of Messrs. Aldrich, Townsend, Snow and Johnson, who have kindly prepared or revised the tables of the families with which they are best acquainted.

In a recent and excellently illustrated memoir (Musaeum Dzeduszyckianum, iv-Lemberg) on the insect fauna of the petroleum beds of Boroslow, Galicia, Lemnicki describes no less than seventy-six Coleoptera, of which nineteen are regarded as identical with living European insects, while the others find their nearest allies in boreal Europe, Asia and America. As only four species are identical with those found by Flach at Hösbach, Bavaria, in beds looked upon as Lower Pleistocene by Flach, and since the Hösbach Coleoptera as a whole show far less boreal affinities than those of Galicia, Lemnicki thinks the Hösbach fauna must be considered Middle Pleistocene and the Galician Lower Pleistocene.

THE SEVENTH VOLUME OF PSYCHE

Began in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

Vols. 1-6, Complete, Unbound, - - Now sold for \$29.00.
 Vols. 1-6, and Subscription to Volume 7, - - \$33.00.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

Vol. 1. Introduction; Nymphalidae.

Vol. 2. Remaining Families of Butterflies.

Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo. half levant, \$75.00 net.

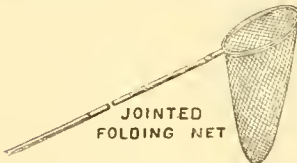
HOUGHTON, MIFFLIN & CO.,

4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,
 Klaeger and Carlsbad Insect Pins, Setting
 Boards, Folding Nets, Locality and
 Special Labels, Forceps, Sheet Cork, Etc.
 Other articles are being added, Send for List.



JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.



PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 229.

MAY, 1895.

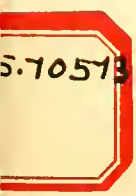
CONTENTS:

ON A RATIONAL NOMENCLATURE OF THE VEINS OF INSECTS, ESPECIALLY THOSE OF LEPIDOPTERA. (Illustrated).— <i>A. S. Packard.</i>	235
THE GENUS OXYPTILA — <i>Nathan Banks.</i>	241
COLIAS HECLA.— <i>Henry Skinner.</i>	244

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]



Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5 00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danais archippus</i> . Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> . col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

ON A RATIONAL NOMENCLATURE OF THE VEINS OF INSECTS, ESPECIALLY THOSE OF LEPIDOPTERA.

BY A. S. PACKARD, PROVIDENCE, R. I.

Hitherto there has been an unfortunate lack of uniformity in the nomenclature of the veins of the wings, different names having been applied to the veins of different orders.

In his paper on the phylogeny and ontogeny of the veins of the wings of Lepidoptera Spuler has, however, given us a simple scheme and a numbering of the veins which will, we think, apply in general to the wings of insects of all orders.

Redtenbacher had previously pointed out that "the geologically older Orthoptera and Neuroptera have a much richer and more complicated venation than the Coleoptera, Lepidoptera, Hymenoptera and Diptera; thus among the Rhynchota, the oldest forms, the Cicadidae and Fulgoridae have a much greater number of veins than the Hemiptera. There is no doubt but that the oldest insects were provided with an excess of veins, that on the other hand in the course of development this superfluity has disappeared by a process of reduction, and in this way a simpler system of venation has resulted. It is also to be observed that the size of the wings has

had a considerable influence on the number of the veins, since small forms almost without exception have fewer veins than insects with large wings." Redtenbacher also believes "that the normal type of a differentiated wing may be found in those insects whose fore and hind wings are most similar in size and shape," and states that the venation is not useful as an ordinal character, but is of more service in separating suborders and families.

We agree with Spuler in rejecting Redtenbacher's system, which is partly based on Adolph's untenable theory of convex and concave veins, but more especially for the reason that Redtenbacher assumes that the primitive form of venation is that of the Ephemerae. He remarks: "There is scarcely another group of insects whose wings show the primitive type, the fan-shaped form, as the May-flies." It may be objected to this that the Ephemerae, though in most respects generalized and primitive insects, yet are, as regards the wings, highly modified or specialized. That this is the case is also suggested by the reduction or atrophy of the mouth-parts.

On the other hand the retention of sexual organs paired throughout, the ducts remaining separate, with open, paired outlets, shows that the May-flies are, in this respect, more primitive than any other winged insects. But as regards the thorax and the wings, we observe that in them a high degree of modification has taken place. Thus the two pairs of wings are very unlike in size and shape, and this feature is a secondary one. Hence the large number of main longitudinal veins in the wings of Ephemera is a case of irrelative repetition of parts mostly situated in the fan-like field, due to a process of specialization, a process which is manifested in quite another way in the wings of the Dermaptera, also a primitive type. Redtenbacher regards the eleven longitudinal veins (I-XI) of Ephemerids as the normal number, and considers that the Trichoptera, Lepidoptera, etc., have lost certain of the veins by a process of reduction. This view has been adopted by Comstock in his suggestive paper, "Evolution and Taxonomy," but it seems to us to be untenable, the anal field ("faltentheil" of Spuler) not being of primary importance. On the other hand Redtenbacher's use of Roman numerals for the main veins, and of a combination of Roman and Arabic numerals for their branches, is very convenient.

Spuler divides the wings of each pair into an outspread portion (*Spreiten-theil*), and a folded part (*Falten-theil*). The veins of the former area

he numbers in the same manner as Redtenbacher, beginning on the costal edge of the wing, while those of the folded area (the submedian and internal or first and second anal veins of other authors) he does not name, but simply numbers with Greek letters α β . He considers that Hagen was right in believing the Phryganidae, Tipulariæ and some Microlepidoptera to be forms with a schematic, *i. e.*, primitive venation (Stettin. Ent. Zeit., p. 316, 1870).

Spuler shares the opinion of Fritz Müller (Termitidae), Brauer and Redtenbacher (Libellulidae), and Haase (Papilionidae), that the costa is only a hypodermal structure, a thickening of the edge, which does not have a trachea as its origin (anlage), and which therefore has nothing to do with the veins.

Spuler also shows that the venation of the Orthoptera, especially their most generalized form Blatta, is fundamentally nearly identical with that of the Lepidoptera, veins I-V being readily homologized with those of the latter group; so also with the most generalized Hemiptera (Fulgora. Fig. 1). We may also draw attention to

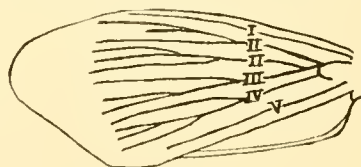


Fig. 1.

the remarkable resemblance in the venation of the generalized Psocid genus *Amphientomum*, which at first

sight, from the shape and size of the wings, reminds one of a Micropteryx or Eriocephala, while it also has a few scales like those of these moths.

But that the system of venation of Spuler is morphologically the correct one is fully and satisfactorily proved by the ontogenetic development of the veins. Fritz Müller (*Kosmos* i, p. 390) was the first to examine the incipient venation of two semi-pupal moths (*Castnia ardalus*). He observed that in the immature pupa the cross veins were wanting, and that different longitudinal veins, which afterwards more or less completely disappeared, were present, and hence he regarded the pupal venation as the primitive one. This view Spuler has adopted and extended, and it plainly enough, supported by the researches of Brauer and Redtenbacher on the venation of the nymph of Odonata, solves the problem of the venation of insects in general, and especially for Neuroptera, Trichoptera, Mecoptera (Panorpidae), Lepidoptera and Diptera.

Spuler's method was to strip off the loose skin of a caterpillar just beginning to pupate, and examine the incipient venation of the wings of the young pupa on the living insect. He placed the living pupa in water and then, since the process of thickening and resulting concealment of the veins of the wing is retarded, the tracheal branches become slightly enlarged, filled with air, and thus are more easily seen. Hence small pupae from which the larval skin has just been cast,

and are transparent, are the fittest objects for examination.

The primitive and generalized condition of the semipupal wing is shown in Spuler's figure of *Cerura vinula* (Fig. 2), to which we have added the

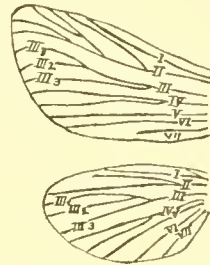


Fig. 2

numbering of all the veins. He shows that the fundamental pupal venation of Lepidoptera will also apply to Orthoptera (Blatta), Hemiptera, Trichoptera, etc. He proves that the cross veins are of quite secondary and subordinate importance. The results of Spuler's investigations, extended through different groups from Tineina to Rhopalocera, and illustrated by many figures, are both interesting and convincing. The comparison of the venation of the fore wing of the adult

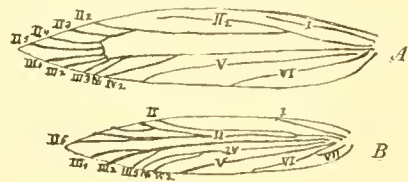


Fig. 3

of *Gracilaria syringella* (Fig. 3 A) compared with that of its semipupa (Fig. 3 B), shows that the generalized

venation of the latter is similar to that of *Micropteryx*, veins IV_1 IV_2 not being connected by a cross vein with III and its branches, and veins II and III, with their branches, being separate. The veins and their numbering

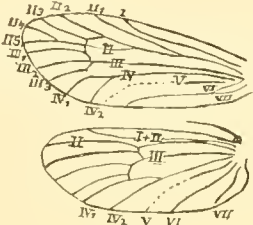


Fig. 4.

are indicated by Spuler's figure of *Talacporia pseudobombycella* (Fig. 4) and one we have drawn of *Hepialus mustelinus* (Fig. 5).

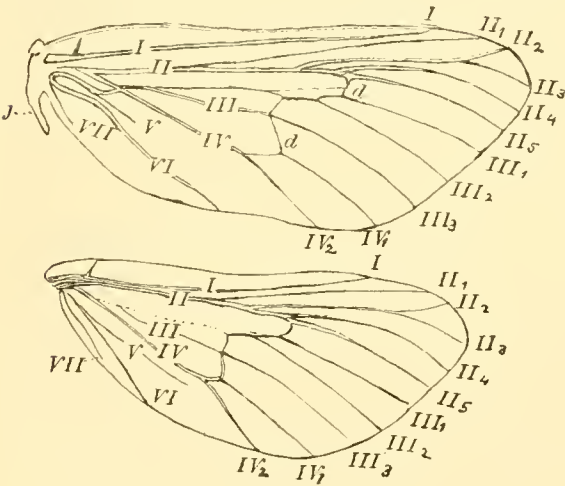


Fig. 5.

The structure of a complete vein is described by Spuler. In a cross-section of a Noctuid (*Triphaena pronuba* Fig. 6) the chitinous walls are seen to

consist of two layers, an outer (*U*) and inner (*c*), which takes a stain and lies

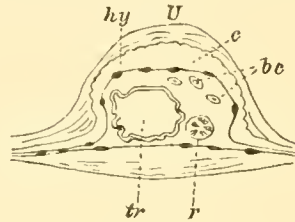


Fig. 6.

next to the hypodermis (*hy*). In the cavity of the vein is the trachea (*tr*), which shows more or less distinctly the so-called spiral thread; within the cavity are also Semper's rib (*r*) and blood corpuscles (*bc*), which proves that the blood circulates in the veins of the completely formed wing, though this does not apply to all Lepidoptera with hard mature wings. I have been able to observe the same structure in sections of the wing of *Zygaena*.

A cross-section of a vein of the immature pupa of *Pieris brassicae* shows that the large trachea is first formed, and that it extends along the track between the protoplasmic threads connecting the two hypodermal layers.

The main tracheae throw off on both sides a number of secondary branches showing at their end a cell with an intracellular tracheal structure;

these accessory tracheae afterwards branch out.

The accessory or cross-tracheae often disappear, though in some moths they

remain permanently. Fig. 7 tr_2 represents these secondary veins in the

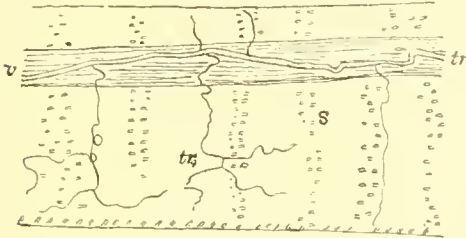


Fig. 7

edge of the fore wing of *Laverna vanella*, arising from a main trachea (tr) passing through vein 1, two of the twigs extending to the centre, showing that the latter has no homology with a vein. Only rarely and in strongly developed thick folds are the cross-tracheae provided with a chitinous thickening, as for example in *Cossus ligniperda*. Since from such accessory tracheae the cross-veins in lepidopterous wings are developed, we can recognize in them the homologies of the net-veins in reticulated

venations. There is no sharply defined difference between reticulated and a non-reticulated venation; no genetic difference exists between the two kinds of venation, since there occur true Blattidae with and without a reticulated venation (Spuler).

It may be remarked that Spuler agrees with Brauer and Redtenbacher, as well as Haase, that Adolph's system of convex and concave veins is entirely erroneous.

We adopt, then, Spuler's system of venation, and earnestly trust that it

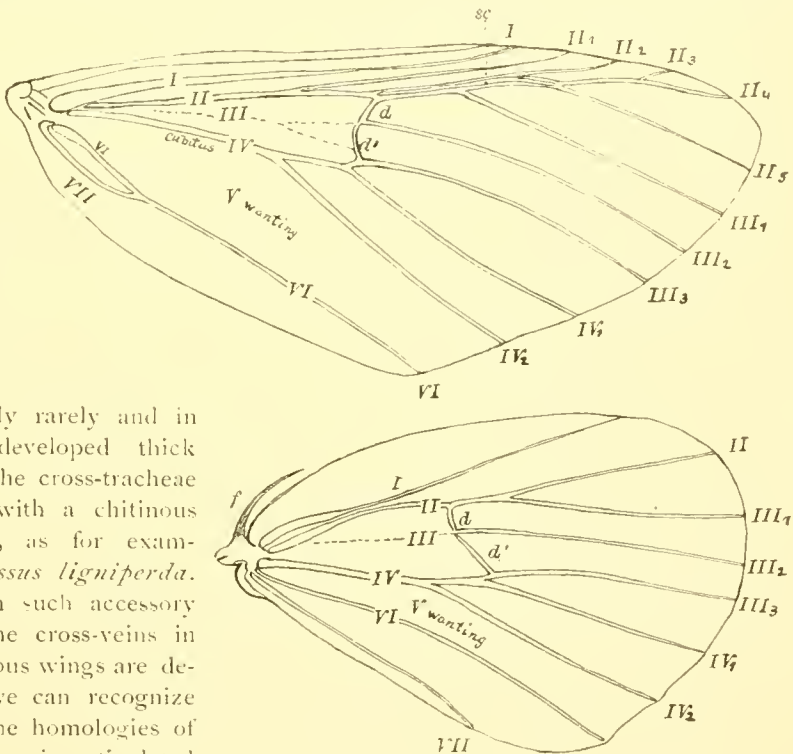


Fig. 8.

may be generally accepted, as simple, intelligible, and applicable to all orders of insects, based as it is on ontogenetic, as well as anatomical, grounds.

The following system applies to the Lepidoptera as well as all other orders. Fig. 8 represents the venation of a Notodontian (*Heterocampa obliqua*). We merely deviate, from motives of convenience, from Spuler's numeration of the two anal veins, by numbering them VI and VII, instead of designating them by the Greek letters α β .

The following table will show the numbers and names of the five veins of the outspread portion of the wing and two (rarely three) of the fan-like or inner portion. Instead of denoting the veins by the noun and adjective as, for example the median vein, we may call it in descriptions or diagnoses, *media*.

- I. Costa.
- II. Subcosta (radius).
- III. Media.
- IV. Cubitus (median vein of some authors).
- V. First anal (submedian).
- VI. Second anal (internal).
- VII. Third anal.

Literature relating to the venation of the wings of insects.

- Furine, L.* Nouvelle méthode de classer les Hyménoptères et les Diptères. 14 Pl. Genève, 1807.
- . Observations sur les ailes des Hyménoptères. (Mém. Acad. Turin., xxiv, pp. 177-214, 1820.)

- Lefebvre, A.* Communication verbale sur la pterologie des Lépidoptères. 3 Pl. (Ann. Soc. Ent. France, xi, pp. 5-35. Rev. Zool., v, pp. 52-55. Pl. 1. 1892).
- Burmeister, H.* Untersuchungen ueber die Flügeltypen der Coleopteren. (Abh. naturf. Ges. Halle, ii, pp. 125-140. 1 Pl. 1854.)
- Romand, B. E. de.* Tableau de l'aile supérieure des Hyménoptères. 1 Pl. 1839. (Revue Zool., ii, p. 339, 1839.)
- Westwood, J. O.* Notes on the wing veins of insects. (Trans. Ent. Soc. London. Ser. 2, iv, pp. 60-64. 1857.)
- Schiner, J. R.* Ueber das Flügelgeäder der Dipteren. (Verh. K. K. Zool.-bot. Ges. Wien., 1864, pp. 193-200. 1 Pl.)
- Newman, E.* Memorandum on the wing-rays of insects. (Trans. Ent. Soc. London. Ser. 2, iii, pp. 225-231. 1855.)
- Speyer, A.* Oken's Isis, p. 94, 1839.
- . Stettin. Ent. Zeit., 1870, p. 202. Figs.
- Hagen, H.* Ueber rationelle Benennung des Geäders in den Flugeln der Insekten. Stettin. Ent. Zeit., p. 316. Figs. 1870.
- Roger, Otto.* Das Flügelgeäder der Käfer. Erlangen. 1875.
- Müller, Fritz.* Beiträge zur Kenntniss der Termiten. Jenaisch. Zeitschr. f. Naturw. 1875.
- Saussure, H. de.* Études sur l'aile der Orthoptères. (Ann. sc. nat. 6 sér., x.)
- Kolbe, H. J.* Das Flügelgeäder der Psociden und seiner systematische Bedeutung. (Stettin. Ent. Zeit., 1880, pp. 179-186. 1 Pl.)
- . Beitrag zur systematik der Lepidoptera. (Berlin. Ent. Zeitschr. Bd. xxvii, pp. 217-224. 1883.)
- . Die zwischenräume zwischen den Punktstreifen der punktiert gestreiften Flügeldecken der Coleoptera als rudimentäre Rippen auf gefasst. (Jahresb. Westfäl. Prov. Ver. Wissen. u. Kunst. Münster., 1886, p. 57-59. 1 Pl.)

Brauer, F. Ansichten über die paläozoischen Insekten und deren Deutung. Annal. K. K. naturh. Hofmus. Wien. i, pp. 86-126. 2 Pl. 1886.

Redtenbacher, Joseph. Vergleichende Studien ueber das Flügelgeäder der Insecten. (Annalen des K. K. Naturh. Hofmus. Bd. i, pp. 153-231.) 12 Pls. Wien, 1886. Abstr. by J. H. Comstock in Amer. Nat., xxi, pp. 932-934. 1887.

Brauer, F. u. Redtenbacher, J. Ein Beitrag zur Entwicklung des Flügelgeäders der Insekten. Zool. Anz. 1888, pp. 443-447.

Bonsdorff, A. von. Ueber die Ableitung der Sculpturverhältnisse bei den Deck-

flügeln der Coleopteren. Zool. Anz. Jahrg., xiii, 1890, pp. 342-346.

Haase, Erich. Zur entwicklung der Flügelrippen der Schmetterlinge. Zool. Anz., xiv, 1891, pp. 116-117.

Spuler, A. Zur Phylogenie und Ontogenie des Flügelgeäders der Schmetterlinge. Zeits. wissens. Zoologie, liii, pp. 597-646. 2 Pl. 1892.

Comstock, J. H. Evolution and Taxonomy, etc. Ithaca, N. Y. 1893.

Also the works of Kirby and Spence, Burmeister, Doubleday, Herrich-Schaeffer, Westwood, Heer, Osten-Sacken, Scudder, Adolph, Graber, Dyar, Kolbe, Packard, etc.

THE GENUS OXYPTILA.

BY NATHAN BANKS, SEA CLIFF, N. Y.

Oxyptila is a genus of Thomisoid spiders, described by Simon in 1864. I consider the characters of this genus in our fauna are that the quadrangle of the M. E. is higher than broad, that the P. M. E. are closer to each other than to the S. E., and that the body bears clavate hairs. Thus I would not place in the genus *O. cinerea* Em. (New Eng. Thomisidae), as it bears no clavate hairs and as it has much the appearance of a true *Nysticus*. In 1877 Thorell described one species of this genus, *O. conspurcata*, from Colorado. In 1880 Keyserling described two species, *O. georgiana* and *O. nevadensis*. In 1882 Kyserling described a

third species, *O. monroensis* from Ft. Monroe, Va. Dr. Marx in 1890 recorded this species from D. C. In 1892 I recorded both *O. georgiana* and *O. conspurcata* from Ithaca, N. Y. I have since decided that *O. georgiana* is the same as *O. conspurcata*; at least I can see no other than color differences between forms which agree with the descriptions; and the form which I recorded from New York as *O. georgiana* is not that species, but is new. I have since received two other new species and obtained *O. monroensis* from Long Island. The six species may be tabulated as follows:—

1	{	No spines above on metatarsus I, quite black species	<i>floridana.</i>
		At least one spine above on metatarsus I	2.
2	{	Two spines above on metatarsus I	<i>nevadensis.</i>
		But one spine above on metatarsus I	3.

- | | | | |
|---|---|---|----------------------|
| 3 | { | Dark spots on under side of coxae and trochanters, anterior legs all pale yellowish and not mottled | <i>pacifica</i> . |
| | | Coxae and trochanters immaculate, or legs mottled | 4. |
| 4 | { | Anterior legs considerably mottled except on tarsi and metatarsis, epigynum divided into three cavities | <i>americana</i> . |
| | | Abdomen legs unmottled, at least tibiae not spotted | 5. |
| 5 | { | Abdomen irregularly spotted, cephalothorax pale behind and near eyes, legs often quite pale | <i>conspurcata</i> . |
| | | Abdomen regularly dotted, cephalothorax pale only behind, legs dark brownish | <i>monroensis</i> . |

Oxyptila monroensis Keyserling. — Cephalothorax dark brown on sides, paler in middle especially behind; anterior legs dark brown, femora darker than other joints; posterior legs with a dark band at tips of femora and one at base of tibiae; coxae and sternum brownish, abdomen dark brown with a number of small pale dots arranged somewhat in rows. The epigynum consists of a broad cavity somewhat like *conspurcata*, but the posterior ridge is only slightly concave, and each end limited by a dark oval body; the rounded lobe in front seems to have a cavity at tip; the two small posterior holes are quite close to each other. The legs are shorter than in *O. conspurcata*.

Ft. Monroe, Va.; Washington, D. C.; Sea Cliff, N. Y.

Oxyptila conspurcata Thorell. (*O. georgiana* Keyserling.) — Cephalothorax reddish yellow, paler in middle, usually with some silvery white lines, white around eyes; the sides often nearly wholly uniform brown, or two brown stripes, the upper one broadest behind and ending in a darker spot, legs pale yellowish or reddish brown, not mottled, the posterior pair with a black band at tip of femur, a black spot on patella, and a basal black band on tibia; sternum yellowish or brownish; abdomen yellowish, anterior sides brown, two spots on anterior margin, often with silvery spots, and many black ones which behind form three irregular dark bands. The epigynum consists of a broad

cavity limited behind by a deeply emarginate line or ridge, which is most prominent on the sides, in front a rounded lobe projects caudad, from each of the small holes there projects an oblique dark body or cavity, the surface above is striate. This gives the appearance figured by Keyserling.

Colorado; Ithaca, N. Y.; Poughkeepsie, N. Y. (G. Van Ingen); Ames, Iowa (C. P. Gillette); Franconia, N. H. (Mrs. A. T. Slosson); Beaver Dam, Wis. (Mr. Snyder). Keyserling recorded *georgiana* from Georgia and from Peoria, Ill. Most of the northern specimens have the four stripes on cephalothorax; but in a large series from Poughkeepsie both forms occur and numerous gradations; those with four stripes usually have very pale legs.

Oxyptila americana nov. sp. — Length 4.2 mm. Cephalothorax pale, sides thickly mottled with dark brown, darkest behind and there including a pale spot; legs pale, mottled with dark brown, posterior femora banded at tip and tibiae at base with brown or black; sternum with a dark brown central stripe behind, and sides with some brown spots; abdomen pale, anterior sides brown, anterior part of dorsum mostly pale, usually some dark spots, behind several irregular dark brown or black bands. Eyes about as usual, the N. E. equal, the quadrangle of

M. E. broader in front than behind, the P. S. E. nearly as large as the A. S. E. The cephalothorax and abdomen with the usual clavate and spatulate hairs. Legs short and stout, the tibia I concave on outer margin near base; all femora with one spine above, femur I with one spine in front, tibia with two pairs beneath, metatarsus with three pairs beneath and one on each side. The epigynum consists of three cavities, or rather a large cavity divided into three portions by a broad plate; the two lateral cavities are somewhat elliptical, broader behind and contain in the posterior part an almost black, blunt projection, beneath and in front of which is a reddish similar one; the anterior cavity is broadly triangular with rounded angles, and contains, projecting from beneath the posterior border, a broad, rounded, dark body; behind are the two small holes as usual.

Three specimens, Ithaca, N. Y., beneath dead leaves in quite marshy ground. This species, which I formerly regarded as *O. georgiana* (Cayuga Lake Spiders), is quite distinct by its peculiar epigynum, by its mottled legs, and by the two white spots above on the cephalothorax.

Oxyptila pacifica nov. sp. — Length 4 mm. Cephalothorax reddish yellow, paler above, white behind; sides somewhat mottled with brown, almost forming a superior stripe which is terminated behind by a black spot, brown and white markings around eyes; legs pale yellow, femora spotted with brown, patellae III and IV with a black spot in front, a dark band at tip of femur and at base of tibia IV; sternum and coxae pale, a brown spot on each coxa and on each trochanter. Abdomen pale, with some silvery spots above and two black spots on front margin, behind two or three irregular interrupted brown bands; venter pale, with a few brown

spots. Eyes about as usual, the M. E. equal, S. E. nearly equal. Cephalothorax and abdomen with two sizes of clavate hairs, the larger size less numerous than the much smaller ones. Legs short, femora with one spine above, femur I with one in front, tibia with two pairs below, metatarsus with three pairs below and one in front. The epigynum consists of a narrow transverse cavity bounded behind by a deeply concave ridge, the sides continued and enlarged posteriorly, the anterior lobe some distance in front, two transverse lines between it and the posterior ridge; behind are the two small holes, less than their diameter apart.

One female and one young male from Olympia, Washington, collected by Mr. Trevor Kincaid.

Oxyptila nevadensis Keys. — This appears to be a very good species, differing from all the others by having two spines on each side of metatarsus I, in that the A. M. E. are a little larger than the P. S. E., and in the different epigynum. The legs are mottled and femur I has three or four spines in front. I have never seen it.

Oxyptila floridana nov. sp. — Length 4 mm. Cephalothorax reddish yellow, almost wholly covered with black markings, eyes surrounded by yellow, three oblong yellowish spots above and two on each side lower down, mandibles black with a yellow spot in the middle, femora pale at base, with black patches, black at tip, tibia and patella almost wholly black, metatarsus black beneath and in front, sternum nearly all black, coxae blackish, abdomen black with white dots, a large white spot on each anterior side, spinnerets white; whole body with a very fine scattered, glistening, silvery pubescence. Eyes about as usual, cephalothorax and abdomen with large and many small clavate hairs; femora with one spine above, femur I with one in front, two pairs under tibia, three pairs under metatarsus,

but none above. The epigynum consists of a shallow cavity divided behind by a septum which is connected with the posterior ridge, in front are two transverse lines and further in front the usual anterior lobe, behind each side appears an oblique convoluted body beneath the surface, and a curved ridge.

One specimen of this fine species from Punta Gorda, Florida; collected by Mrs. Annie T. Slosson.

COLIAS HECLA.

Mr. Bean in an interesting paper in the April Psyche on "A Comparison of *Colias hecla* with *Colias meadii* and *Colias elis*" seems to think I made a blunder in describing a pallid ♀ form of hecla. It appears to me quite illogical for Mr. Bean to theorize in regard to the lesser degree of variation in hecla, and because the discovery of a pallid female somewhat interferes with these theories, to assume that the identification of the pallid female is probably an error. The specimen in question came from Northern Greenland, is bright, beautiful and faultlessly perfect, and there is not

the slightest doubt as to what species it is. Mr. Bean's paper is a very valuable one, but in my opinion there is but one key to the solution of all such problems in the Rhopalocera, and that is the study of many individual specimens representing the entire geographical distribution. If it were possible to get many series of specimens of hecla, elis, and meadii from the entire territory, in a line, from the home of the Arctic highlander to New Mexico, we would be able to solve the problem. I am inclined to think that elis will be found to have a greater range than is at present supposed. To show my opinion of the effect of distribution, I think where a species covers considerable territory that it would be quite possible in many instances for one of experience in such studies to tell almost exactly from whence it came. By using measurements, etc., I think it would not be difficult to prove the Lapland hecla quite distinct from the Greenland one, but get a series representing the intervening territory and your new species will probably fall into the second line. I should also state that *Colias nastes*, which Mr. Bean thinks I mistook for hecla, is not found in Greenland.

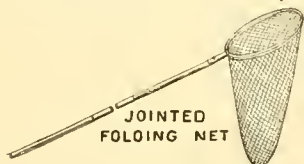
Henry Skinner.

A. SMITH & SONS, 269 PEARL STREET, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.



JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.
78 Ashland Place,

BROOKLYN, N. Y.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 230.

JUNE, 1895.

CONTENTS:

NOTES ON THE WINTER INSECT FAUNA OF VIGO COUNTY, INDIANA.—I.— <i>W. S. Blatchley.</i>	247
EGGS OF THE LONG-NOSED OX-LOUSE, <i>HAEMATOPINUS VITULA</i> L. (Illustrated.)— <i>F. L. Harvey.</i>	250
ON THE VALIDITY OF THE TACHINID GENUS <i>CELATORIA</i> .— <i>D. W. Coquillet.</i>	251
THE LARVA OF <i>BUTALIS BASILLARIS</i> ZELL.: THE RELATIONS OF ITS SETAE. (Illustrated.)— <i>Harrison G. Dyar.</i>	252
TWO NEW WESTERN COCCIDAE. (Illustrated.)— <i>T. D. A. Cockerell.</i>	254
COMSTOCK'S MANUAL FOR THE STUDY OF INSECTS	256

PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

10573

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	.50c
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by
R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danaus archippus</i> . Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichnology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> , col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

NOTES ON THE WINTER INSECT FAUNA OF VIGO COUNTY, INDIANA,—I.

BY W. S. BLATCHLEY, INDIANAPOLIS, IND.

One of the greatest problems which each of the living forms about us has had to solve during the years of its existence on earth is how best to perpetuate its kind during that cold season which once each year, in our temperate zone, is bound to come. Many are the solutions to this problem. Each form of life has, as it were, solved it best to suit its own peculiar case, and, to the earnest student of nature, there is nothing more interesting than to pry into these solutions and note how varied, strange and wonderful they are.

As far as I can ascertain but little has as yet been written concerning the winter habits of insects, and yet every one of the 30,000 or more species known to inhabit North America survives the cold season in some form.

At present I have a knowledge of but two papers that have been written on the subject.* One, "On Winter

Collecting," by H. T. Fay, was published in the Proc. Ent. Soc. Phil., 1862, v, 194, in which 129 species of beetles were listed as having been taken during the winter months in the vicinity of Columbus, Ohio. This paper I have never seen and have a knowledge of it only through Psyche.† The other, "Our Winter Beetles," by H. F. Wickham, appeared in the Canadian Entomologist, xxiv, 1892, 99, in which 33 species are mentioned as having been noted near Iowa City, Iowa.

Dr. A. S. Packard, in his "Entomology for Beginners," p. 41, makes the following statement:—

"During the winter the species (of insects) in most cases are represented by the egg alone. *Rarely does the mature insect hibernate*,‡ though one will find a few ichneumons, beetles, and bugs under leaves and the bark of trees; but in many species, especially moths, the pupa hibernates to disclose the imago in the spring or early summer. Larvæ seldom live through the winter, although there are some well known exceptions to this law."

In January, 1891, I began to collect the Coleoptera and the Hemiptera—

* Since writing the above I have, through the kindness of Mr. S. H. Scudder, been enabled to examine a rare and little known paper which was published by Dr. Asa Fitch (Am. Journ. Sci. Agric., v, 1846, 274), on "Winter Insects of Eastern New York." In it Dr. Fitch describes as new and gives the habits of the following eight species of insects which he found quite common in winter in the locality mentioned: *Boreus nivoriundus*, *B. brumalis*, *Perla nivicola*, *Nemoura nivalis*, *Culex hyemalis*, *Chironomus nivoriundus*, *Trichocera brumalis* and *Podura nivicola*. With the exception of the last, these belong to the orders *Neuroptera* and *Diptera*, the members of which I did not collect.

† October, 1891, 162.

‡ The italics are mine.

Heteroptera found in Vigo County, Indiana, and to keep full accession notes of the species of those two orders as well as of the Orthoptera which I had been collecting for some years.

In November, 1893, I conceived the idea of preparing a paper on the insects of the three orders mentioned which I found either as adults or nymphs (active young) of Orthoptera and Hemiptera in the winter months of December, January and February. I had intended to collect during the present winter and prepare the paper as the result, mainly, of the two winters' (1893-'94 and 1894-'95) collecting, but having moved from the county before December, 1894, I shall have to base it upon the former winter's collecting and such accession notes as I took before I began a systematic search for winter insects.

The Orthoptera taken are noted in the present paper. The Hemiptera-Heteroptera (about 65 species), and the Coleoptera (between 250 and 300 species) will be treated of in future articles.

ORTHOPTERA.

BLATTIDÆ.

Of the six species of this family known to occur in the county four have been taken in winter. Of these *Phyllodromia germanica* (L.), the Croton bug, is very abundant in all stages about the older hotels and boarding houses of the city of Terre Haute. On Dec. 16, 1893, 30 adult specimens and fully half that number of young were taken in less than ten minutes in

the kitchen of one of the hotels. Two of the adults were females with oötheca protruding.

Periplaneta orientalis (L.) is less common and I have seen only half grown nymphs in the winter months. It is most frequent in bakeries and about old tenements.

The other two species, *Ischnoptera unicolor* (Scudder), and *I. pennsylvanica* (De Geer), occur only in the country. They are usually found in company but the former is scarce while the latter is the most common insect noticeable in the woods in winter. One cannot pull the loose bark from an old log without dislodging a colony of from ten to a hundred of the nymphs of various sizes. Cold has seemingly but little effect upon them as they scramble away almost as hurriedly when their protective shelter of bark is removed on a day in mid-January with the mercury at zero as they do in June when it registers a hundred in the shade. The adults of these two species occur only from about May 12 to October. The nymphs of the two are distinguishable by color alone. *Ectobia flavocincta* Scudder and *Tennopteryx deropeltiformis* Brunner are found in the county and probably pass the winter in the nymph stage, but I have not been able to identify them with certainty at that season. I might add here that an adult male of *Periplaneta americana* as well as two nymphs were seen in a hotel in Indianapolis on Jan. 15, thus proving that that insect passes the winter in all stages.

ACRIDIDÆ.

Of the 38 species of this family occurring in the county 10 are to be found in the winter season, the others being then represented by the eggs alone. Seven of the ten belong to the subfamily of *Tettiginae* or Grouse Locusts. Five of these, namely: *Tettix arenosus* Burm., *T. ornatus* Say, *T. granulatus* Kirby, *Tettigidealateralis* Say, and *polymorpha* Burm., are found in the mature state only. During severe cold weather they ensconce themselves beneath the loose bark of logs, piles of decaying leaves, the radical leaves of mullein (*Verbascum thapsus* L.), or the bottom rails of the old and fast disappearing Virginia rail fences. From these retreats every warm, sunny day tempts them forth in numbers, and, on such occasions, the earth seems to swarm with them as they leap before the intruder, their hard bodies striking the dead leaves with a sound similar to that produced by falling hail.

Batrachidea cristata Harris occurs sparingly in winter both as nymphs and adults in like situations; while *Tettix cucullatus* Burm. has been taken only in the various larval stages, usually beneath logs in sandy soil near water. The two species of *Tettigidea* are gregarious in winter, as many as 11 specimens having been found within a space of six square inches on the side of an overturned log.

The winter species of Acrididæ other than those mentioned are *Chortophaga*

viridifasciata (De Geer), both brown and green forms; *Arphia sulphurea* Fab., and *Hippiscus tuberculatus* Pal. de Beauv., all of which are found only as larvae or pupa. The first two are very common in the county, and the young of *Arphia sulphurea* are often very prettily mottled with lichen-like, grayish markings — a character which I have never seen in the adult. These three species in winter frequent dry, open woods and roadsides and are very active on all sunny days when the mercury rises above the freezing point; often climbing or leaping upon the lower rails of fences or sides of stumps and there resting in and apparently enjoying the sunshine.

LOCUSTIDÆ.

The young of one or two species of *Ceuthophilus* are the only winter representatives known to me of the 34 species of this family which I have taken in the county. Specimens varying much in size have been taken singly on a number of occasions in each of the winter months — usually from beneath logs deeply buried in decaying leaves and vegetable mold. I have kept examples of them in confinement for some weeks in winter but they invariably died before reaching maturity. The young of the different species are difficult to separate; but judging mainly from color characters, most, if not all, of the winter specimens were *C. blatchleyi* Scudder, the most common species in western Indiana.

GRYLLIDAE.

Since my paper on the "Gryllidae of Indiana"* appeared, seven additional species have been taken, so that now 22 are known to occur in Vigo County. From what is known of the life history of the mole crickets, the two species, *Gryllotalpa borealis* Burm., and *G. columbia* Scudder, undoubtedly exist through the winter in the larval stage, though I have never happened upon them in that season.

A careful study of the members of the genus *Gryllus* during the last three years has developed the fact that 4 species, namely: *G. neglectus* Scudder, *abbreviatus* Serville, *pennsylvanicus* Burm., and *luctuosus* Serville inhabit the county. The last two may be different forms of the same species, but

that the first 3 are distinct, there is, to my mind, no doubt.

Of these, the eggs of *neglectus* and *pennsylvanicus*, and probably those of *luctuosus*, hatch in autumn, and the young in numbers may be found beneath logs, rails, and other protective cover during the entire winter. Often as many as a dozen are sheltered beneath the same object, each at the bottom of a cone-shaped pit, quite similar to the one made in loose sand by the larva of the ant lion, *Myrmeleon obsoletus* Say.

G. neglectus reaches maturity as early as May 5th, the males having been heard chirping on that date. *Pennsylvanicus* and *luctuosus* are full grown about the 25th of May, while the adults of *abbreviatus*, from eggs hatched in spring, do not occur until the last week in July.

EGGS OF THE LONG-NOSED OX-LOUSE, *HAEMATOPINUS VITULA* L.

BY F. L. HARVEY, ORONO, ME.

Professor Osborn says in his monograph "Pedicula and Mallophaga affecting Man and the Lower Animals" (Bull. 7, Div. Ent. U. S. Dept. Agric. p. 18) "that the eggs of this species have not been described, and we have not had the good fortune to discover them." Having been more fortunate we are able to submit the following

account of the eggs of this species. The Long-nosed ox-lice has been quite bad this winter in herds in the vicinity of Thomaston, Me. At our request Mr. A. W. Batchelder of Thomaston collected some hair from the infested animals, and upon this we found *three egg-shells* with the operculum off, but the form, sculpture, manner and place of attachment to the hairs seemed perfect.

* Proc. Ind. Acad. Sci., 1891.

Description. Elongate oval, tapering toward the base. Slightly bulging on the side away from the hair in one specimen, or in the others narrower and more symmetrical. About two and a half times as long as wide. The empty shell hyaline and *beautifully sculptured with hexagonal reticulations*. The hexagons somewhat variable in size and perfectness in different



parts of the shell, but average ones about one-twentieth of the width of the shell. The surface apparently smooth, the angles of

the reticulations not beset with points as in the eggs of the Short-nosed ox-louse. Attached to the hair by a cement mass about one-third the length of the egg, as shown in the figure. The cement mass varies in shape, the distance it extends along the hair and the remoteness of the attachment from the root of the hair. The sloping base of the egg is included more or less in the cement mass, and the egg stands somewhat obliquely outward from the hair.

Below we give measurements of the three eggs observed. The figure, drawn to scale by the writer, shows the egg enlarged 40 times.

Measurements: Specimen (*a*), length, .863 mm.; width, .38 mm.; width of operculum, .265 mm.; from base of hair, 5 mm.; cement mass, .345 mm.; hexagonal reticulations of shell, .02 mm.

Specimen (*b*), length, .805 mm.; width, .379 mm.; width of operculum, .253 mm.; from base of hair, 5.75 mm.; cement mass, .288 mm.

Specimen (*c*), length, .805 mm.; width, .379 mm.; width of operculum, .265 mm.; from base of hair, 10 mm.; cement mass, .312 mm.

ON THE VALIDITY OF THE TACHINID GENUS CELATORIA.

BY D. W. COQUILLET, WASHINGTON, D. C.

On page 235 of the second volume of *Insect life*, the writer erected the genus *Celatoria* for the reception of an interesting Californian species of *Tachina* fly that preys upon the adults of the destructive *Diabrotica soror*, as many as one-third of these beetles sometimes falling a prey to the attacks of this parasite. The validity of this genus has been called in question by the well-

known authors, Messrs. Brauer and Bergenstamm, who cite it as a synonym of the previously described genus *Besseria* (*Die zweiflugler des Kaiserlichen Museums zu Wien*, vi, 154 and 189; also p. 220, where the species, *crawii* Coq., is erroneously credited to C. H. T. Townsend). That these two genera are very distinct from each other may easily be seen by the following

comparisons, the characters of *Besseria* being taken from the figures and descriptions given by the authors above mentioned. For the sake of uniformity, it will be assumed that the sex having

the process on the second ventral segment is the female, to which sex the above authors assign it, although in the genus *Celatoria* this form undoubtedly represents the male:—

BESSERIA.

Front of male destitute of orbital bristles.
 Face perpendicular, in profile strongly concave; epistoma projecting.
 Facial ridges bare.
 Third joint of antennae less than twice as long as the second.
 Genitalia of female nearly as broad as the abdomen, incapable of being concealed within the latter.

CELATORIA.

Front of male bearing two pairs of orbital bristles.
 Face retreating, in profile strongly convex, epistoma retreating.
 Facial ridges bristly to or beyond the middle.
 Third joint of antennae at least four times as long as the second.
 Genitalia horny, not broader than the tibia, capable of concealment in a groove on the venter.

From this it will be seen that not only are these two genera *not* identical, but their differences are so great that it becomes a matter of much surprise that the authors above mentioned, who have

not hesitated to establish new genera on very trivial characters, should have arrived at the conclusion that these two forms are one and the same.

THE LARVA OF BUTALIS BASILARIS ZELL.: THE RELATIONS OF ITS SETAE.

BY HARRISON G DYAR, NEW YORK CITY.

In *Butalis basilaris* Zeller (determined by Prof. C. H. Fernald) we have a Tineid larva which lives an exposed life. Its superficial resemblance to a Pterophorid is extremely close and it lives in the same situations. The larvae were found eating into the young leaves and buds at the ends of the growing shoots of the blackberry in June and again in August, at Keene Valley, N. Y.

Larva. Cylindrical, the abdominal feet slender, the circular planta with a ring of six

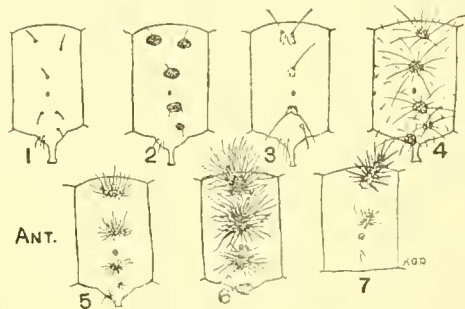
crochets regularly distributed. No secondary hairs; setae long, with flattened or winged-furcate ends, arising from cylindrical produced tubercles; i and ii approximate, their bases fused; iii lateral, iv and v united, vi subventral posteriorly, vii of three setae on the anterior side of the base of the foot; viii very small, next mid-ventral line. Color of the body shining green, closely adapted to the color of the young leaves; setae and tubercles white, adding a mossy appearance to the larva and causing it to still further resemble the leaves. Head slightly testaceous; width .6 mm., length of larva 5 mm.

When mature the larva spins a cocoon of a coarse open network of silk at the ground

and transforms to a pupa therein. The pupa is of the "incomplete" type (Chapman) and emerges from the cocoon at the time of exit of the moth.

The arrangement of the setae of the larva is very interesting, as it affords an example from the Tineidae of the arrangement characteristic of the Anthrocerid section of the Microlepidoptera, in which I have previously included only a part of the Pterophoridae, the Anthroceridae, Pryomorphiidae, Megalopygidae and Eucleidae. Thus different genera throughout the Microlepidoptera exhibit an ascending series, increasing in complexity and differentiation of structure, culminating in the Eucleidae. This differentiation follows certain definite lines and can be distinguished by a number of important characters from the parallel series of the Noctuidae. The more important of these are: (1) The conversion of tubercle vii into a leg-plate in the Noctuidae. (2) The approximation of the subdorsal and substigmatal tubercles in the Microlepidoptera. (3) The cutting off of secondary warts from the edge of the cervical shield on the prothoracic segment in the Noctuidae. (4) The formation of a true wart by tubercle iii on the meso- and post-thoracic segments in the Microlepidoptera. Each of these contrasts with the opposite condition in the other superfamily. I have made some diagrams to illustrate the series leading up to the Eucleidae, in which *Butalis basilaris* forms a link. In this I have not intended to trace certain side lines of development which occur.

Fig. 1 (*Plutella porrectella*) shows the primitive arrangement, found in certain lowly Tineidae. Fig. 2 (*Simiaethis pariana*) represents the usual microlepidopterous type, in which tubercles iv and v are united. Fig. 3 shows the present insect, in which i and ii are also united. The next step is the conversion of the single setae into warts by reduplication. It is illustrated in fig. 4 (*Oxyptilus periscelidactylus*) where, however, there are also secondary hairs present. In fig. 5 (*Ino pruni*) the warts have become more consolidated and the



unequal development of the subventral ones is seen. Here the soft hairs begin to be transformed into sharp spines. In fig. 6 (*Megalopyge crispata*) the subventral tubercles are still further reduced, and finally in fig. 7 (*Sibine stimulea*) we reach the Eucleid form, in which the subventrals are absent, the substigmatal wart has been reduced to two very obscure setae; representing iv and v, while the other warts are prolonged and their hairs nearly completely converted into spines.

TWO NEW WESTERN COCCIDAE.

BY T. D. A. COCKERELL, AGRIC. EXP. STATION. LAS CRUCES, NEW MEXICO.

One day last November, when riding home from the College, I noticed, about a hundred yards from the road, a clump of Lycium-bush, turning yellow from the approach of winter. Although most of the wild shrubs of the neighborhood had yielded their peculiar species of scale-insects (Coccidae), I had never been able to find any on the Lycium. Just at this moment, however, I was so impressed with the feeling that there *ought* to be a species on Lycium, that I got down, tied my horse to a post, and went to examine the above-mentioned clump. As I had hoped, in the middle of the clump, swarming on the stems and twigs, was a very interesting new species, which I now describe.

LICHTENSIA LYCII, sp. nov.

♀ scales numerous on the twigs and stems, more or less gregarious.

♀ reddish-brown, transversely wrinkled; nearly covered by the white convex ovisac, which is not woolly but leathery in consistency, not ribbed, slightly shiny, appearing as if made up of small roundish plates.

♀ with ovisac 7 mm. long, $4\frac{1}{2}$ high, or in many individuals somewhat smaller.

Eggs pale-orange. Larva brownish.

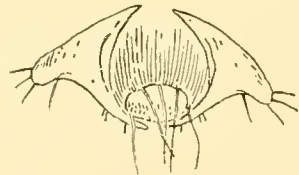
♂ scale about 2 mm. long, narrow, white, semitransparent, granulose, of the ordinary form seen in the Lecaniinae. When immature it is dark brown and subcarinate.

The above characters can all be seen with a hand-lens without preparation.

On boiling the insects in caustic potash the following additional points are discerned by the aid of a microscope.

♀ after being boiled colorless, flattened under a cover-glass it measures $4\frac{1}{2}$ mm. long, 4 mm. wide.

Antennae 8-jointed, 3 longest and about as long as 4 + 5. 5 a little longer than 4. 4 about as long as 8, or slightly longer. 8 as long as 2, or slightly longer. 6 a little longer than 7. Formula* 354 (821) 67. Joint 2 with a conspicuously long hair; joint 5 with a rather long hair. Legs well-developed and fairly large; tarsus, exclusive of claw, about as long as or slightly longer than third joint of antenna. Coxa with two hairs. Trochanter with two hairs, one much longer than the other. Femur very little longer than tibia, tibia considerably longer than tarsus. Femur with one, and tibia with two weak bristles on the inner side. Claw almost straight, fairly stout, the usual digitules well-developed.



slender though not filiform; digitules of claw extending considerably beyond its tip, but tarsal digitules extending beyond those of claw. All four digitules well-knobbed. Rostral loop very short. Margin with rather small, stout, blunt (almost truncate)

* The antennal formula is constructed by enumerating the joints in the order of their lengths, beginning with the longest, and bracketing together those of equal length.

spines. Anal plates appearing curved, sub-lunate, but on pressure flattening out to a more triangular form, with the outer sides meeting at less than a right angle. Anogenital ring with six hairs. The peculiar plates, with the anogenital ring between, are figured herewith, being difficult to describe in a satisfactory manner. The disposition of the seven bristles on each plate is to be noted; also the striae radiating from the ring.

Lichtensia viburni (Licht. MS.) Signoret, 1873, was until last year the only known species of its genus. It was first found at Montpellier, France, but was recorded from England by Mr. Douglas in 1887. I have received specimens from Mr. R. Newstead, which were found on ivy at Llandaff, Wales, by Mr. B. Tomlin. Just twenty years after the discovery of the first species, I found at Vera Cruz, Mexico, a most beautiful species with a yellow ovisac (*Lichtensia lutea* Ckll.), which at the time of its description (Ann. Mag. N. H. July 1893) was regarded as an aberrant Pulvinaria. Subsequent studies showed that it must be regarded as a *Lichtensia*, though widely departing from the type of that genus.

Quite lately I have received yet another species from Japan (coll. Takahashi, com. L. O. Howard) which will be elsewhere described as *Lichtensia dubia*.

The genus thus appears to consist of four species so far known, inhabiting widely distant localities. It is by no means certain, however, that we have a natural genus, consisting of species

derived from a common stock exhibiting the generic characters. The possibility cannot be forgotten, that what we call *Lichtensia* merely comprises several independent derivatives from the general Pulvinaria stock, in which case the peculiar distribution need not cause surprise.

L. lycii is from Las Cruces, N. M., 3,800 feet alt.; on a *Lycium* which Prof. E. O. Wootton informs me is almost certainly *L. Torreyi*, Gray.

CEROCOCCUS EHRHORNII, sp. nov.

♀ bright crimson, pyriform. Antennae minute, hardly longer than broad, jointless, subtruncate, with about five stiff bristles at the end. The antennae are about twice as far from each other as from the edge of the body, and about as far from each other as from the mouth-parts. Mouth-parts brownish. Caudal portion brown, cylindrical, produced, divided a little before its middle into two conical processes,—the lobes,—each bearing a few inconspicuous short but stout spines. Anal ring between these processes, with four (two pairs) of stout spines. Derm with very small double pores.

The females, no bigger than ordinary females of *Diaspis*, are gregariously massed on the bark in a hard dirty-white secretion, the scales not being separable. On boiling in soda, the insects turn the liquid brown.

Hab. On live oak, Mountain View, California, 1895 (coll. Ehrhorn).

This singular insect differs from *C. quercus* Comstock, the only Cerococcus hitherto known, by the shape of the ♀, the character of the anal ring (if Comstock's figure is correct), the shortness of the spines on caudal lobes, and the totally different external appearance.

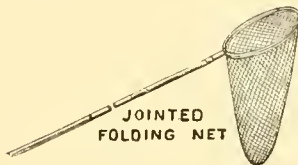
COMSTOCK'S MANUAL.

Professor and Mrs. Comstock have made a happy venture in their new Manual.* It is quite different in plan and execution from anything before attempted and, especially in simplicity of language, is far better fitted for the beginner than any work with which we are acquainted. Excepting for the mention of the commoner forms, admirably illustrated and almost entirely by original cuts (a few of the smaller of which have been unfortunately ruined in the printing), the student is carried only as far as the families. More than that would be utterly impossible in a single volume, but it would have added greatly to its usefulness if for each family, either in its place or in an appendix, short references had been made

* A Manual for the study of insects, by J. H. Comstock and Anna B. Comstock. 12,701 pp., 797 figs., 6 pl. Ithaca 1895, 8°.

to the principal literature to enable the student to know how to proceed further. In carrying out their plan the authors have employed a vast number of tables of great simplicity and directness; but not content with this they have introduced (for the first time, we believe, in such a manual) a uniform terminology for the venation of the wings of all insects, so that the work becomes an important aid to the advanced student as well. Their system has the merit of simplicity and of accordance with the principal terminology heretofore employed, but the working of this out for all the orders of insects and its direct application throughout, merits the thanks of every student and must have entailed far more labor than is commonly given to a volume of this sort. It is in the nature of an original research. We have not space to enter upon further details but must express our belief that the volume will greatly further the study of insects in this country.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,
Klaeger and Carlsbad Insect Pins, Setting
Boards, Folding Nets, Locality and
Special Labels, Forceps, Sheet Cork, Etc.
Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.
78 Ashland Place,

BROOKLYN, N. Y.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 231.

JULY, 1895.

CONTENTS:

LIFE HISTORY OF CLISIOCAMPA PLUVIALIS DYAR.— <i>Harrison G. Dyar</i>	259
ON THE TACHINID GENUS ACROGLOSSA WILLISTON.— <i>D. W. Coquillett</i>	261
WOOLLY LEAF-GALL MADE BY A SPECIES OF CALLIRHYTIS ON SCRUB-OAK.— <i>C. H. Tyler Townsend</i>	262
LOCAL BUTTERFLY NOTES.— <i>Shelley W. Denton</i>	263

SUPPLEMENT TO PSYCHE, I.—CONTRIBUTIONS FROM THE NEW MEXICO AGRICULTURAL EXPERIMENT STATION (New North American Coccidae, <i>T. D. A. Cockerell</i> ; New North American Bees, <i>T. D. A. Cockerell</i>).	1
--	---

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c

[Entered as second class mail matter.]

95-70573

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	.500
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE,

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$25.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, Danaüs archippus. Boston, 1880, 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichnology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, Retinia frustrana. col. pl. Boston, 1883.	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

LIFE HISTORY OF CLISIOCAMPA PLUVIALIS DYAR.

BY HARRISON G. DYAR, A. M., NEW YORK.

C. PLUVIALIS DYAR.

1883 — Stretch, Papilio, iii, 20 (as larva no. 1).

1893 — Dyar, Can. entom., xxv, 42.

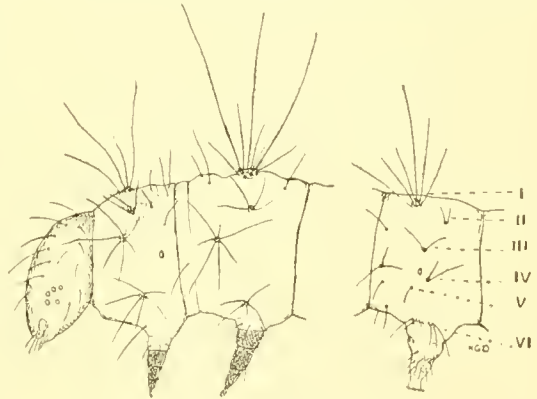
I have been enabled to complete the life history of this species through the kindness of Prof. O. B. Johnson of Seattle, and Prof. C. V. Piper of Pullman, Washington.

Both of these gentlemen have sent me eggs and examples of the moth.

C. pluvialis occurs throughout the Pacific Northwest where it represents *fragilis*. I have found the nests at Victoria, B. C. on Vancouver Island, at Tacoma and Seattle in Washington, and Portland, Oregon. It is recorded from Astoria, Oregon by Mr. R. H. Stretch, and sent me by Mr. Piper from Pullman, Washington.

The fully marked larvae look strikingly different from *fragilis*, yet the two are exactly alike in pattern, and whereas in *pluvialis* the orange marks are greatly developed and the blue reduced, in *fragilis* the orange is reduced almost to obliteration and the blue greatly extended. Mr. Stretch has noted a considerable range of varia-

tion in the Astoria larvae. He says that they varied by the expansion or contraction of the dorsal orange markings, and in the latter case the blue became strikingly visible. This is a greater range of variation than I have happened to observe in any one locality, but the specimens sent me by Mr. Piper have the orange considerably reduced.



Segments of stage i. $\times 35$.

I suspect that as we go East the orange marks will tend to be supplanted by the blue, and this species will grade into *fragilis*. However, I have yet to see larvae which are not definitely one or the other, and the moths seem not to pass into each other, though the Idaho region is still to be explored.

Eggs. The eggs are as usual in the genus. The ring-like masses are large, quite prominent and well covered with the usual frothy varnish. They appear to be deposited around the smaller twigs.

First stage. Entirely black with long pale hairs, finely barbed. Under a half inch objective small luteous subdorsal patches appear on the posterior margin of each segment, except at the extremities. Head black, not shining, width 0.4 mm. As the stage advances, the subdorsal patches become more distinct, especially on joints 5-10. They are triangular in shape, the base directed posteriorly. Subventral region pale. The arrangement of the warts is shown in the accompanying figure * magnified thirty-five diameters.

Second stage. Head dull black, width about 0.6 mm. Body black, the subdorsal orange patches as before or larger, but not extending cephalad of the large black wart i. Orange lateral and substigmatal lines now appear and slight traces of a subventral line, but all obscure and obsolete at both extremities. The subdorsal patches vary in width and may even reach the lateral line. Hairs faintly reddish, a little paler subventrally. Wart iv and the secondary one before the spiracle conspicuous; secondary hairs also present, but small.

Third stage. Head round, black, not shining; width 1.0-1.3 mm. Body black, marked as before, but the orange marks are greatly extended, the subdorsal patches reach the front part of the segment, or are divided into two by wart i; lateral lines broadened and diffused, so that most of the side is covered by orange mottlings. A series of narrow,

elliptical, segmentary, dorsal, blue patches. Hair reddish.

Fourth stage. Head round, black, hairy; width 1.6-1.8 mm. The dorsal blue spots form a broken line, on each side of which are the two orange spots on each segment, the posterior one large and irregularly triangular. A diffuse and mottled pale orange lateral line and many irregular orange mottlings, laterally and subventrally. The subdorsal blue dots now appear, but small, two on each segment situated above the lateral line.

Fifth stage. As in the next stage. Width of head 2.2-2.6 mm.

Sixth stage. Width of head 3.2 mm. I have already described this stage. (Can. ent xxv, 42.) It will be noticed that the evolution of the markings of *C. pluvialis* is very direct. The original pattern is outlined when the larva hatches and is merely increased and supplemented by the small blue marks as development proceeds. This is to be contrasted with the evolution of *fragilis* (Psyche vii, 189). *C. fragilis* starts with the same pattern as *pluvialis*, but in the third stage the course of development is abruptly changed, the orange is reduced and the supplementary blue marks afterward predominate. *C. pluvialis* seems to be the most generalized of our *Clisiocampa* larvae in respect to its markings.

Cocoon and pupa as usual in the genus. The pupa is cylindrical, the thorax and cases small, the abdomen large centrally, the last segment pointed, but blunt and without cremaster. Color black, hardly shining, covered sparsely with reddish pile except on the cases.

Food plants. Alder (*Ainus*), apple and *Crataegus* and also cherry, currant, bramble and rose, according to Stretch.

The nests are not large, but compact. One measured was 130 mm. long and 90 mm. broad at the top.

* In Journal N. Y. ent. soc. iii, 23, I described the setae in stage i of the genus *Clisiocampa*, using my notes on *fragilis*. My description is quite erroneous, as the figure shows, as my magnification was insufficient at that time. My description should be replaced by the figure. It will be noted that the arrangement beautifully corroborates the points which I was trying to establish. The series of hairs along the anterior edge of the abdominal segments are secondary, and the primitive first stage is wanting

ON THE TACHINID GENUS ACROGLOSSA WILLISTON.

BY D. W. COQUILLET, WASHINGTON, D. C.

A short time ago, in the course of classifying the Tachinidae in my collection, I referred one of the species to *Acroglossa hesperidarum* Will., since it agreed in every particular with the description of this genus and species in Scudder's "Butterflies of New England," pp. 1916-1917, with the single exception that the anterior pair of ocellar bristles curved *backward*, instead of forward, as stated in the description—a discrepancy which I imputed to a typographical or clerical error. The species also agreed so well with the descriptions of the genus *Spallanzania* Desv. as given by various European authors that I accepted the statement of Brauer and Bergenstamm, based upon a study of North and South American specimens, that the genus *Acroglossa* Williston is identical with the previously described *Spallanzania* Desvoidy (not Rondani, to whom these authors erroneously credit it; Zweif. Kais. Museums Wien, V, 354). Not long after this I received a copy of a paper by Giglio-Tos, on the "Ditteri del Messico, parte III." wherein this author refers a Mexican species to *Acroglossa* (l. c., 35), stating that the latter genus cannot be the same as *Spallanzania*, owing to the fact that the ocellar bristles curve *forward*—an opinion reiterated by Mr. W. A. Snow in the Kans. Univ. Quarterly, III, 185.

Neither of these authors had seen the types of *Acroglossa*, which are contained in the Harris collection, now in the Boston Museum. Wishing to settle this matter definitely I applied to the Secretary, Mr. Samuel Henshaw, who kindly examined these types for me and writes that the bristles in question *curve backward*. My supposition of an error in the original description, therefore, proves to be correct, and there is no valid reason for not sinking *Acroglossa* as a synonym of *Spallanzania*.

It is interesting to note that Mr. C. H. T. Townsend had correctly identified a specimen of *Acroglossa hesperidarum*. Mr. W. A. Snow recently compared this specimen with the types of *Pseudogonia ruficauda* Town. and *P. obsoleta* Towns., and reached the conclusion that they all belong to one and the same species (l. c., 184). The descriptions leave no doubt that this is the true *Acroglossa hesperidarum* Will.

Brauer and Bergenstamm refer *Cnephalia* Rond., *Pseudogonia* B. B. and *Spallanzania* Desv. as sub-genera of one genus, to which they erroneously apply the name of *Cnephalia* (l. c., VI, 214); whereas *Spallanzania* is much the older name. Owing to the fact that in certain species of this genus the third antennal and second arisal

joints vary in the different specimens of the same species even to a greater degree than the above authors state exists between *Cnephalia* and *Spallanzania*, the former cannot be maintained even in the sense of a sub-genus, but must be considered a synonym of *Spallanzania*.

The species referred to above as having been assigned to *Acroglossa* by Giglio-Tos, is evidently the form previously described by Van der Wulp as *Prospberryssa vilis* (Biol. Cent. Am., Diptera, II, 121), which Brauer and Bergenstamm make the type of their new genus, *Chaetogaedia* (l. c., V, 336). Giglio Tos remarks on the close

resemblance between his species and *Frontina acroglossoides* Town.; the latter is a synonym of *Baumhaueria analis* V. d. W., and also belongs to *Chaetogaedia*.

The forms discussed above may be listed as follows (synonyms in italics):
Spallanzania Desv. *Cnephalia* Rond.;

Acroglossa Will.

hesperidarum Will. (*Acroglossa*).

Pseudogonia ruficauda Town.;

P. obsoleta Town.

Chaetogaedia B. B.

analis V. d. W. (*Baumhaueria*).

Frontina acroglossoides Town.

vilis V. d. W. (*Prospberryssa*)

Acroglossa tessellata Giglio-Tos.

WOOLLY LEAF-GALL MADE BY A SPECIES OF CALLIRHYTIS ON SCRUB OAK.

BY C. H. TYLER TOWNSEND, BROWNSVILLE, TEX.

In the *Can. Ent.*, 1892, p. 200, I mentioned the breeding of a hymenopter, determined by Dr. Riley as *Andricus* sp. (?) from a woolly leaf-gall on scrub oak, found in the Organ Mts., Donna Ana Co., N. M.

On Nov. 12, 1892, this gall was found on scrub oak well up in the Organ Mts., above the Modoc vine. Sections that were opened on this date contained pupae. The galls were also noticed same date on scrub oaks at the base of the same mountains, at Riley's water.

On March 16, 1893, there were found issued and dead, from galls collected

Nov. 12, 1892, eleven gall-flies of a beautiful metallic green color. This is the above species. There was also found one specimen, larger in size and of a flavous brown color, apparently different, which had issued with the rest.

The gall may be described as follows:—

Gall.—Diameter, about 12 to 15 mm.; greatest height, 8 to 9 mm. On under side of leaf, woolly subhemispherical or dome-shaped in form, attached to the leaf by small rootlets or stems on the basal flattened surface, a stem to each principal section of the gall. Color, pink externally, shaded to slightly brownish or yellowish in mature or

old specimens, white internally, the basal portion somewhat darker. Gall formed of sections, each section at base containing a cell in which lives a larva or pupa, sections formed of more or less straight woolly-like brittle fibers all extending upward (downward on leaf) from and around the cell which forms basal portion of each section; the fibers are provided with fine spine-like spicules, the more terminal ones arranged in whorls. The fibers are white except on tips, which are pink or pale brownish yellow. These terminal ends of the fibers with their spicules are what form the external visible surface of the gall, and give it its woolly appearance. The basal portion of each section containing the cell is hard, pale greenish in color, and 5 or 6 mm. long by about 2 mm. wide external measurement. The cell contained within is about 4 mm. long by 1 mm. wide.

Described from several specimens. On leaves of *Quercus undulata* var.

wrightii. Organ Mts., southern N. M.

Specimens of the gall-maker, sent to Mr. Wm. H. Ashmead, were determined as *Callirhytis* sp. Two parasites of the latter that had been bred were determined as *Syntomaspis* sp. and *Torymus* sp.

The *Callirhytis* is an ample-winged light rufous species. Head and dorsum of abdomen darker rufous. Wings clear. Length 2 mm.; of wing 3 mm. The *Syntomaspis* is a small, elegantly formed, bright metallic green species, with ovipositor nearly as long as abdomen and thorax together, and hyaline wings. Tarsi yellowish. Length about 1½ mm.; of ovipositor, 1½ mm.

The *Torymus* is a very small, elongate, dark green species, with tarsi whitish. Wings clear. Length, 1½ mm.

LOCAL BUTTERFLY NOTES.

On June 2, 1895, while butterfly hunting in Wellesley, I saw and nearly captured a fine specimen of *Papilio cresphontes*. This is the first I remember to have seen flying in Wellesley although Mr. Thomas Smith at the Hunnewell gardens has one taken by him a few years ago on those grounds.

On June 7 Lieut. W. Robinson captured in the street opposite his house in Cambridge a perfect specimen of *Basilarchia arthemis* which had evidently just emerged. It was busily engaged sucking up the moisture from a muddy spot in the street and was taken without difficulty, making no attempt to fly. I can find no record of this butterfly's occurrence in Cambridge, hence communicate the fact.

The aberrations *fasciata* and *obliterata* of the butterfly *Heodes hypophlaeas* have been particularly numerous about Cambridge this

season, Lieut. Robinson having taken a great many and well marked individuals of the former and several good examples of the latter. In one specimen of *obliterata* not a spot or trace of a spot on the upper or under surface of the fore-wings was visible, except the two included within the cell, which appear to be always present. He also took a remarkable example of the aberration *fulliola* in which the upper surface of the fore-wings are a light brassy yellow except near the base on the costal margin where the usual coppery red is visible in a slight degree. This specimen is in excellent condition. I may add, however, that the taking of the above aberrations is the result of intelligent collecting since Mr. Robinson looked over hundreds in the fields only selecting those that appeared interesting or peculiar.

Shelley W. Denton.

Wellesley, Mass.

THE SEVENTH VOLUME OF PSYCHE *

Began in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

Vols. 1-6, Complete, Unbound, - Now sold for \$29.00.
 Vols. 1-6, and Subscription to Volume 7, - - \$33.00.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

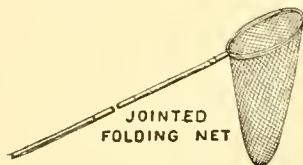
- Vol. 1. Introduction; Nymphalidae.
 Vol. 2. Remaining Families of Butterflies.
 Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo, half levant, \$75.00 net.

HOUGHTON, MIFFLIN & CO.,

4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carl-bader Insect Pins a specialty. Price List sent on application.
 78 Ashland Place.

BROOKLYN, N. Y.

SUPPLEMENT TO PSYCHE,—I.

CONTRIBUTIONS FROM THE NEW MEXICO AGRICULTURAL EXPERIMENT STATION.

I. NEW NORTH AMERICAN COCCIDAE

BY T. D. A. COCKERELL.

Tachardia fulgens, n. sp.—♀ scales usually massed together, more or less surrounding the twig, forming an irregular nodulose bright reddish-orange coating about 4 mm. thick. A single scale is about 5 mm. long and 4 broad, and presents a conspicuous somewhat curved, blunt, shining, dorsal hump; also a tail-like projection, sometimes directed upwards, and two or three irregular projections on each side. The “hump” and “tail” are sometimes so placed, that when the scale is viewed from the side it presents a ludicrous resemblance to the head of a man with a very long, crooked nose and a short, pointed beard.—or when the “tail” is pointed upwards, it looks like a much-produced chin, and the scale then strongly suggests the features of the historical Mr. Punch!

On boiling in caustic alkali, the insects give a fine deep crimson color.

♀ approximately globular, purple (becoming reddish-brown after being placed in absolute alcohol and mounted in balsam), with the lac-tubes very conspicuously contrasting—these latter quite colorless, with the terminal gland-mass yellow. Rostral loop extremely short. Spine stout. Groups of glands in vicinity of “tail” (which has

nothing to do with the external “tail” above) round in outline, with about 12 orifices. “Tail” very broad, its outline about that of the dome of St. Paul’s, or narrower in some examples; projecting from it the 10 or 12 bristles of the anogenital ring. (In one I counted 12, in another only 10.) Lac-tubes cylindrical, with stout stalks, gland-groups at end rounded beneath; forming, seen from the side, a broad crescent, not quite a hemisphere.

The young larvae are elongate, dark crimson in color.

This species is in many respects allied to *T. larreae* and *T. cornuta*, but can easily be distinguished from both by external appearance alone.

Hab. Arizona, received from Prof. J. W. Toumey, who gives me the following interesting particulars. He got it from a Mexican, and has seen only the stem of the food-plant, but thinks it is a *Sesbania*. He was told that this lac was used quite extensively by the Mexicans as a medicine for stomach troubles, under the name of “Gomea.” It is kept in the drug shops at Tucson, and meets quite a sale. It is also used to some extent in mending pottery, etc. Finally, he adds, the Mexicans make a

marked distinction between this and *T. larreae*, the latter not being considered to have any medicinal qualities.

It is certainly the most beautiful and striking lac I have ever seen.

Tachardia pustulata, n. sp. — ♀ scales more or less massed together, sometimes single, deep crimson, about the color of black-currant jelly, moderately shiny, with small, pellucid pustule-like prominences. A single scale is $3\frac{1}{2}$ mm. long, 3 wide and $2\frac{1}{2}$ high, but there is variability in size, some being larger.

Very young scales, only about $1\frac{1}{2}$ mm. long, are more pellucid, and about the color of guava-jelly, with three irregular blunt rays on each side, and a dorsal tooth-like prominence resembling that of adult *T. cornuta*.

♀ subglobular, colorless when boiled in alkali. Rostral loop very short. "Tail" broad, anal ring with 10 hairs, which are short and straight. Spine thorn-like, broad at base, rapidly narrowing to its almost needle-like terminal half; or sometimes stouter. Lac-tubes conical, broadening at base, truncate as usual at ends, terminal mass brownish, nearly a hemisphere seen from the side. Groups of glands inconspicuous, irregular in outline, with about 12 orifices.

Young larva like that of *T. fulgens*.

Embryonic or newly-hatched larva with 6-jointed antennae; joints 1, 2, 4 and 5 short, 3 and 6 long; 5 swollen, with a whorl of hairs; 6 with 1 long and several short hairs. Legs ordinary, claw very slender. Anal ring with 6 stout bristles.

Hab. *T. pustulata* was found by Prof. Toumey near Phoenix, Arizona, early in the spring of 1894. It occurred on a small perennial composite which was unknown to Prof. Toumey, and being without flowers or fruit, could not be identified. It has linear leaves.

Ceroplastodes acaciae, n. sp. — ♀ scales clustered on twig. Scale strongly convex, snow-white, very like *C. niveus*, but rather smaller, and more nodulose, the dorsum

being covered by irregular prominences. It is, however, less nodulose than *C. daleac*. Length of scale about 3 mm.

♀ not staining liquid when boiled; derm reddish-brown. Antennae 8-jointed, 2 broader than long, 3 longer than broad, and decidedly longer than 2 or 4. 4 longer than broad, somewhat longer than 2. 5 subequal with 4. 6 shorter, 7 shorter still, 8 longer than 7. Rostral loop very short. Legs ordinary, trochanter with a moderate bristle. Tarsus not so very much shorter than tibia, though distinctly so. Digitules ordinary not very long. Anal ring with very numerous hairs; anal plates pale brownish.

♂ scales elongate, white, nodulose, with a marginal fringe of small nodules. Length about 2 mm. or slightly more.

Young larvae naked, reddish-brown, granular, distinctly segmented, not particularly elongated.

Hab. On *Acacia constricta*, June, 1893, between the University of Arizona and Tucson, collected by Prof. J. W. Toumey. Prof. Toumey states that he has seen the scale several times since on this species of *Acacia*, but never on other plants. The food-plant of the Mexican *C. niveus*, to judge from the twigs the type-specimens are on, is also an *Acacia*, but a different species.

This is only the third species of the genus discovered.

Toumeyella, n. subg. of *Lecanium*. — ♀ scale convex, embracing twig, moderately hard; dorsum shiny, with numerous broad, white, waxy rings on which are sometimes small black spots. Adult ♀ with the legs apparently absent: the antennae very short, rudimentary, 6-jointed. Embryonic larva with a pair of extremely long bristles on each side, each representing the larger stigmatal spine. Type *L. mirabile* n. sp. This will doubtless be considered a distinct genus hereafter, but it is preferred to leave it as a subgenus of *Lecanium* until the whole Lecaniine group can be generically revised.

Lecanium mirabile, n. sp.—♀ scale about 8 mm. long, 7 broad, and 5 high. Nearly circular in outline seen from above, hard, yet soft or elastic enough when alive to crush without breaking in pieces; very dark brown, with conspicuous irregular rings of snow-white waxy secretion, about 1 mm. diameter. In some specimens the rings are dotted with black. In a general way it may be said that the rings are arranged in six longitudinal bands; their centres are more or less depressed. The insect has quite a strong, musky odor. Removed from the twig, the insect leaves a small amount of white powder.

♀ apparently without legs. Antennae very short, cylindrical, hardly at all tapering, 6-jointed; 3 longest, 4 shorter than 2, 5 shorter than 4, 6 very short, button-like, emitting numerous straight hairs. There is a false joint in the middle of 5, and an obscure one in 3.

Derm orange-brown, microscopically tessellate, the tesserae not gland-spotted. Portions of the derm exhibit numerous glands, appearing as round rings situated on oval discs.

The insects, when boiled in caustic alkali, give a very strong, dark, madder color. The young larvae in soda are pale crimson.

Young larva oval; when alive it has the dorsum pale, purplish-grey, with a dark band down each side, and the margin very pale.

The embryonic or newly-hatched larva is very peculiar. The egg-membrane fits closely to the larva on one side, while on the other it is widely expanded, being apparently held in this position by a pair of very large and long straight bristles projecting from the side of the larva. When the larva is free one can see that these bristles also exist on the side which was adjacent to the egg-membrane; they are, in fact, the largest stigmal bristles very greatly developed. The legs of these larvae have the digitules well developed. The anal ring seems to present

numerous hairs, but in a free larva there were clearly seen to be but six. The rostral filaments are coiled like a watch-spring. The caudal filaments in a free larva are seen to be quite long, each arising from a tuft of small bristles.

Hab. This extraordinary insect was sent by Prof. Toumey, whose attention was first called to it by Prof. R. H. Forbes, Chemist of the Arizona Exper. Station. It occurs on mesquite (*Prosopis juliflora* var. *glandulosa*) near the University of Arizona, Tucson.

Lecanium quadrifasciatum, n. sp.—♀ scales crowded in a thick cluster 7 or 8 cm. long, overlapping. Scale about 7 mm. long, 5 broad, and 3½ high. When alive moderately soft, shiny, of a livid pinkish color, with four longitudinal bands of grey spots, the spots being slightly depressed. There is mottling of the same character below the fourth band. The bands are about equally distant from one another, and the dorsal bands may be closer together than to the lateral. Margin immaculate, and more pinkish than the rest of the scale. The scales have quite a musky odor, as in *L. mirabile*.

Boiled in soda, the adult ♀ gives a strong madder color. Derm colorless, with small round gland-spots. Anal ring with six well-developed hairs. Anal plates together forming nearly a square. Antennae rudimentary, cylindrical, obscurely 6-jointed, tip with several short straight hairs. Legs rudimentary, looking something like small stout antennae, tibia and tarsus each nearly as broad as long, femur about 1½ times as long as broad. All four digitules present though small. Mouth-parts well developed.

Hab. On twig of *Robinia neomexicana*, Soledad Cañon, Organ Mts., New Mexico; found by J. E. Owen, a student in the preparatory department of the N. M. Agric. College.

This is another extraordinary species, and should probably fall under *Toumeyella*, in which case the diagnosis of that group

would have to be altered a little. Nothing certain can be said, however, until the embryonic larva of *quadrifasciatum* has been seen. It is to be observed that *L. robiniarum* Douglas, found at Las Cruces, N. M., on *Robinia pseudacacia*, has nothing whatever to do with *quadrifasciatum*, being a *Eulecanium*. It has doubtless been introduced into New Mexico from the Eastern States, though not hitherto recognized there by entomologists.

Diaspis toumeyi, n. sp. — ♀ scales circular or nearly so, moderately convex, about 2 mm. diameter, white tinged with yellowish or brown, exuviae sublateral, first skin exposed, pale straw; second skin, exposed by rubbing, orange. Removed from the twig, the scale leaves a white mark.

♂ scale as usual in genus, white, obscurely uncarinate, with the very pale yellowish exuviae at one end.

♀ (boiled in soda) very pale brownish (when dry, not boiled, dark brown). Rows of transversely oval pores, as usual in genus. Anal orifice small, subcircular, not very far from hind end. 5 groups of ventral glands, median round, caudolateral oval, cephalolateral long-oval. Caudolateral with 25

orifices, caphaloteral 36, median 24. Median lobes extremely large, separated by a wide interval in which is a pair of small spines, strongly divergent, pale brown, rounded, finely crenate. Remaining lobes practically obsolete. Following first lobe on margin is a low obscurely quadrifid structure representing the second lobe, then a pair of short broad cone like plates, then a slight prominence, then a conical plate, then a spine, then a conical plate, then a short interval, then two small conical plates, then an almost obsolete plate, then a pyramidal small blunt brownish projection apparently representing a lobe, then two small plates, then a spine, then three large conical plates separated by rather wide intervals.

Hab. Prof. Toumey, sending specimens, writes on April 29, 1895: "While at Maricopa a few days ago, I drove to the mountains some 10 miles south, and on the way found an interesting shrub which grows here to the size of a tree; I refer to *Holacantha emoryi*, which has not before been reported north of Mexico. In many places this plant was entirely covered" by *Diaspis toumeyi*. The species is allied to *D. cacti* in some respects, but very distinct.

II. NEW NORTH AMERICAN BEES.

BY T. D. A. COCKERELL.

Andrena salicinella, n. sp. — ♀ about 8 mm. long, black, with thin white pubescence, abdomen with hair-bands.

Head somewhat broader than long, vertex sub-depressed; clypeus prominent, shining, strongly and rather closely punctate, its disc almost bare. Vertex minutely roughened, more or less aciculated. A very distinct but short broad band of appressed snow-white pubescence before each anterior orbit. Flagellum slightly tinged with brown towards end. Thorax rather small; mesothorax with large, sparse, distinct punctures. Scutellum

with similar punctures. Metathorax finely roughened, enclosed area sculptured like the part beyond, enclosure bounded by a very obscure rim. Pleura with long white hairs, not dense. Tegulae testaceous, moderately shining. Wings distinctly yellowish, nervures and stigma honey-yellow. Legs with pale hairs; femora and tibiae piceous-black, all tarsi clear ferruginous.

Abdomen shining, its surface minutely tessellate, impunctate. Apical margins of segments narrowly testaceous, segments 2 to 5 with apical bands of dirty-white hairs,

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 232.

AUGUST, 1895.

CONTENTS:

NOTES ON THE WINTER INSECT FAUNA OF VIGO COUNTY, INDIANA.—II.— <i>W. S. Blatchley.</i>	267
HABITS AND PARASITES OF <i>STIGMUS INORDINATUS</i> FOX.— <i>A. Davidson.</i>	271
PRICKLY LEAF-GALL OF <i>RHODITES TUMIDUS</i> ON <i>ROSA FENDLERI</i> .— <i>C. H. Tyler Townsend.</i>	272
THE BOMBYLID GENUS <i>ACREOTRICHUS</i> IN AMERICA.— <i>D. W. Coquillett.</i>	273
NEW NORTH AMERICAN ODONATA.—II.— <i>A. P. Morse.</i>	274
NOTES ON MOTHS.— <i>Caroline G. Soule.</i>	275
PROCEEDINGS OF THE CAMBRIDGE ENTOMOLOGICAL CLUB (Election; <i>Colias hecla</i> ; winter collecting; <i>Lycaena xerces</i>).	275

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

5.70573

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

PS Subscriptions not discontinued are considered renewed.

PS Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	.500
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

PS Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " " "	1.25	1.00
Half " " " "	2.25	1.75
One " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by
R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danaus archippus</i> . Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> . col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

NOTES ON THE WINTER INSECT FAUNA OF VIGO COUNTY, INDIANA.—II.

BY W. S. BLATCHLEY, INDIANAPOLIS, IND.

Vigo County lies on the western border of Indiana, and almost midway between the northern and southern boundaries of the State. The topography of the county is varied. The Wabash River flows through its north-western corner and in many places its bottoms, which are usually overflowed each spring, are from two to four miles in width.

Bordering these lowland bottoms are level river terraces or prairies varying in width from three to eight miles, the soils of which for a half mile or more are exceedingly sandy, but lose this character as one proceeds farther away from the lowlands. Beyond the prairies are the uplands, usually more or less broken or hilly, which extend to the confines of the county, and are underlaid with coal. I mention these facts because observation has led me to believe that the insect fauna of any region is determined largely by its topography and soils, as well as by its latitude, temperature, etc.

My collecting, especially that of winter, has mostly been within a radius of ten miles of the city of Terre Haute, and largely along the hillsides where

the bottoms and prairies, or the prairies and uplands meet.

About 160 species of Hemiptera-Heteroptera have been taken in the county, but I believe that this number by no means exhausts the fauna of this suborder existing there, as such species only have been taken as have come to hand while searching for other forms. Of these, two-fifths, or 64 species, have been taken in the winter months.

Thirty-eight of the sixty-four are listed in the present paper, and brief notes as to the places which they occupy in winter are given. The remaining species, — from the Lygaeidae onward, will be treated of in a future article.

The arrangement and nomenclature is that of Uhler's "Check-List of the Hemiptera-Heteroptera of North America," to the author of which, Mr. P. R. Uhler of Baltimore, Md., I am under many obligations for aid in determining the species of Heteroptera which inhabit the county.

In addition to the 64 species of this suborder taken by myself in winter, Mr. E. P. Van Duzee, in his recent "List of the Hemiptera of Buffalo and

Vicinity," mentions 13 other species taken by him in that season, in the vicinity of Buffalo, New York. It is probable, therefore, that, in the north-eastern United States, fully 100 species of Heteroptera survive the winter as imagoes.

HEMIPTERA—HETEROPTERA.

CORIMELAENIDÆ.

1, *Corimelaena atra* Am. et Serv. Found singly beneath logs and the leaves of mullein (*Verbascum thapsus* L.) Dec. 10—Feb. 25.

2, *Corimelaena pulicaria* Germ. Beneath rails and dead leaves in fence corners (Feb. 11—Feb. 25).

CYDNIDÆ.

3, *Amnestus pusillus* Uhler. One specimen, the only one seen in the State, was taken from an overturned log on a sandy hillside (Dec. 23).

PENTATOMIDÆ.

4, *Podisus spinosus* Dallas. Not a common species in Western Indiana. Hibernates beneath the leaves of mullein, etc. (Jan. 5—Feb. 11.) The "soldier bug" seems to have a fondness for a diet of butterfly larvae, as a specimen was taken in June feeding upon a caterpillar of *Danaï archippus* Fab., and another in November on one of *Papilio cresphontes* Cram.

5, *Podops cinctipes* Say. Frequent in winter beneath chunks on sandy hillsides.

6, *Brochymena annulata* Fab. This, the common member of the genus with us, is found throughout the winter in small colonies of three to a dozen huddled closely together beneath the loose bark of dead black walnut and ash trees. When, even on a warm day, the protective cover of bark is removed, they remain perfectly motionless, with antennae invisible on account of being folded back close alongside the beak beneath the head and body.

7, *Mormidea lugens* Fab. Rare in winter beneath chunks and the leaves of mullein (Dec. 10—Jan. 25). Common in summer on mullein, and on one occasion (Oct. 16), thousands were seen crawling over the leaves and stems of the Strawberry Bush (*Euonymus americanus* L.).

8, *Euchistus tristigmus* Say. Hibernates singly beneath logs and chunks, especially those with sides deeply buried in vegetable mold (Dec. 12—Feb. 14).

9, *Euchistus ictericus* L. Singly beneath radical leaves of mullein, and beneath leaves and pieces of rail in fence corners.

10, *Hymenarcys aequalis* Say. In winter a common and gregarious species beneath logs, mullein leaves, etc.—especially in sandy soil. In one instance 50 or more were found huddled together in one bunch. The nymphs are also rarely found in winter.

11, *Hymenarcys nervosa* Say. Rare in winter beneath logs and stones near the borders of woods and cultivated fields (Feb. 6—8).

12, *Thyanta custator* Fab. An uncommon species in Western Indiana, and varying much in color through different shades of green and olive brown. Taken in January on three occasions from beneath the radical leaves of mullein.

13, *Nezara hiliaris* Say. In Vigo County this handsome Pentatomid reaches maturity about the middle of August, and a few individuals undoubtedly survive the winter, as I have taken it in two instances on sunny days in the first half of March from the branches of shrubs, but have never happened upon it during my winter collecting.

COREIDAE.

14. *Anasa tristis* DeGeer. This common and disgusting insect hibernates in numbers beneath the loose bark of stumps and snags of various kinds. Often a score or more will be found occupying a space a foot square beneath the bark. Many of them die before spring, especially if the winter is an open one with alternate freezing and thawing, but there are always plenty left for "seed." They have been found in winter a mile and more away from any spot where squash or kindred plant was grown the season before—showing that distance does not deter them from securing a hibernaculum to their liking.

15, *Ceraleptus americanus* Stål. But three specimens of this insect have been taken in the county. They were found beneath chunks, in sandy soil, on Dec. 10, March 11, and March 28,

respectively. In general appearance it resembles a diminutive "squash bug."

BERYTIDAE.

16. *Jalysus spinosus* Say. Singly beneath logs and mullein leaves on a number of occasions during the winter months.

17, *Harmostes reflexulus* Say. Beneath mullein leaves, (Dec. 10—Jan. 13). Frequents flowers of yarrow (*Achillea millefolium* L.) in June.

18, *Corizus hyalinus* Fab. A common winter insect beneath mullein leaves, chips, chunks, etc. Usually several are found in close proximity.

LYGAEIDAE.

19, *Nysius angustatus* Uhler. Beneath boards and chunks along the borders of cultivated fields (Dec. 3—Jan. 6).

20, *Ischnorhynchus didymus* Zett. Rare. Singly beneath logs near the edges of woods (Jan. 13).

21, *Cymodemata tabida* Spin. Rare. But two specimens taken in the county. Beneath logs in open woods (Nov. 30—Dec 18).

22, *Blissus leucopterus* Say. Too common. Gregarious. Hibernates beneath chunks and mullein leaves, especially along borders of cultivated fields; also within small crevices in bottom rails of fences; between the root leaves and stems of sedges, grasses, etc., etc.

23, *Geocoris discopterus* Stål. Taken on two occasions in winter

from beneath mullein leaves (Jan. 5–Feb. 20).

24, *Geocoris fuliginosus* Say. Frequent. Singly or in pairs beneath logs and chunks along roadsides.

25, *Ligyrocoris constrictus* Say. Rare. Beneath logs (Dec. 10).

26, *Myodocha serripes* Oliv. One of the most common of our winter Hemiptera. Found beneath logs, chunks, decaying leaves, etc., especially in dry sandy soil in upland woods. Seldom more than two are found together though sometimes gregarious. When their protective shelter is disturbed, unless benumbed with cold, they crawl hurriedly away, their slender neck and long swinging antennae giving them an odd appearance as they go. Occasionally the last two nymph stages are found in mid-winter.

27, *Pamera basalis* Dallas. Rather common throughout the winter beneath logs, stones, and rubbish along the borders of cultivated fields.

28, *Ozophora picturata* Uhler. The only specimen in my collection was taken from beneath a log on a sandy hillside, Dec. 3.

29, *Ptochiomera nodosa* Say. Very common beneath chunks along the borders of open fields.

30, *Cnemodus mavortius*, Say. An uncommon species but taken on several occasions in winter from beneath logs in damp localities. Usually two in a place.

31, *Trapezonotus nebulosus* Fall. Quite common beneath rubbish along the borders of sandy fields, especially those in which melons had been cultivated (Dec. 4–Feb. 1).

32, *Emblethis arenarius* Linn. Frequent; especially so beneath mullein leaves (Dec. 10–Jan. 25).

33, *Peritrechus fraternus* Uhl. Rare. Beneath chips and dead leaves on the side of high sandy hill (Feb. 14–Feb. 21).

34, *Megalonotus unus* Say. I have taken this insect on but two occasions. March 21, 1893, I found ten occupying a space of a few square inches beneath a rail near the border of an upland woods. They feigned death when disturbed. On Dec. 23, an additional specimen was secured from beneath a log on a sandy hillside.

35, *Microtoma carbonaria* Rossi. Common. Hibernating singly or in pairs, beneath logs, chunks, leaves of mullein, etc.

36, *Peliopelta abbreviata* Uhler. Rare. Two were taken from beneath a chunk on roadsides, Dec. 23.

37, *Lygaeus turcicus* Fab. Common throughout the winter, both as nymph and imago, beneath logs and mullein leaves along the sandy border of the old Wabash and Erie canal, where its food plant the common milkweed (*Asclepius cornuti* Decaisne) grows in abundance.

38, *Lygaeus reclinatus* Say. This form, distinguished from the above only by the white spots on the membranes of the wing covers, is much less common in winter. It frequents the same localities as *L. turcicus*, and I doubt whether the two are distinct, though Uhler treats them as so in his Catalogue, and named them as so for me.

HABITS AND PARASITES OF STIGMUS INORDINATUS FOX.

BY A. DAVIDSON, M. D., LOS ANGELES, CAL.

Judging from the number of tunnels excavated by this species in soft stemmed plants and friable rock, it must be somewhat common in this vicinity, although on account of the small size and rapid flight it is very seldom seen. The only time I have ever seen it flying was when watching near their excavations, at which time the wasp with its prey may be easily captured. They usually build their cells in tunnels excavated in the stems of the bramble, black mustard, dock, or other pithy plants; but not infrequently they may be found in burrows in the soft sandstone abounding in this district. The plant-stems invariably chosen for a nesting site are those already severed, or broken sufficiently to expose the pith. In the center of this a tunnel of varying depth is excavated. I have a specimen in my possession in which this tiny insect has formed a tunnel 12 inches deep and built and provisioned therein 30 cells. The latter measure on an average one-fourth inch in length by one-sixteenth in width; but both are variable, the width frequently being one-eighth of an inch. This wasp stores its nest with the common aphid, 20 of which are on an average required to provision each cell. The partitions between the cells are composed of pith and vary in thickness. From specimens which I secured in the autumn

the mature insects issued in February and March, but the discovery of freshly made cells in February and throughout the summer gives me the impression that while the majority of the adults issue in the spring, yet they are more or less active all the year round, in which respect they are unique among the native hymenoptera of my acquaintance. The larvae spin no cocoons the light yellow pupa lying on its back in the cell. Of the parasites, but two species have been bred thus far; viz.: *Omalus iridescens* Nort., and a new species of *Eurytoma*. Of the former only two specimens were reared, from separate cells; both had pupated when discovered in February, and hatched out March 14. Of the *Eurytoma*, of which a description has been kindly furnished by Mr. Ashmead, a dozen specimens were bred. Each occupied a separate cell which showed no trace of wasp remains; they spun no cocoons, and were about two weeks later in hatching out than the wasps in the same burrows.

Mr. Ashmead's description of the new *Eurytoma* is as follows:—

Eurytoma stigma Ashm. n. sp.

♀. Length 3 mm. Black, umbilicately punctate, clothed with sparse white pile; antennae entirely black; apical half of anterior femora, their tibiae, except a black stripe outwardly, and all their tarsi, except the last

joint, knees of middle and of hind legs and the tips of their tibiae, honey yellow. Wings hyaline, the veins brown, the marginal vein linear but rather stout, twice as long as the stigmal, the post-marginal slender, a little longer than the stigmal. The flagellum is about three and a half times as long as the scape; the funicle 5-jointed, the first joint the longest, not quite twice as long as thick, the following joints imperceptibly shortening, submoniliform; club 3-jointed, a little longer than the first two funicular joints united, the joints closely conjoined. Thorax as in *E. diastrophi*. Abdomen conically pointed, subcompressed, nearly one-half longer than the head and thorax united, smooth and pol-

ished, except segments 6, 7 and 9 which are finely shagreened from some microscopic punctures and bearded with white hairs.

♂. Length 2.5 mm. Agrees with the ♀ in color, but the funicular joints are incised and pedicellate at tips, the thickened portion being furnished with two whorls of long white hairs, some of which are as long as the joints, the latter very gradually decreasing in length; the club is as long as the first funicular joint, but slenderer; while the body of the abdomen is small, compressed and as viewed from the side triangular in outline attached to the metathorax by a long petiole which is finely sculptured or shagreened and nearly as long as the body of the abdomen.

PRICKLY LEAF-GALL OF RHODITES TUMIDUS ON ROSA FENDLERI.

BY C. H. TYLER TOWNSEND, BROWNSVILLE, TEXAS.

A few miles to the north of Ojo Caliente, on the Hot Springs reservation, in Socorro County, New Mexico, some spherical prickly galls were found in bunches on the leaves of a wild rose, June 18, 1892. They were the size of very large peas, reddish and greenish, and covered with prickles. One of these galls that was opened Dec. 13, 1892, contained a whitish live hymenopterous pupa, which was somewhat active. This was the pupa of the gall-maker, *Rhodites tumidus* Bass.

Description of gall.—Diameter 3 to 9 mm. Usual size, 6 to 8 mm. Globular, or subglobular, covered with prickles on upper half, prickles mostly directed upward especially the more superior ones which are from 1 to 1½ mm. long, those on sides much shorter. Color brick-reddish above, and pea-green below, indicating the surface that has been

exposed to the sun and that which has been sheltered therefrom. Growing in bunches, from 2 to 10 in a bunch, rarely singly. Borne always on upper surface of leaf, sometimes three on the same very small leaf which is thus almost obliterated, sometimes borne on petiole of leaf, often double. Gall containing a single large perfectly round cavity, lined with a very thin greenish lining, walls 1½ mm. thick in gall of 8 mm. external diameter, leaving cavity about 5⅓ mm. in diameter. Walls porous, minutely cellular, a cross section appearing finely reticulate under lens, the lining of cavity sharing this appearance. The walls average 1 mm. in thickness. Each gall contains but a single occupant. The double ones never communicate inside. The gall-fly emerges by a circular hole gnawed in one side of the gall about 1¼ mm. in diameter.

Described from 38 galls. From two of these galls, two gall-flies had

emerged and died, being discovered April 2, 1893. On April 3, 1893, all of the remaining galls were opened. Every one contained an insect, either as adult, pupa, or in one case (that of the smallest gall only 3 mm. in diameter) a small shrivelled larva. The occupants were as follows: Dead adults (including the two that had emerged), 12; live adults, 6; pupae, 18; larva, 1. The pupa usually bears the cast larval skin attached dorsally to the anal extremity.

The gall-fly is 1 to 4½ mm. long. The whole insect is black, except the abdomen and legs which are orange-red. Wings subhyaline, shaded with fuscous. It is a notable fact that no sign of a parasite was discovered in all of these galls.

I am indebted to Mr. Wm. H. Ashmead for identifying the *Rhodites*. It is a very pretty species. The abdomen changes to a dark but very highly *polished brown* in dried specimens.

THE BOMBYLID GENUS *ACREOTRICHUS* IN AMERICA.

BY D. W. COQUILLET, WASHINGTON, D. C.

For several years past the writer has enjoyed the privilege of examining many interesting forms of Diptera taken by Prof. O. B. Johnson in various parts of the state of Washington, and several of these have been made known from time to time in our various entomological journals. Among a recent sending is a single specimen belonging to the Bombylid genus *Acreotrichus* of Macquart, heretofore known only from Australia. It is closely related to the genus *Phthiria*, differing in the structure of the antennae and in the densely hairy face. The species is as follows:

Acreotrichus americanus n. sp. ♂. Black, including the palpi and knob of halteres, only the stem of the latter is yellow. Eyes contiguous, frontal triangle and face gray pollinose, face and underside of head densely long black pilose. Antennae slightly longer than the head, first joint twice as long but not wider than the second, the

latter as broad as long, both densely long black pilose; third joint slightly over twice as long as the first, at its base narrower than the second joint, continuing slender nearly to the middle, then rather suddenly expanding to nearly twice its former width, the greatest expansion being on its upper side, then tapering quite suddenly to the tip which is blunt; a short, blunt-pointed style on the upper side of this joint a short distance before the apex; on the upper edge of the expanded portion of this joint are five black bristly hairs, each nearly half as long as the joint itself. Proboscis as long as the head and thorax taken together, the labella very narrow; palpi filiform, two-fifths as long as the proboscis. Thorax velvety, the front corners, sides and pleura gray pollinose, its pile black; scutellum velvety, densely black pilose. Abdomen velvety, its pile light yellowish. Wings hyaline, stigma yellow, second submarginal cell not appendiculate, small crossvein scarcely beyond the middle of the discal cell. Length 7 mm. Washington. A single specimen captured April 4, 1894 (O. B. Johnson).

NEW NORTH AMERICAN ODONATA. — II.

BY ALBERT P. MORSE, WELLESLEY, MASS.

Nehalennia gracilis sp. nov.

Very similar to *N. irene* but even slenderer and differing in structure and markings. Post-ocular spots present in the shape of a continuation of the occipital line half-way to each eye. ♂: segments 9 and 10 all blue; 8 blue except a very narrow transverse basal band. Superior appendages one-third (when well extruded) as long as the side of 10, in side view about two-thirds as broad as long, directed backward, upper margin convex, lower margin slightly concave, apex rounded; in dorsal view about twice as broad as long, the inner margins nearly contiguous, the distal margin parallel with the excised margin of 10 but a little concave, the lateral and inner margins equal, slightly convex, directed caudad, the outer apical angle well rounded, the inner less so. Inferior appendages very short, the upper outer angle produced caudad into a stout apical tooth which projects nearly as far as the superior appendages; in dorsal view these teeth are seen at the sides of the latter, directed outward and backward, their inner margins concave, outer margins convex. ♀: similar to *irene* but the hind margin of the prothorax is excavate medially making it bilobed (instead of trilobed as in that species); the markings differ in that a large triangular apical spot on 9 and all of 10 are blue. In three examples the spot on 9 is produced to base and the dorsum of 8 also is nearly or entirely blue medially, widest behind.

Abd.: ♂, 20-22; ♀, 20-22. Hind wing: ♂, 13-14.5; ♀, 14-15.

2 pairs, 13 ♂, 11 ♀, June 24, Sherborn, Mass.; 6 ♂, 2 ♀, June 19; 1 ♀, June 27; 1 ♂, July 19, Wellesley, Mass.

Taken near stagnant pools in peat-bogs in company with *irene*, with which species it has hitherto been confused, as shown by the series in the Hagen collection.

Enallagma laterale sp. nov.

Post-ocular spots of moderate size. Mid-dorsal thoracic and humeral dark stripes of medium width. Abdomen blue with the dorsum black as follows: apical half of 2, fourth of 3, third of 4, half of 5, three-fourths of 6, all of 7 except an interrupted basal ring, a stripe each side on 8, and all of 10. Dorsum of 10 emarginate. Superior appendages short, one-fourth to one-third as long as side of 10, in side view nearly as broad as long, directed caudad or slightly deflexed, sides parallel, apex blunt, emarginate; in dorsal view as broad as long, widened apically, emarginate at end, apex of both limbs showing equally, smoothly rounded, the upper presenting a little tooth on inner margin. Seen from the left dorso-lateral aspect the right (and *vice versa*) appendage is seen to be deeply rounded-emarginate, or slightly bifurcate, the lower limb usually slightly larger and longer. Inferior appendages nearly twice as long as the superior, stout at base but much narrowed dorsally, directed backward and a little upward, sides straight, tapering smoothly to the slightly upturned and incurved tip.

Abd.: ♂, 20.5-22. Hind wing: ♂, 15-16. 14 ♂, May 25; 9 ♀, June 8, Wellesley, Mass.

Enallagma pictum sp. nov.

Allied to *signatum*. Coloration black and yellow. Post-ocular spots reduced to a continuation of the occipital line. A pair of very small pale spots between the anterior ocellus and the posterior two. Dorsum of thorax chiefly black, humeral pale stripes narrow, ♂, or very narrow, ♀. ♂: abdomen black as follows: dorsum of 1-10, on 2 in form of an orbicular apical spot narrowly connected to base, on 3 terminating in a sharp point basally. 1 with wide apical, and 4-7 with narrow interrupted basal ring, yellow.

low. Superior appendages two and a half times as long as wide, nearly as long as 10, directed backward, equal or slightly enlarged apically, dorsal margin one-fifth longer, slightly concave, apex obliquely truncate, angles rounded, distal margin concave or shallowly emarginate. In dorsal view stouter at base, only twice as long as wide, the upper limb tapering to a rounded tip which bears a short, stout tooth on the inner side next the rounded apex; the lower limb projects inward making the two sides of the whole appendage nearly parallel, the inner apical margin truncate. The inferior appendages are three-fifths as long as the superior, stout, tapering to a blunt point, directed caudad, a little incurved. ♀: humeral pale stripe one-third as wide as the dark stripe, a line on second lateral suture, and a short line between it and the humeral stripe. Dorsum of 1-10 greenish black, not narrowed, more or less maculate on 10: 3-6 with interrupted basal ring, 7 and 8 with apical margin yellow.

Abd.: ♂, 25; ♀, 26.5. Hind wing: ♂, 16.5; ♀, 18.5.

1 ♂, 1 ♀, Sherborn, Mass., collected by Mr. A. L. Babcock, to whom I am indebted for an opportunity to examine and describe them and who has donated the types to the Hagen collection at Cambridge, Mass., in conjunction with the other types described by me from my own collection in this and the preceding papers.

NOTES ON MOTHS.

Amphion nesus.—Last year I found young larvae of *Amphion nesus* on *Ampelopsis vitifolia*, and this year I have found them on *Ampelopsis quinquefolia*, one specimen being of a clear wine-color, with subdorsal and oblique lines pink edged above with deep claret-color. The granulation was pale yellow, as were the face lines and the edge of the anal plate. The larvae drop from the vine at a very slight shake and are easily found in this way.

"Red-fringed" *Actias luna*.—In early June Miss Norton sent me eggs of the *A. luna* having deep red fringes on its wings. These

eggs hatched twelve days after they were laid, and the larvae differed from any I had seen in having a dark brown lateral band from head to anal shield; a dark brown patch on the dorsum of the third and of the pre-anal segments, with the anal plate blackish-brown. The bristles from the tubercles were black with some white ones. The feet were green with a brown patch on each. At the first moult they came out like normal *Luna* larvae.

Attacus promethea.—Is this moth rare this year? I have placed on my window-sill nine females, but in no case has a male been attracted. Last year every female which emerged in my box attracted from five to forty males, and some of the females were not even near the open window.

Caroline G. Soule.

Brookline, Mass., June 30, 1895.

PROCEEDINGS OF THE CLUB.

8 March, 1895. The 186th meeting was held at 156 Brattle St., Mr. S. Henshaw in the chair. Mr. A. G. Mayer was chosen secretary.

Mr. W. L. W. Field was elected a member.

Mr. S. H. Scudder read the delayed address of the retiring President, Mr. T. E. Bean, entitled "A comparison of *Colias hecla* with *Colias meadii* and *Colias elis*."

Mr. S. Henshaw asked what the distribution of *C. hecla* was. Mr. Scudder stated that it was quoted from Greenland, Lapland, Hudson Bay, Bering Straits and Grinnell-land and *C. meadii* from Colorado, Arizona, and New Mexico.

A paper by Mr. W. S. Blatchley on winter collecting (see *Psyche*, vii, 247) was read. Mr. Henshaw stated that he had found between 2-300 species of Coleoptera and a few larvae by sifting leaves during the winter months; the greater number of species thus found were Pselaphidae and Staphylinidae.

Mr. Henshaw exhibited a specimen of *Lycena xerces* from San Francisco. This species was erroneously supposed to have been exterminated by the extirpation of its food plant.

THE SEVENTH VOLUME OF PSYCHE

Began in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

Vols. 1-6, Complete, Unbound, - Now sold for \$29.00.
 Vols. 1-6, and Subscription to Volume 7, - - \$33.00.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

Vol. 1. Introduction; Nymphalidae.

Vol. 2. Remaining Families of Butterflies.

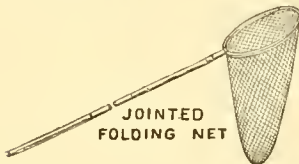
Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo, half levant, \$75.00 net.

HOUGHTON, MIFFLIN & CO.,

4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 233.

SEPTEMBER, 1895.

CONTENTS:

NOTES ON THE WINTER INSECT FAUNA OF VIGO COUNTY, INDIANA.—III.— <i>W. S. Blatchley.</i>	279
SOME HABITS OF <i>FORMICA OBSURIPES</i> FOREL, WITH NOTES ON SOME INSECTS FOUND ASSOCIATED WITH IT.— <i>George B. King.</i>	281
<hr/>	
SUPPLEMENT TO PSYCHE, I.—CONTRIBUTIONS FROM THE NEW MEXICO AGRICULTURAL EXPERIMENT STATION (New North American Bees, <i>T. D. A. Cockerell</i> ; A Mutillid which resembles thistle-down, <i>T. D. A. Ckll.</i> ; New species of Coccidae, <i>T. D. A. Cockerell</i>).	5

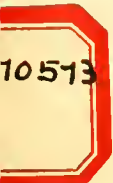
PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]



Psyche, A Journal of Entomology

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	.500
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.03
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " " "	1.25	1.00
Half " " " "	2.25	1.75
One " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danais archippus</i> . Boston, 1880, 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichnology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> . col. pl. Boston, 1883.	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report. Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

NOTES ON THE WINTER INSECT FAUNA OF VIGO COUNTY, INDIANA.—III.

BY W. S. BLATCHLEY, INDIANAPOLIS, IND.

HEMIPTERA—HETEROPTERA.

(CONTINUED.)

CAPSIDAE.

39, *Lygus pratensis* Linn. Very common in both summer and winter. In the latter season it is found in numbers beneath and between the radical leaves of every mullein plant. The species varies greatly with the season, and the winter form may be *flavo-maculatus* Prov.

40, *Callicapsus histrio* Reut. A southern insect, but two specimens of which have been taken in Indiana. They were found beneath the bark of a black oak (*Quercus coccinea tinctoria* Gray) log which lay on the side of a high sandy hill near the Wabash River. Feb. 19, 1893.

ACANTHIIDAE.

41, *Anthocoris musculus* Say. An uncommon species in winter, when it is found beneath the bark of willow trees.

42, *Acanthia lectularia* Linn. The "festive bed-bug" — found in all stages in its usual abiding places.

TINGITIDAE.

43, *Piesma cinerea* Say. Common; gregarious. Hibernates beneath the bark near the bases of red and black oaks, and beneath logs on sandy hill-sides.

44, *Corythuca ciliata* Say. Frequent in winter beneath the loose bark of the sycamore (*Platanus occidentalis* L.) and beneath logs and rubbish near them. Gregarious.

ARADIDAE.

45, *Aradus robustus* Uhler. Scarce. Hibernates beneath the bark of red and black oaks. Feb. 15, 1891.

46, *Aradus similis* Say. Rare. Two mature specimens were taken from beneath an oak log, March 16, 1891. The species, therefore, certainly hibernates either as nymph or imago.

47, *Aradus crenatus* Say. Winters in all stages beneath logs and chunks whose sides are deeply buried in sand and mold. Our largest species of the genus.

48, *Aradus americanus* H. Schf. Rare. Two were taken from beneath a log on a sandy hillside, Feb. 11, 1892. This species is not listed in

Uhler's catalogue, but it was so named for me by Mr. Uhler.

49, *Aradus* sp.? Rare. One imago and two nymphs of this unidentified species were taken from beneath some oak chips on a sandy hillside, Jan. 1, 1893.

50, *Brachyrhynchus lobatus* Say. Rare. One specimen from beneath the bark of an elm log, Dec. 16, 1892.

51, *Brachyrhynchus simplex* Uhler. Our most common member of the family. Winters in all stages beneath the bark of red oak logs. Gregarious.

NABIDAE.

52, *Coriscus ferus* Linn. A common winter resident beneath logs and leaves of mullein along roadsides and the borders of dry upland fields.

53, *Coriscus punctipes* Reut. Scarce in winter. Several were found with *ferus* beneath chunks in the sandy bed of the old Wabash and Erie Canal, Jan. 1, 1893.

54, *Coriscus* sp.? Rare. Two were taken from beneath a log partly buried in the sand near the border of a pond, on Jan. 1, 1893. Uhler returned them marked, "new to me."

REDUVIIDAE.

55, *Sirthenea carinata* Fab. Another southern form but three of which have been taken by myself in this State. One of these was found beneath a log partly buried in low wet ground on Feb. 21, 1892. The others in similar localities in April.

56, *Melanolestes picipes* H. Schf. Rather common in winter, singly or in pairs, in dry upland woods beneath logs whose sides are deeply buried in leaves and mold. Experience has taught me that this "bug" can inflict a severe wound with its beak when handled carelessly.

57, *Melanolestes abdominalis* H. Schf. Much less common than the preceding. Hibernates in similar places. Dec. 18-Jan. 11.

58, *Opsicoetus personatus* Linn. The nymphs only, with body very thin and covered with an accumulation of dust, have been taken in houses in winter. They reach maturity about June 10 when they fly into houses in the early evening, attracted by the lights.

59, *Pygolampis pectoralis* Say. Quite frequent in winter both as nymphs and adults. Found singly or in pairs beneath chunks and boards, along roadsides and borders of upland woods.

60, *Oncerothelus acuminatus* Say. Common. Often as many as 50 are found hibernating beneath one chunk or log; preferably those of damp localities.

EMESIDAE.

61, *Barce annulipes* Stål. Uncommon. Taken on three different occasions in winter from beneath pieces of rails along the border of a cultivated upland field. A pair were found in copulation, Nov. 20, 1892.

HYDROBATIDÆ.

62, *Hydrotrochus remigus* Say. Frequent. Hibernates beneath logs and piles of drift along the border of streams. Sometimes seen warm days in latter part of February on the surface of the water.

63, *Limnotrochus marginatus* Say. Frequent. All that I have found in winter were beneath logs on hillsides, 200 yards or more from water.

64, *Limnoporus rufoscutellatus* Lat. This species, abundant on the lakes of northern Indiana, has been

found only in small numbers on a large pond in Vigo Co. Two living specimens were found beneath a pile of drift near the border of the pond on Jan. 1, 1893.

The species of *Zaitha*, *Belostoma*, *Ranatra*, and, perhaps, *Notonecta*, presumably pass the winter as nymphs, inhabiting the mud in the bottoms of ponds and streams; but as I have taken none of them at that season they are not incorporated with the above list of winter Heteroptera, which includes only such species as I have actually found hibernating.

SOME HABITS OF FORMICA OBSCURIPES FOREL,

WITH NOTES ON SOME INSECTS FOUND ASSOCIATED WITH IT.

BY GEORGE B. KING, LAWRENCE, MASS.

It is generally believed and is also stated by the majority of writers upon the habits of ants, that in such climates as we have in our northern States and Canada, the ants just before the ground begins to freeze go down into their burrows below the freezing point, and remain there until the approach of spring, when they ascend again, attend to their accustomed avocations, and repair their nests.

To satisfy myself as to whether or not this were true, I last year located and marked three of the mounds in which this ant lives; they were several miles apart. On November 25 at 3 P. M. I went with my son to nest no. 1. The temperature of the air was 38°, the

snow which had fallen on the morning previous had nearly disappeared, and it was gradually growing colder. We removed some of the earth from the top of the nest, and at the depth of six inches we found plenty of ants. They were in a sluggish condition and apparently asleep and when disturbed could barely move about. We continued digging down to the depth of two and one-half feet and found ants huddled together in little piles all through the nest. I took the temperature at this depth, 33° F. The ground froze the following night and remained frozen all winter. We collected 177 of the ants, and brought them home to look for winter parasites on ants. I found 8

specimens of *Uropoda ricasoliana* Berlese. They were all fastened to the tibiae and in every case but one attached to the middle leg. I also found 5 mites of another genus *Laelaps equitans* Michael. I did not observe where they were attached as they became loosened by my handling of the ants. The *Uropoda*s did not lose their grip. We also found one coleopteron *Serica sericea* Burm. hibernating with the ants; it is frequently found with ants in the spring under stones.

We did not disturb this nest again until March 17 of 1895 when we found snow and ice on the top of the nest averaging in depth nearly 5 inches. The atmospheric temperature was 33° F. We cut through the frozen earth which was a little over a foot in thickness and in doing so observed a number of ants. We continued digging to the depth of two feet and found plenty of ants in the same condition as we did on November 25, 1894. The temperature of the nest below the frozen parts was 33° F.* We again collected 42 of the ants for the purpose of examining them for mites and found 4 of the *Uropoda* sp. attached to the legs of the ants as before, but did not find at this time any of the other mites.

On March 23 we went to nest no. 2. Snow and ice was still on the ground, but had nearly all thawed off from the nest. The northern portion of the nest was still frozen, but the other parts more exposed to the rays of the sun had

thawed out and were quite wet. Upon removing the soil from the top of the nest we found ants plentiful at 3 inches from the top of the nest. The temperature of the nest at the depth of 8 inches was 39° F. All of the ants were in a sluggish condition, and could move slowly about when disturbed. The temperature of the air was 49° F. and the sun was shining. I placed some of the ants in the sun and in about fifteen minutes they began to appear active. We collected 141 of them for the examination of mites and found 8 of the *Uropoda* sp. We also found another species of ant *Cremastogaster lineolata* in large numbers and but very few of them alive; this species of ant usually occurs under stones and old cord-wood, sticks, logs, etc. Why these ants went into this mound with the other ants I am not able to say. We found a number of the common earth worms, *Lumbricus* sp., two species of *Julus canadensis* Newp., two specimens of a *Porcellio*, a male and female of *Platynus cupripennis* Say, and a large species of staphylinid.

April 6 we made a visit to nest no. 3. Here we found a number of the ants at work; several of the doors were open and the ants moved about quietly, not as they usually do when the weather is warmer and the season more advanced. The thermometer stood at 58° F. and at the depth of two feet down into the nest at 40° F. The day was clear. We found a number of the *Uropoda* walking around among the ants and some attached to the ants' legs as before mentioned. We found one staphylinid.

* We covered the nest up very carefully after our first visit with the same material of which the nest was composed.

Nest no. 1 measured three and one-half feet across the top and was elevated but little from the surrounding surface, being nearly flat. The ground was of a light sandy soil and situated beside a road passing through a young growth of woods. Nest no. 2 was on the roadside elevated somewhat above the water gutter. It was covered with sod similar to the surroundings and measured three feet across the top and was elevated above the surface nearly six inches; it was a long distance from any woods and composed of a coarse sandy soil. Nest no. 3 measured four and one-half feet across the top and was elevated eight inches above the surrounding surface situated beside a public highway and a long distance from any woods; it was composed of a very light soil covered with small sticks and pebbles and was much the largest colony of the three nests examined.

One of our warmest days last summer, we visited this nest no. 3, approached it carefully, just before 11 A. M. We observed none of the ants coming or going from the nest; its doors were all closed. On removing a little of the loose covering of the nest not more than two inches deep we found the ants in great abundance and to all appearances these ants were asleep.

The ants that we collected in November from nest no. 1 we exposed to a temperature of 26° F. for one hour in a bottle. They immediately collected into a cluster. On taking them into my study which was 72° F. they became quite lively in half an hour. Dr. McCook, who has given much of his time to the study of some of our ants,

performed a number of experiments with *Camponotus pennsylvanicus*, and found it to live and to be quite active after being put on ice for forty-eight hours and sluggish at a temperature of 30° F. He also found *Formica rufa* to be active in its nests at 34° F. and both of these species to stand a very high degree of heat. I have also found *Camponotus pennsylvanicus* in hollow trees in the woods imbedded in ice and the decomposed portion of the tree. I have taken them home, thawed them out, and they became lively and appeared well and healthy, and went to work in my artificial nest.

I do not mean to have it understood that all of our ants can or do stand this low degree of temperature, but only that those writers who claim that all of our ants go down below the freezing point in the fall of the year are mistaken and in all probability have never observed these creatures.

There is, however, very little indeed known in this country about our Formicidae in general, there being very few entomologists that have made any study of this group of insects.

In regard to the literature relating to mites found associated with ants, the latest work that I know of is that of Dr. E. Wasmann of Berlin on Myrmecophilous insects found with ants. He mentions 34 Acarina found with ants through the world. I have one-half of this number found in Massachusetts and New Hampshire alone, and expect to find more. The number of ants that I have found to inhabit Essex County, Massachusetts, are 41 species and I have a large part of it to look over yet.

THE SEVENTH VOLUME OF PSYCHE

Began in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

Vols. 1-6, Complete, Unbound, - Now sold for \$29.00.
 Vols. 1-6, and Subscription to Volume 7, - - \$33.00.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

Vol. 1. Introduction; Nymphalidae.

Vol. 2. Remaining Families of Butterflies.

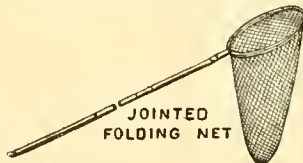
Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo, half levant, \$75.00 net.

HOUGHTON, MIFFLIN & CO.,

4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,
 Klaeger and Carlsbad Insect Pins, Setting
 Boards, Folding Nets, Locality and
 Special Labels, Forceps, Sheet Cork, Etc.
 Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a speciality. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

that on 2 broadly interrupted in the middle. Hairs of tip of abdomen yellowish.

Hab., on *Salix* (narrow-leaved willow), by the acequia in Las Cruces, New Mexico, early in May, 1895 (Ckll., 2908).

This species is evidently distinct, but it must be separated from its allies with care. In its general appearance, and the color of its wings, it resembles the ♀ of *A. flavoclypeata* Smith. I have an Illinois specimen of the latter from Mr. Robertson, and can distinguish it from *salicinella* by its duller granulated mesothorax, not showing distinct sparse punctures as in our species. The clypeus also is comparatively impunctate in *flavoclypeata*; the abdominal bands also are thinner. Mr. Robertson describes from Illinois a species, *A. salicis*, which is evidently very near to *salicinella*. On going through the description I find that our species differs thus:—

The pubescence of head and thorax is white or dirty-white, not fulvous; the basal process of labrum is triangular, not truncate; the wings are not clouded beyond the marginal cell; the abdominal fasciæ are dirty-white, not fulvous. Otherwise the two seem to agree.

A species I found in Wet Mountain Valley, Colorado, to the best of my recollection on willows, was named by Mr. Ashmead *Cilissa trizonata*. *A. salicinella* differs from *A. trizonata* (Ashm.) thus:—

The thorax is not closely punctate; the pubescence is not dense; all the tarsi are rufous, not black or piceous; the ocelli are not pale; the wings are yellowish. I have no doubt that other differences could be demonstrated by actual comparison of specimens.

Perdita nitidella var. *exclamans* n. var. — ♂ about 5 mm. long. Head moderately broad, vertex minutely roughened and sparsely punctate. Pubescence hardly noticeable, but cheeks beneath bear long hairs. Antennæ yellow, with the flagellum black above. Vertex and upper half of cheeks metallic greenish-blue. Face at and

below level of antennæ entirely pale yellow, the labrum and mandibles becoming nearly white, except that the latter are ferruginous at tips. Above the level of the antennæ the yellow extends irregularly upwards, becoming deeper in tone. The median upward extension of the yellow is broad and rounded and just reaches the anterior ocellus. It shows a slight projection on each side not far from its top; and on each side of its base close to the origin of the antennæ, it encloses a dark spot by sending a bridge to join the lateral yellow extension. The lateral upward extension of the yellow follows the margin of the orbit, at first rapidly narrowing; and then continuing, narrow but of uniform width, to its oblique termination at about the level of the lateral ocelli. These face-makings strikingly resemble a person with uplifted arms in the act of making an exclamation—hence the varietal name. The median extension of the yellow represents the head, the lateral ones the arms. If the resemblance were not so obviously purposeless, I presume we should call it mimicry! Prothorax yellow, neck with a short dark band on each side. Pleura with its anterior half yellow, its posterior half covered by two large metallic blotches, separated by a narrow yellow band. Dorsum of mesothorax very shiny, hardly punctured, very sparsely hairy, dark metallic green, with the lateral margins yellow. Tegulae yellow, metathorax blue, in strong contrast with the green mesothorax, sides of metathorax with white hairs; its exposed dorsal surface minutely striolate. Four anterior legs entirely yellow; hind legs yellow with a spot at end of femur, posterior side of tibia, posterior side of first joint of tarsus and whole of remaining joints, dark brown. Wings hyaline, nervures pale brown, third discoidal cell excessively indistinct; stigma hyaline margined with brown. Abdomen yellow with a brown band at apex and base of each segment. Venter entirely yellow.

Hab. Close to the Agricultural College,

Las Cruces, N. M., 13th May, 1895. (Miss Jessie Casad, no. 296.) Taken on mesquite.

I had described this as a distinct species, but after prolonged consideration I believe it to be but a varietal form of *P. nitidella* Ckll. In typical *nitidella* the median excursion of the yellow does not extend to the middle ocellus, while in the variety it may be said to do so, the interval between its upper border and the ocellus being scarcely observable with a strong lens. In *nitidella* the incur-sion of the blue terminates in a right angle, whereas in the variety its termination is much more acute. Other differences will appear to any one comparing the descriptions.

Typical *nitidella* was taken in September.

Perdita punctosignata, n. sp.—♂ about $4\frac{1}{2}$ mm. long. Head moderately broad, vertex minutely roughened, not punctate. Cheeks beneath with sparse hairs. Antennae yellow; tip of scape, funicle, and flagellum except last two joints, brown above. Head, including face and cheeks, entirely dull yellow except a broad transverse black band stretching from eye to eye on vertex, and enclosing the two lateral ocelli; a black basi-occipital band connected with that on vertex in median line; and a conspicuous black spot close to the anterior orbit about as far above level of insertion of antennae as length of scape. The yellow of the face becomes paler downwards, the labrum being rather whitish.

Thorax bright lemon yellow, with two broad black bands extending backwards from near the anterior margin of the mesothorax to the metathorax, where they meet; making the whole of the dorsum of metathorax black except a couple of yellow spots in the median line near its anterior border. The dorsum of scutellum and post-scutellum are broadly greenish-yellow. Tegulae hyaline. Wings hyaline, nervures pale, stigma hyaline with a brown margin, third discoidal excessively indistinct. Legs all yellow, except a brownish shade behind middle tibiae, and a still stronger shade on hind tibiae and a slight brown spot at end of hind femora.

Abdomen yellow with sepia bands; first segment mostly sepia, with an interrupted yellow band and yellow anterior border; second and third segments each with a narrow proximal and a broad distal band, the latter narrowing suddenly before lateral margin; fourth segment similar, but the distal band narrower; fifth segment with the bands becoming obscure, or at least the distal one. Venter all yellow.

Hab. Close to the Agricultural College, Las Cruces, N. M., 13th May, 1895, on mesquite. (Miss Jessie Casad, no. 297.)

By the face-makings, this might be confounded with *P. martini* Ckll., but the yellow thorax with broad longitudinal bands will at once separate it.

III. A MUTILLID WHICH RESEMBLES THISTLE-DOWN.

Sphaerophthalma gloriosa Sauss., var. nov. *pseudopappus*.—♀ about 13 to 16 mm. long, entirely dull black, clothed with very long pure white hairs. The long hairs on the dorsum of the second segment of abdomen are about 5 mm. long. The first abdominal segment widens gradually to the second, and is dorsally bare, with white hairs at base and apex.

Hab. Las Cruces, New Mexico, in June. One also on September 6. Mr. Fox knows it also from Arizona and California.

I have never seen typical *gloriosa*, in which the body color is reddish, but Mr. Fox assures me that the present insect is but a variety of it. It is, perhaps, rather a sub-species, for I have now seen about 8 specimens, every one of them black. A specimen of *S. sackenii*, collected in California, and sent to me by Mr. Wickham, is very different. It is larger, the hairs have a yellowish tinge, and the pubescence on the legs, venter, etc., is black; whereas in *pseudopappus* all the pubescence is white.

As it runs over the ground, this insect looks extremely like a bit of thistle-down blown by a gentle breeze. The resemblance is so extraordinary, that it is difficult to realize that it is an insect until it is actually in the killing-bottle. It proceeds in a zigzag

jerky manner, so increasing the illusion. What is the purpose of this mimicry, I do not know; these creatures possess powerful stings, and most of the allied forms seem to be warningly colored—usually contrasts of black and red.

T. D. A. Ckll.

IV. NEW SPECIES OF COCCIDAE.

BY T. D. A. COCKERELL.

Aspidiotus hartii, n. sp. — ♀ scales irregular, subcircular to oval, about $1\frac{1}{2}$ mm. diam., moderately convex, dull brownish-gray, with a slight purplish tint; first skin partly covered or entirely exposed, shining pale straw-color, nearly central. When removed, the scales leave a conspicuous white mark, with no black ring.

♂ scale colored like that of the ♀, small, elongate, with the exuviae near one end.

♀ brown, becoming pale lemon yellow when boiled in soda. 5 groups of ventral glands, median of about 4, cephalolaterals 9, caudolaterals 6 to 7. Anal orifice posterior to level of caudolateral glands, but some distance from hind end. No long tubular glands at bases of lobes. Two pairs of lobes only; median large with parallel sides and gently rounded subtruncate ends, slightly diverging, not contiguous, obscurely notched at end towards outer side. Second lobes similar in shape, but much smaller. Two rather stout branched plates between the median lobes, and two between 1st and 2nd lobes. Margin cephalad of 2nd lobe with first three stout strongly branched plates close together, then three equally long but not so stout and only slightly branched plates further apart. Then two very slender small plates, then a long interval, then the margin coarsely serrate, with about 6 serrations.

Hab. Trinidad, West Indies, in great numbers on tubers of yam. Sent by Mr. Hart, of the Royal Botanic Gardens. The occurrence of an *Aspidiotus* on yams was

hardly expected; though Mr. Barber had sent me from Antigua a new *Lecanium* (*L. batatae* Ckll. ined.) on sweet potato tubers. The present insect is allied to *Aspidiotus sacchari* Ckll., 1893.

Aspidiotus sphaerioides, n. sp. — ♀ scale circular, rather over 1 mm. diam., in numbers on the leaf, moderately convex, dark reddish-brown, with the part covering the exuviae indicated by a pale raised ring. When rubbed, the exuviae are uncovered and appear shining black. Removed from the plant, the scale leaves a whitish patch, surrounded by a blackish ring.

♀ pale yellow, circular, mouth-parts about as far from anterior margin as their length. Anterior margin with a row of about 9 strong spines or stout hairs, such as I have seen in no other species. Anal orifice oval, a fair distance from hind end, but posterior to level of caudolateral groups of glands. 5 groups of ventral glands, caudolaterals of 3, cephalolaterals 4, median 3.

Three pairs of well-developed lobes, small but distinct, about equal in size, rounded, with a slight tendency to be notched on each side. Branched plates, hardly longer than the lobes, between them. Margin cephalad of 3rd lobe very coarsely serrate, with five large serrations, the bases of these all fringed with numerous tubular glands. Long tubular glands at bases of lobes; those cephalad of median lobes, and in the interval between 2nd and 3rd lobes much the longest; that cephalad of 3rd lobe next longest.

Hab. On leaves of New Zealand flax.

Louisiana (exact locality not known); sent by Mr. E. M. Ehrhorn. This is a species of neotropical affinities, and must have attacked the New Zealand flax since the introduction of the latter into this country as an ornamental plant. It cannot be *A. phormii* Breme, which has a white scale. In its black exuviae it resembles *A. vitis*, from which it differs in other respects. Of the New Zealand species it only comes near *A. sophorae*, with its 5 groups of glands and branched plates, but that is different in its lobes. It is very near to *A. bowreyi*, but that has 4 groups of glands, differs somewhat in the tubular glands, and also markedly in the shape of the scale. In the scar it leaves it suggests *A. personatus*, which is otherwise different. It resembles, also, *A. yuccae* Ckll. ined, but that has a different scale, and leaves a scar without any black ring. It is also allied to *A. obscurus*, but in the long glands rather resembles *A. perseae*, from which it differs in the grouped glands.

Dactylopius aphyllonis, n. sp. — ♀ 3 mm. long, of the general shape and appearance of *D. citri*, but without any caudal or lateral tufts. Dorsum covered more or less with mealy white secretion; color of body when freed from secretion olive-brown, antennae and legs small and pale, inconspicuous. Boiled in caustic soda it gives a blood red color, after the manner of *D. indicus* and *D. walkeri*.

Antennae 7-jointed; 7 much longest, a little longer than 5+6; 5 shortest, 4 and 6 equal, next longest; 2 and 3 equal, next longest, then 1. Formula 71 (32) (46) 5. Joints with sparse whorls of hairs. Color of antennae very pale yellowish. In some examples, 4 is a little longer than 6, and about as long as 3, which is not quite as long as 2; the formula is then 712 (34) 65.

Legs pale brown, ordinary, femur about as long as tibia; tarsus hardly half as long as tibia. Claw large, stout, blunt, little curved; digitules filiform. Mentum elongate, with several short bristles. Posterior

tubercles obsolete, the place of each indicated by a large bristle. Anal ring small, with 6 hairs, much smaller than bristle of lobe.

Hab. Wenatchee, Washington State, on *Aphyllon fasciculatum*. Collected by Prof. C. V. Piper. By its antennae and legs, this is clearly not *D. trifolii*.

Eriococcus neglectus, n. sp. — ♀ Enclosed in a somewhat irregular waxy pyriform scale, nearly 3 mm. long, shiny, pale ochreous, not in the least divided into plates. The scales or sacs, when boiled in soda, are seen to be really composed of very closely-felted threads. ♀ oval or subpyriform, pale pinkish, about 1½ mm. long; when boiled in soda it becomes bright crimson.

Antennae brown, joints distinct, 6 in number, 3 much longest, rather longer than 4+5, which are subequal and shortest, 5 being a little the shorter. 6 rather longer than 4, but hardly so long as 2. 1 about as long as 2. Formula 3 (12) 645. In another example, 2 is clearly shorter than 6.

Legs small, pale brown. Trochanter with two bristles. Femur moderately swollen, with a short bristle on its inner side. Tibia thick, stouter than tarsus, but about ½ shorter. Claw large, very little curved. Tarsal digitules long, filiform. Digitules of claw filiform. Posterior tubercles low and rounded, with several bristles, one longer than the rest; also round gland orifices. Anal ring small, chitinous, without bristles (or bristles easily deciduous?). Mentum obscurely tenuous. Derm colorless. Eggs pale lemon yellow.

Hab. Las Cruces, N. M., on stems of *Atriplex canescens*, looking very like the *Phoradendron* seeds so commonly seen on trees in this vicinity. The plants are thickly infested by them, but I had entirely overlooked them until recently, notwithstanding that I pass within a few feet of them on my way to and from College. The insect is peculiar for its waxy scale, and might form a new subgenus.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 234.

OCTOBER, 1895.

CONTENTS:

REVISION OF THE SPECIES OF SPHARAGEMON (Illustrated).— <i>Albert P. Morse.</i>	287
COMSTOCK'S INSECT ANATOMY.	299
PROCEEDINGS OF THE CAMBRIDGE ENTOMOLOGICAL CLUB.	299

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

70573

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	.500
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.
 Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
 Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
 Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
 Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danais archippus</i> . Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> . col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidæ, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung, Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
 Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
 Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
 Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
 37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

REVISION OF THE SPECIES OF SPHARAGEMON.

BY ALBERT P. MORSE, WELLESLEY, MASS.

Since the publication of my paper on the New England species of this genus (Proc. Boston soc. nat. hist., xxvi, 220-240) I have had an opportunity to study all the material in this genus in the collections of Mr. Scudder and the National Museum. In addition, I have received several forms which would otherwise not have been seen, together with numerous notes on the distribution of the species, from Prof. Lawrence Bruner. I desire to express here my thanks to Mr. Scudder, Prof. Bruner, and Dr. Riley for the obligations under which they have thus placed me. While I have been unable, owing to lack of sufficient material, to reach as definite conclusions as I had in some cases hoped, it seems best to publish the results of this inspection of a considerable number of specimens from all parts of the country.

All of the material examined is from localities east of the Sierra Nevada Mts., yet it is not unlikely that the genus may occur on the Pacific coast. A single specimen of one species from Mexico, and several of another from Aspinwall (if the labeling is correct, which is open to some doubt in the latter case), indicate a considerable southward extension of the genus.

While some species are restricted to a limited portion of the territory mentioned, as nearly as may be judged, others occur over its entire area.

The more important papers treating of the members of this genus are those of Scudder (Proc. Boston soc. nat. hist., xvii, 467-471); Morse (*ibid.*, xxvi, 220-240); Saussure (Prodromus Oedipodiorum, 134-140); and the original descriptions of Say, Thomas, and Scudder, references to which will be found in the proper places elsewhere in this paper. In the bibliography and synonymy references are given only to the more important items.

I regret to say that several changes have been found necessary in the nomenclature of the species. At the time of preparing my previous paper it seemed best to accept the determinations of Scudder, at least until the western forms could be more thoroughly examined. This I have now done, as far as material permitted, and while some points remain unsettled a considerable advance has been made — there is strong reason for believing that the names as used here have been accurately applied and now rest upon a permanent basis. Discrimination of the species has proved a stumbling-

block to many; why this is so is not to be wondered at in some cases, though in others it is difficult to understand. Species belonging to different sections of the genus and even to other genera have been confused by the ablest authorities. Examples will be readily found in the synonymy given under the different species, statements there made referring only to specimens bearing labels on the pins, not to those arranged with them, since mistakes are liable to occur during re-arrangement.

Variation in color in this genus, in common with other Oedipodinae, counts for very little; the same species or race may be of all shades from a general dark fuscous to a pale buff or even a bright reddish brown, even in specimens from the same spot, yet it is probable that the general tint of a large series will be found to agree with the color of the soil of the locality, or other peculiarity of environment. Specimens of several different species from certain localities in Colorado show a striking reddish, almost rosaceous, coloration, due to some such cause. The coloration so frequently found in *collare*, viz., the ventral half of head, sides and metazona of pronotum white or pale clay color, is not characteristic of that species nor confined to it, specimens lacking that coloration being about equally common, and other species showing it. It is found in several species but most commonly in those of the *collare* series,

especially from the western States. It is doubtful if it occurs in the *bolli* series, whose coloration is different in character from that of the others.

Variation in size of individuals of the same species is quite noteworthy, the average size of species increasing to the southward. In general, it may be stated that Texan specimens are twenty-five to forty per cent. larger than those from the northern borders of the country. This is well shown in *bolli*, by comparing New England and Texas specimens, linear measurements of the latter showing about forty per cent. increase. The sexes also differ markedly in this respect; an extreme case of which is shown in two specimens of *collare* from northern Indiana in Mr. Scudder's collection; in these the female is fifty per cent. larger in linear measurements than the male, the two forming the extremes in the table of measurements given under that species.

The diagnostic characters of most importance are the structure and elevation of the pronotal carina; of less value are the size and prominence of the eyes, color and marking of hind legs, form of hind margin of pronotum, and extent of fuscous wing-band.

The species may be arranged in three series according to the structure of the pronotum. In the first of these, which is readily distinguished from the other two, and of which *bolli* may be taken as a type, the disk of the pronotum is flat in longitudinal section and the carina is equally compressed throughout;

the body is also more compressed and the hind tibiae are usually heavily infuscated. This section is worthy of sub-generic distinction. In the others the disk of the prozona is more or less elevated on its posterior portion, rising broadly upon the carina, rendering it less compressed in that part; the lateral carinae are usually more distinct; the body is less compressed, and the hind tibiae red, sometimes annulate with pale next base. The species showing this structure are referable to a "high" and a "low" series, though they are closely related and it is probable that connecting forms will be found. In the "high" forms (*collare* series) the carina is well or highly developed, much compressed, and the hind margin of the pronotum shows a tendency to be strongly acute-angled with excavated

sides. In the "low" forms (*aequale* series) the carina is low or carinate and the hind margin is more nearly or quite rectangular with straight sides. This series is represented in New England by *saxatile*. The form described here as *humile* has the carina so little developed as to leave some doubt regarding its proper position in the *bolli* or the *aequale* series.

Whether the genus should be extended to include additional species remains to be learned by study of the forms most closely allied; whether it is an entirely natural group as it stands is perhaps a little questionable. As here treated it follows closely the characterization given by Scudder when established; and by Saussure, who places it as a subgenus under *Dissosteira* (Prod. Oed., 134-135).

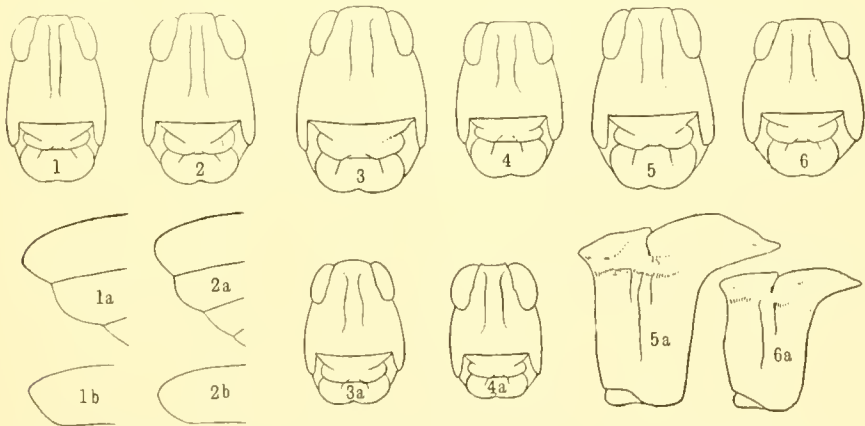


Fig. 1, 1a, 1b, *S. crepitans*, ♀. Fig. 2, 2a, 2b, *S. bolli*, ♀
 ♂ Fig. 5, 5a, *S. cristatum*, ♀ Fig. 6, 6a, *S. collare*, ♀.
 Fig. 3, *S. aequale*, ♀; 3a, ♂ Fig. 4, *S. saxatile*, ♀; 4a,

GROUP 1. BOLLI SERIES.

Carina of pronotum equally compressed throughout; disc flat in longitudinal section. Hind tibiae usually annulate with fuscous.

Synopsis of Species.

- A. Hind tibiae annulate with fuscous.
 B. Head and body strongly compressed; apex of wings sub-parabolic. (Fla. and Ga.) *crepitans*.
 BB. Head and body less compressed; apex of wings rounded. *bolli*.
 BBB. Head and body robust; metazona longer proportionally than in above species. (Mex.)
robustum.
 AA. Hind tibiae not annulate with fuscous. (New Mexico.)

inornatum.

(See also the description of *humile*.)

Spharagemon bolli Sauss.

Dissosteira bollii var. *crepitans*.

Saussure, Prod. Oed., p. 140.

1 ♀, Jacksonville, Fla.,—Priddey;

1 ♀, Fla.,—Morrison; ♂ unknown.

Antenna.	Hind fem.	Teg.	Body.	Total.*
16	18-18.2	32-33	33-38	41-41.5 mm.

These two specimens, sent by Prof. Bruner, were referred doubtfully by him to *Tomonotus zimmermanni* Sauss. which is given as a synonym of *Chortophaga viridifasciata* by Saussure himself (Prod. Oed., p. 73).

They agree with the description of *crepitans* (l. c.) from Georgia in the greatly compressed form of the body and especially of the head, and the sub-parabolic apex of wings. It seems, however, sufficiently distinct from *bolli* to be regarded as a different species. The hind tibiae lack the bright red coloration of *bolli* but the specimens may have been in alcohol and had the color largely destroyed.

Spharagemon bolli Scudder.

Sph. bolli. Scudder, Proc. Boston soc. nat. hist., v. 17, 469.

Sph. balteatum. Scudder, Proc. Boston soc. nat. hist., v. 17, 469.

Sph. bolli Scudd. Morse, Proc. Boston soc. nat. hist., v. 26, 227.

I have nothing further to add to the synonymy as cited and stated in my previous paper (l. c.)

The great difference in size between New England and Texas specimens has already been mentioned, linear measurements of the latter being nearly forty per cent. larger. New England specimens are smaller than those of Indiana, Indiana than those of North Carolina, N. Carolina than those of Texas, and, should the specimen described here as *robustum* prove to belong to this species, we have reason to think that Mexican specimens are even larger than those of Texas. This is not improbable, specimens of *cris-tatum* from the Gulf coast of Texas being decidedly larger than those from Dallas in that State. Individuals also

* By "total" is meant the length of the insect at rest including the tegmina.

Spharagemon aequale Say.

Gryllus aequalis. Say, Journ. acad. nat. sc. Phila. ser. 1, v. 4, p. 307, — Amer. ent., ed. Leconte, v. 2, p. 237. (1825.)

Spharagemon aequale Say. Scudder, Proc. Boston soc. nat. hist., v. 17, 469; Ent. notes, iv, 68; 1 ♂ (Boll. No. 105) in collection, labeled at time of revision.

Spharagemon aequale Bruner (*in litt.*) "on Thomas' authority."

Spharagemon collare Scudd. Bruner, in Nat. mus. coll., labeled thus.

Spharagemon bolli Scudd. Bruner, in Nat. mus. coll., labeled thus.

Spharagemon wyomingianum Thos. (?) in Nat. mus. coll., labeled thus.

Oed. utahensis Thos. Thomas, in Nat. mus. coll., labeled thus.

H[adrotettix] trifasciata Say. Scudder (1 ♂, 1 ♀, Texas, Belfrage) in collection, thus labeled.

Dissosteira texensis Saussure is perhaps a synonym of this species.

While it is now impossible, owing to the destruction of the types, to identify with certainty the species described by Say, and while I regret to disturb existing nomenclature, it is yet necessary to apply Say's name to that species which the description best fits which inhabits the territory from which the types were procured. The most valuable diagnostic characters of the species of this genus are those relating to the structure of the pronotum and marking of the hind legs. This spe-

cies, better than any other, agrees with Say's statements "The thorax is not gradually raised into a carina, but the line is abrupt and of little elevation," and "Hind thighs within with four black bands." It is found in the territory traversed by Say (see Morse. — Proc. Boston soc. nat. hist., xxvi, 223) and is widespread. For these reasons, and from the fact that Harris's description of *aequale* from Massachusetts indicates the species most closely allied to this of those found there, I have applied Say's name to it.

It seems probable that *texensis* Sauss. (Prod. Oed., 135-137, 140) was applied to a Texas form of this species, but from an examination of over sixty specimens from various parts of the West, although much variation occurs in size and in height of the carina on the metazona, I have been unable to perceive any satisfactory or desirable subdivision of the species, still less an allied but distinct member of the genus.

The specimen above referred to as labeled *utahensis* by Thomas should not be regarded as the type of *utahensis* Thos. While it agrees in length of hind femora and breadth of wingband with Thomas' description it disagrees in the structure of the pronotum with both the description and figure published (U. S. Geog. Surv., Wheeler's Rep't, v., 883, pl. 44, fig. 2). As there characterized *utahensis* belongs to the *collare* series.

Aequale is closely resembled by a species of *Trimerotropis* occurring in the same territory which may be dis-

tinguished from it by having the pronotal carina cut by *two* sulci and in which the head is smaller.

42 ♂, 20 ♀, many antennae damaged, give the following measurements: Ant.: ♂, 14-14.5; ♀, 13.8-14. Hind fem.: ♂, 13.3-18.4; ♀, 16.3-18.6. Teg.: ♂, 24.6-34; ♀, 30-36. Total: ♂, 31-42; ♀, 38-45 mm.

Like *saxatile*, specimens sometimes have the metazona slightly arched in longitudinal section and the carina less compressed.

This species is often of a grayish cast of color, the disk of the wings pale in tint and with the veining at base noticeably glaucous. About one-half of the specimens seen are "collared." Specimens from Manitou and elsewhere in Colorado show the reddish suffusion mentioned in the earlier part of this paper, while those from Dallas, Texas, are vivid in tint, with strongly contrasting colors; in this form it is the handsomest member of the genus. In these the hind thighs are suffused with red internally along the median ridge. Superficially this form of the species bears some resemblance to *Hadrotettix trifasciata*, which probably accounts for the labeling mentioned above.

In distribution it is widespread. I have examined specimens as follows: Ft. Walsh, Br. Amer., Sept. (Nat. mus.); Boise City and Salmon City, Id., Aug. (Bruner and Nat. mus.); Custer, Black Hills, and Harney's Pk., Dak., 7000-8000 ft. (Nat. mus.); Yellowstone, Mont. (Nat. mus.); Ft. McKin, Wyo., Aug. (Nat. mus.);

Pueblo, July 8-Aug. 31, 4700 ft.; and Manitou, Colo., Aug. 25, 6300 ft. (Scudder); Salt Lake Vall., Utah, Aug. 1-4, 4300 ft. (Scudder); Chadron, Gordon, Ft. Robinson (Nat. mus.) and Nebraska City (Scudder) Neb.; San Antonio, — Newell, — June (Bruner), Dallas, July, — Boll, — and collected by Belfrage, June and July (Scudder and Nat. mus.). Prof. Bruner reports it also from Eastern Washington, Snake R., Id., and Barbour Co., Kansas.

Spharagemon saxatile Morse.

Spharagemon saxatile. Morse. Proc. Boston soc. nat. hist., xxvi, 229 (1894).

There is little new to be added here to the full account of this species published in my previous paper. Additional localities where I have secured it in New England are Canaan, So. Kent, and Deep River, Conn. At the latter place it is quite common. I have received it from Belmont, Mass., through Mr. C. J. Maynard, from which locality some of the specimens show a distinct pale bluish tint along the edges of the tegmina and the posterior margin of the pronotum. I have yet to see a "collared" example. It has been reported from New Jersey by Beutenmüller (Journ. N. Y. ent. soc., ii, 144; Bull. Amer. mus. nat. hist., vi, 301) occurring in situations similar to its haunts in New England.

It should be looked for, and will probably be found, on rocky hills in

vary considerably in the proportions of the eyes and head.

The species is very variable in color, partly, no doubt, in accordance with its environment, showing well the three extremes of fuscous, fulvous, and pale buff coloration; and in markings, those of the tegmina being sometimes almost entirely obsolete. The wing-band varies greatly in width; in a ♂ from Iowa in Scudder's collection it is nearly one-third the breadth of the wing, being double the width as found in many specimens.

Since my previous paper I have obtained it from the following additional New England localities: Brattleboro, Vt. (Mrs. J. B. Powers); Dedham and Belmont, Mass. (C. J. Maynard); Adams, Dover, and Martha's Vineyard Id., Mass.; Cunaan, Deep River, N. Windham, and So. Kent, Conn. I have also received it from Toronto, Can. (C. Hills); Ft. Ancient, O., Williamsville, Mo. (S. W. Denton); Vigo and Marshall Co's, Ind. (Blatchley); Hot Springs, Dak. (Bruner). Bruner (in litt.) reports it from E. and N. W. Neb., Kas., Ill., Va., S. Dak., Iowa, Texas. In addition to many of these localities, Scudder's collection contains examples from Georgia, N. Car., and Colo., 6300-7000 feet. The National Museum material consists of specimens from Ind., June 29 (Bollman); Washington, D. C., and Texas. Prof. Garman reports it from eastern and Western Kentucky (Orth. of Ky., p. 9. — 6th ann. rept. Ky. agr. exp. sta.).

Spharagemon robustum sp. nov. (?)

1 ♀, Coahuila, Mex., in Scudder's collection, labeled "Spharagemon n. sp."

Antenna	Hind fem.	Teg	Body.	Total.	Proz.	Metaz.
16.5	20.6	36.5	39	46.5	3.1	6.6 mm.
Of Texas specimens of <i>bolli</i>					3	5.3

This may be only an extremely large form of *bolli*. The only specimen seen differs, in addition to its larger size and more robust form of head and body, in having the posterior process of the pronotum more produced (as shown by the measurements), distinctly acute-angled, with excavated sides and the median carina less elevated on the prozona and less compressed throughout. (See remarks under *cristatum*.)

Spharagemon inornatum sp. nov.

1 ♀, Hot Springs, N. Mex., 7000 feet alt. Received from Prof. Bruner.

Hind fem.	Teg	Body.	Total
19	29	31.5	36 mm.

Similar to *bolli* but lacks the fuscous and pale markings of the hind tibiae, which are pale reddish throughout, and the inner side of the hind femora has the two basal fuscous bands obsolete in the tibial sulcus. Two additional females in Bruner's collection have hind tibiae as above. Male unknown. The pronotal carina is scarcely as high as in *bolli* and is sharply and equally compressed throughout.

GROUP II. AEQUALE SERIES.

Pronotum carinate, carina often sinuate on prozona, otherwise as in Group III.

put, the eyes appearing more prominent in consequence; and in having the prozona proportionally shorter than in the average specimen of *aequale*. The hind tibiae are unicolorous, red;

Synopsis of Species.

	<i>Saxatile.</i>	<i>Aequale.</i>	<i>Humile.</i>
Eyes	larger, subprominent, = $\frac{1}{2}$ (σ) to $\frac{2}{5}$ (φ) the height of face from crown to clypeus	smaller, = about $\frac{2}{5}$ (σ) to $\frac{1}{3}$ (φ) said height	like <i>aequale</i>
Width of head across cheeks	= width across eyes (σ), or a little more (φ)	distinctly more than across eyes, especially in φ	like <i>aequale</i>
Crown of head in front view	flat	convex	a little convex
Width of vertex between eyes, dorsal view	= (σ), or a little more than (φ), the width of an eye	distinctly more (σ), or twice (φ), width of eye	like <i>aequale</i>
Carina	subcristate or carinate	carinate	very low, scarcely carinate
Post. process of pronotum	acute-angled (σ); slightly so or rect. (φ).	usually rectang., sometimes acute	like <i>aequale</i>

Spharagemon humile sp. nov.

2 σ , Garden of the Gods, Colo., in Scudder's collection.

Antenna.	Hind fem.	Teg.	Body.	Total.
13.5-14	13-13.3	25-26	24.6-25	31.5-33

These specimens differ from *aequale* in having the carina very low, it being scarcely more than an elevated line; in having less tumid cheeks and occi-

and the hind femora lack fuscous in the basal part of the tibial sulcus. The coloration is markedly rosaceous in tint. They are so nearly intermediate, both in coloration and pronotal structure, between the forms of series I and II with least developed carina that their correct position is open to a doubt which could be readily settled by examination of more material.

most of the eastern States, although at present known only from southern N. E., N. J., and Md.

AA. Carina only one to two-thirds as high as the width of one-half of disc of metazona. Body not or relatively little compressed.

GROUP III. COLLARE SERIES.

collare.

Carina of pronotum cristate, strongly compressed except on hind part of prozona which is joined broadly to it. Lateral carinae well-marked. Hind margin chiefly acute-angled with excavated sides.

It is impossible to give any key which will enable the novice to determine the subordinate forms treated as races of *collare* with any degree of certainty, but the following tabulated statement of the more important comparative differences will be found helpful. Additional aid may in some cases be derived from the figures and comparisons given in my paper on the New England species.

Synopsis of Species.

A. Carina of pronotum very high, about equal in height to the width of one-half of the disc of the metazona, laminate; body compressed. *cristatum.*

	<i>Head.</i>	<i>Eyes.</i>	<i>Height of carina.</i>	<i>Angulation of post. process.</i>	<i>Connection of proximal fuscous bands on inside of hind femora</i>	<i>Tegmina</i>
(<i>Larger forms</i>)						
<i>collare</i>	narrowed above; cheeks and occiput tumid	small	moderate	rectangular	not or but slightly both in amount and degree	
<i>utahense</i>	'	moderate?	high	rectangular?	?	
<i>scudderi</i>	less tumid	larger, of moderate size	high	acute	broadly, with dark fuscous or black	
<i>angustifemur</i>	sub-compressed	large	high	acute	not or but faintly	
(<i>Smaller forms</i>)						
<i>wyomingianum</i>	quadrate	large, in ♂ prominent	variable, but rather high	acute	not or but faintly	widest at costal dilatation; distinctly arcuate toward apex
<i>pallidum</i>	quadrate	moderate	moderate; low on metazona	rectangular	not or but faintly	of equal breadth throughout; very slightly arcuate toward apex

Spharagemon cristatum Scudder.

The elevation of the crest of the pronotum in this species, while the best diagnostic character with which I am acquainted, varies much individually in

Spharagemon cristatum. Scudder, Proc. Boston soc. nat. hist., xvii. 470.

its relative development on the prozona and metazona, and also the overlapping of the lobes. The anal, and sometimes also the posterior half of the discoidal, area of the tegmina is occasionally of a marked rosaceous tint. Eight specimens from the Gulf coast of Texas are noticeably larger and more bulky and have the posterior process of the pronotum more produced than those from Dallas.

Prof. Bruner has sent me a specimen from Tiger Mills, Texas, and reports it also from San Antonio, and S. W. Texas, and Barbour Co., Kansas. The National museum material consists of three examples from Dallas, and a pair from Carrizo Springs, Texas, the latter taken Aug. 28 by Dr. A. Wadgymar. Scudder's collection contains about forty specimens chiefly from Dallas, taken by Boll, a number collected by Belfrage, a single example from Dingo Bluffs, N. C., Nov. 15, and one from Tallahassee, Fla., Glover. These latter are the only examples known from the eastern States.

Spharagemon collare Scudd.

Oedipoda collaris. Scudder, Geol. Surv. Neb., 250.

Oedipoda collaris. Thomas, Syn. Acrid. N. A., 113.

Spharagemon collare. Scudder, Proc. Boston soc. nat. hist., xvii, 470.

Spharagemon collare. Morse, Proc. Boston soc. nat. hist., xxvi, 234-5.

Examination of a considerable number of specimens indicates that the forms

described as *collare*, *wyomingianum* (= *oculatum*), and *scudderi* approach each other so closely that it is at the present writing impossible to definitely limit them. Although typical specimens of these forms may be readily distinguished, others cannot be referred to any one of them with certainty: for this reason it seems best to regard them as races of one composite species. Yet it is not improbable that with more systematic collecting and observation in the territory where the forms overlap a limitation may be found possible. To this group belongs also the *Oed. utahensis* of Thomas and other western forms described here.

Race *Collare* Scudder.

Spharagemon aequale (in part). Scudder, Proc. Boston soc. nat. hist., xvii, 468.

For additional bibliography see *supra*.

This race, the typical *collare* of Scudder, is a widespread and common form in the central part of the country, and varies much in color and size. Only about one-third of the specimens seen are of the "collared" type of coloration. The hind femora sometimes have the proximal two fuscous bands slightly connected internally, but never to such an extent or depth of tint as in *scudderi*. Individuals vary much in wing-length, and in size, as the following measurements show:—

Antenna.	Hind fem.	Teg.	Total.
♂ 12	11.5-14.5	21.5-26	26.6-33
♀ 12	16 -17.6	28.5-31	36 -40

The national museum material contains specimens from Watertown, Dak., Mont., Iowa, and Ft. Robinson, Gordon, and Valentine, Neb. Prof. Bruner has sent me examples from N. and S. Dak., and reports it also from Wyo., and various parts of Neb. Scudder's collection comprises specimens from N. Ind., Crawford Co., Dallas Co., and Jefferson, Iowa, July and Aug.; North Red R., Dak., Platte R., Denver, Colo., Utah, and several specimens labeled Aspinwall but whose locality is open to some doubt.

Race *Utahense* Thomas.

Oedipoda utahensis. Thomas, U. S. Geog. Surv., Wheeler, v. 883: pl. 44, fig. 2.

Dissosteira utahensis Thos. Sausure, Addit. Prod. Oed., 167.

What the form is to which Thomas applied this name is problematical. The characterization given in the reference noted above indicates a form intermediate between *collare* and *cristatum*, and it is probable that it was applied to some form of the *collare* group. Breadth of wing-band, given by Thomas as a distinguishing character, is entirely worthless for that purpose. The only diagnostic character given that is of any importance is: "Crest of pronotum a little more elevated than in *Æ*. [*Diss.*] *carolina*." (See also *aequale*, this paper.)

Prof. Bruner has sent me a ♀ from Ogden, Utah, of a form to which he applies this name. In Mr. Scudder's collection is a series of 18 ♂, 7 ♀, from

Pueblo, Colo., Aug. 30-31, 4700 ft. alt., with which this specimen agrees save in having the carina very slightly higher. These specimens are very near the typical *collare*, though having the eyes somewhat larger, and the tegmina a little shorter than do many specimens from the plains.

Race *Scudderi* Morse.

S. aequale, subsp. *scudderi*. Morse, Proc. Boston soc. nat. hist., xxvi, 225.

S. aequale, in part Scudder, Proc. Boston soc. nat. hist., xvii, 468.

Concerning this race there is little to be added to the account given in my New England paper. I have since taken it on July 7 at Dover, Mass., two weeks earlier than before recorded. I have secured it also at North Windham and North Haven, Ct., and on Martha's Vineyard, and have received it from Belmont, Mass., through Mr. C. J. Maynard. Mr. Scudder's material consists of a single ♀ from the vicinity of Boston, several specimens from Cape Cod, and a considerable number from Nantucket Id. A badly damaged ♂, presumably of this race, from Brunswick, Me., in Scudder's collection, so strongly resembles the specimens of *collare* from Minnesota and the Red R. of the North arranged with it in the form of the head and pronotum, and as far as may be judged from what remains of the femora in lacking fuscous on their basal part, as to suggest a doubt regarding the correctness of the locality indicated.

This race rarely presents the "colored" type of coloration, though some specimens from Nantucket and a single one from Sherborn, Mass., are thus marked. It is very desirable to learn the distribution of this race outside of New England, it being unknown at present from beyond that district.

Race *Augustipenne* var. nov.

This form is very near *wyomingianum* differing in having the head larger proportionally, the tegmina and wings longer, and the pronotum slightly more constricted. The tegmina when spread are of equal width throughout and their edges are straighter toward the apex than in *wyomingianum*.

9 ♂, 4 ♀, Salt Lake Valley, Utah, 4300 ft., Aug. 1-4. Scudder's collection.

Antenna.	Hind fem.	Tegmina.	Total.
♂ 11.4-12.5	12.8-15.3	23-26	28.7-33
♀ 12.5	15 -16	27-29.5	34 -36

Race *Wyomingianum* Thos.

Oedipoda wyomingiana. Thomas, Geol. Surv. Terr., 1871, 462.

Oedipoda wyomingiana. Thomas, Syn. Acrid. N. A., 113.

Spharagemon wyomingianum. Scudder, Proc. Boston soc. nat. hist., xvii, 470.

Spharagemon aequale (in part). Scudder, Proc. Boston soc. nat. hist., xvii, 468.

Spharagemon collare. Scudder, in collection, labeled thus, from N. J. (described by Morse as *oculatum*).

Spharagemon collare. McNeill, Psyche, vi, 64. Determined from a pair in Scudder's collection, Moline, Ill., received from McNeill.

Spharagemon oculatum. Morse, Proc. Boston soc. nat. hist., xxvi, 232.

Spharagemon oculatum. Blatchley, Can. ent., 1894, 218.

The description of Thomas is misleading in some particulars and the locality of the specimens was so far removed, while the discrimination of the species has been attended with such confusion, that I described this form as new under the name of *oculatum* (l. c.) from material from Indiana and Staten Id. I have since compared what are undoubtedly the types in the National museum collection with these and find that they agree in all essential particulars. I have also received an additional series from Prof. Blatchley from Marshall Co., Ind., and in that locality at least it is a well-marked form or race. Yet specimens from Md. and N. Y. closely approach the New England form *scudderi*, and in the west even the typical *collare*. 2 ♀ from Colo. show the reddish suffusion previously mentioned.

In addition to several of the types of "oculatum" previously described, my collection contains a series of 15 ♂, 11 ♀, Marshall Co., Ind.—Blatchley; a pair from Illinois and a ♀ from Staten Id. received from Beutenmüller. Scudder's collection contains a pair from Moline, Ill.,—McNeill; 3 ♀, Chicago; and 1 ♀, Md., Sept. 14,—Uhler ("aequale"). The National

museum material consists of the following: 2 ♂, 1 ♀, labeled "*Oedipoda wyomingianum*. E. Wyo. Terr."—these are doubtless the types; 1 ♀, D. C., Sept. 7; 1 ♂, 1 ♀, Ill., Sept.; 2 ♂, Colo.; 2 ♂, 1 ♀, Valentine, Neb.; and 2 ♂, 1 ♀, Gordon, Neb. Prof. Bruner reports it from Glendive, Mont., Wyo., Colo., and W. Neb.

Race *Pallidum* var. nov.

"*Spharagemon n. sp. near balteatum*" Scudder, in collection. 4 ♂, 2 ♀, White R., Colo., July 24–Aug. 13.

Antenna	Hind fem	Teg.	Total.
♂ 11.5	12 -13.5	21-23	27 -29.5
♀ 10 -11	14.5-15.5	24-27	31.5-33.5

This form is of about the size of the typical *wyomingianum* but differs from it in having a less compressed body and head, and a less elevated carina, especially on the metazona. The eyes are smaller proportionally and less protuberant, and the hind tibiae have the basal third largely luteous. The whole insect is pallid in color. While perhaps it can scarcely be considered a distinct race it varies so much from the other forms as to make a name desirable.

COMSTOCK'S INSECT ANATOMY.

The serious study of insects in this country has already received strong support from the Professor of Entomology in the Cornell and Stanford universities, by the publication of his Introduction and his Manual, the latter of very recent appearance; and now, associating with himself Professor Kellogg, Professor Comstock has issued an Elements of Insect Anatomy, a little volume of nearly 100 pages. It is an admirable little guide, based on dissections of *Melanoplus*, *Corydalis*, *Pterostichus* and *Anosia*, but dealing more with the external anatomy than with the internal organs. Special chapters treat of the distinctively characteristic parts of insects, the organs of the mouth and the venation of the wings. In the latter, Professor Comstock modifies the position he held in his Manual and adopts more closely the views of Spuler (which Dr. Packard upheld in a recent number of *Psyche*), although he considers the costa as vein I and consequently pushes forward by one digit the numbering of all the rest. With a single exception, all the illustrations are in the chapter on venation.

We hope the little work, issued by the Comstock Publishing Co. of Ithaca, N. Y., may have a wide sale.

PROCEEDINGS OF THE CLUB.

12 April, 1895. The 187th meeting was held at 346 Marlborough St., Boston. Mr. A. G. Mayer in the chair.

Mr. F. C. Bowditch spoke of finding *Acanthocinus obsoletus* on white pine and remarked that those collected in this vicinity seem distinct. He also spoke of the habits of *Oberia bimaculata*.

Mr. A. G. Mayer discussed at some length the colors of the genus *Papilio*, especially comparing the North American and South American species. He found black very prevalent in species from temperate and boreal regions, while in tropical countries it is represented by brown.

Mr. W. L. W. Field asked if Mr. Mayer had compared specimens of *P. cresphontes* from northern localities with those from the southern states, brown being rather prevalent in those coming from Connecticut. Mr. Mayer replied this was rather a southern than a northern species.

THE SEVENTH VOLUME OF PSYCHE

Began in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

Vols. 1-6, Complete, Unbound, - Now sold for \$29.00.
 Vols. 1-6, and Subscription to Volume 7, - - \$33.00.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

Vol. 1. Introduction; Nymphalidae.

Vol. 2. Remaining Families of Butterflies.

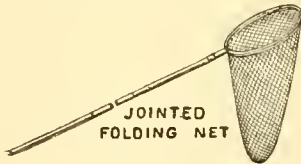
Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo, half levant, \$75.00 net.

HOUGHTON, MIFFLIN & CO.,

4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbad Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 235.

NOVEMBER, 1895.

CONTENTS:

NOTES ON THE HABITS OF TRYPOXYLLON RUBROCINCTUM AND TRYPOXYLLON ALBOPILOSUM.— <i>George W. Peckham and Elizabeth G. Peckham.</i>	303
THE LARVA OF HARRISINA CORACINA CLEMENS.— <i>Harrison G. Dyar.</i>	305
ENALLAGMA PICTUM MORSE.— <i>A. P. Morse.</i>	307
RHODITES TUMIDUS.— <i>C. H. Tyler Townsend.</i>	307
EDWARDS'S BUTTERFLIES OF NORTH AMERICA.	307
CHARLES VALENTINE RILEY.	308

SUPPLEMENT TO PSYCHE, I.—CONTRIBUTIONS FROM THE NEW MEXICO AGRICULTURAL EXPERIMENT STATION (New Species of Bees, <i>T. D. A. Cockerell</i> ; Doryphora (Mycocoryna) lineolata Stål, <i>T. D. A. Ckll.</i> ; New Homoptera received from the N. Mex. Agric. Exp. Station.—I (Illustrated) <i>Carl F. Baker.</i>)	9
--	---

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

70573

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, *without change of form*, to the author of any leading article, if ordered at the time of sending copy, . . . Free

Author's extras over twenty-five in number, under same conditions, each per page, . . . 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . .	.75	.60
Quarter " " " " " " " " . . .	1.25	1.00
Half " " " " " " " "	2.25	1.75
One " " " " " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by
R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danais archippus</i> . Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Technology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> . col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

NOTES ON THE HABITS OF TRYPOXYLLON RUBROCINCTUM AND TRYPOXYLLON ALBOPHILOSUM.

BY GEORGE W. PECKHAM AND ELIZABETH G. PECKHAM, MILWAUKEE, WISC.

When we went out to our summer cottage, in the last days of June, we found many little wasps of the species *Trypoxyllon rubrocinctum* busily working about a brick smoke-house on the place. Closer examination showed that in the mortar between the bricks were many little openings leading back for a considerable distance, which were occupied by the wasps. It would seem that these holes were excavated by some other agency than the wasps themselves as they were so much too deep for their purposes that before using them they built a mud partition across the opening about an inch from the outside of the wall. Later on we found nests of the same species in the posts which support an upper balcony of the cottage, and here, too, the wasps made use of holes which were already excavated. We also found in these posts nests of *Trypoxyllon albopilosum* and during July and August we kept a close watch upon the comings and going of our little neighbors.

They were very good-tempered little creatures, never resenting our close proximity nor our interference with their housekeeping. By working hard

they could prepare a nest, store it with spiders and seal it up, all in the same day. This we have seen them do in several instances. In other cases the same operation takes three or four days.

With both species, when the preliminary work of cleaning the nest and erecting the inner partition has been performed by the female, the male takes up his station inside the cell facing outward, his little head just filling the opening. Here he stands on guard for the greater part of the time until the nest is provisioned and sealed up, occasionally varying the monotony of his task by a short flight. As a usual thing all of the work is performed by the female, who applies herself to her duties with greater or with less industry according to her individual character; but the male doubtless performs an important office in protecting the nest from parasites. We have frequently seen him drive away the brilliant green *Chrysis* fly which is always waiting about for a chance to enter an unguarded nest. On these occasions the defence is carried on with great vigor, the fly being pursued for some distance

into the air. There are usually two or three unmated males flying about in the neighborhood of the nests, poking their heads into unused holes, and occasionally trying to enter one that is occupied, but never so far as we have seen, with any success, the male in charge being always quite ready and able to take care of his rights. The males, however, never made any objection when strange females entered the nest as they sometimes did by mistake, nor did the females object to the entrance of a strange male when the one belonging to the nest happened to be away, but in such cases the rightful owner, on his return, quickly ejected the intruder. We often amused ourselves, while we were watching the nests, by approaching the little male, as he stood in his doorway, with a blade of grass. He always attacked it valiantly, and sometimes grasped it so tightly in his mandibles that he could be drawn out of the nest with it.

When the female returns to the nest with a spider the male flies out to make way for her, and then as she goes in he alights on her back and enters with her. When she comes out again she brings him with her, but he at once re-enters, and then, after a moment, comes out and backs in, so that he faces outward as before.

In one instance, with *rubrocinctum*, where the work of storing the nest had been delayed by rainy weather, we saw the male assisting by taking the spiders from the female as she brought them and packing them into the nest leaving her free to hunt for more. This was

an especially attentive little fellow, as he guarded the nest almost continuously for four days, the female sometimes being gone for hours at a time. On the last day he even revisited the nest three or four times after it had been sealed up.

It is upon the female that the heaviest part of the work devolves. As soon as she has put the nest in order she begins the arduous task of catching spiders wherewith to store it. It usually takes them from ten to twenty minutes to find a spider and bring it home, but they are sometimes absent for a much longer time. When the spider has been carried to the nest the process of packing it in begins. This occupies some time and, apparently, a good deal of strength, the female pushing it into place with her head with a total disregard of its comfort, all the spiders that are caught being pressed and jammed together into a compact mass. While she is busied in this way she makes a loud cheerful humming noise like that made by the blue and yellow mud-daubers, as, standing on their heads, they gather their loads of mud. The number of spiders brought seems to depend upon their size, in which quality they vary greatly, the largest ones being six or eight times as large as the smallest. *Rubrocinctum* fills her nest with from seven to twelve, while the larger *albopilosum* brings as many as twenty-five or thirty. Those that we examined represented many different genera, and even different families, although they were usually Epeiridae.

In a number of cases, after several spiders had been stored, we gently drew them out with a bent wire. In one nest in which there were five spiders, we found, two hours after they had been stored, that three were alive and two were dead. In another which the wasp had just begun to seal up were ten spiders. Three of these were injured in being drawn out. Of the remainder four were alive and three dead. On the anterior part of the dorsum of one of the living spiders was the egg. It had probably been fertilized as the female carried the male into the nest on her back.

When a female returns with her load she usually hunts about for a few moments before finding her nest, often entering two or three that are empty or are occupied by other wasps by mistake, so that it would seem that their sense of locality is not very strongly developed.

After the storing process is completed the female seals up the nest with mud. In the case of one *rubrocinctum* that we were watching she began to close the opening at 4.43 P.M. and finished her work just thirty minutes later. In this time she made ten journeys for mud bringing it in pellets in her mandibles. In another case, also a *rubrocinctum*, the female, after bringing so many spiders that the cell was full up to the very door (which we saw in no other case), went away without closing it and never returned. The male seemed uneasy at her conduct and several times flew away, staying an hour or two and

then returning; but after a time he too deserted the nest. Whether some evil fate overtook the female or whether there was some failure of instinct on her part can only be conjectured, but the latter hypothesis is not untenable, since out of twenty-six nests that we had under observation three were cleaned out and prepared and were then sealed up empty. We have often found similar cases among the nests of the blue mud-dauber wasps where it is not a very uncommon thing for the absent-minded females to build their pretty little cylindrical nests with infinite care and patience and then to seal them up without putting anything inside.

One afternoon as we sat, literally, at our posts, a female of *albovilosum* came humming along looking very important and energetic, as though she had planned beforehand exactly what to do. She entered an empty hole, head first, and at once began to gnaw at the wood, kicking it out backwards with considerable violence. After a few minutes she changed her method of work, and began to carry out loads of wood dust in her mandibles, dropping it in little showers just outside the nest, and then hastening back. In forty minutes she carried out, in this way, upwards of fifty loads. She then flew away, but returned in ten minutes with a male. She alighted, he took his place on her back and they went in together.

After a time they came out and both flew away, but the next morning they came back and the nest was stored.

In this species (*albopilosum*) the male does not always come out of the nest when the female brings a spider. Perhaps the nest is enough larger than in *rubrocinctum* to accommodate them both comfortably. As a usual thing, however, he enters on the back of the female. The spiders brought by *albopilosum* are larger than those used by *rubrocinctum*. They sometimes bring such heavy specimens of *Epeira insularis* that they are carried with difficulty, the wasp alighting and dragging the spider into the hole instead of flying directly in, as usual.

Mr. W. H. Ashmead has noted that *albopilosum* stores its nest with aphides but in the cases that we observed they used only spiders. There can be no mistake on this point as we more than once took the spider from the wasp as she was entering the nest. In a recent letter Mr. Ashmead says that his notes were made in the field, and that it was probably a case of mistaken identity on his part.

We sometimes found the parasitic *Melittobia* fly in the nests of *rubrocinctum*, and from two nests we reared the common fly *Pachyophthalmus aurifrons*.

We do not know how many nests are stored by the female in one season, nor the length of time taken in the development of the young. Two nests, sealed up on June 30 and July 1 are at the present time, August 31, still unopened.

The interest of the wasps in family affairs seems to flag in the second week of August and we saw no new nests started after the fifteenth, so that it is probable that after that time the hard working little creatures enjoy a well earned holiday on the blossoms of the aster and the golden rod.

We are under many obligations to Mr. W. H. Ashmead for his kindness in naming for us both the wasps and their parasites. His name is a sufficient guarantee for the correctness of the identification.

THE LARVA OF HARRISINA CORACINA CLEMENS.

BY HARRISON G. DYAR, NEW YORK, N. Y.

Mr. T. D. A. Cockerell has sent me larvae of a *Harrisina* found on *Vitis vinifera* at Las Cruces, New Mexico. Mr. Cockerell takes the moth of *H. coracina* commonly on the same vines, and also a few *H. metallica*; but he does not think that these are the larvae of the latter, as they are so much more rare. With this conclusion I agree, as the larvae differ too much from our *H. americana* to be those of the closely allied *H. metallica*.

Larva. Shaped as *H. americana*, thick, flattened, the head retractile. Yellow; cervical shield, warts on joint 2, a band on joint 3 covering the three upper warts and the two lower ones also black; a band on joint 4 and on 5 to wart vi; a band on joints 6, 8, 10, 11 and 12 to the spiracle and the anal plate black, including the short hairs. Purple patches extend between the bands on joints 5 and 6, running forward to cover the lateral area of joint 4 to the band on that

segment and in a rounded point subventrally nearly to the foot; edging the band of joint 8 in front, widest at the lower edge of the band; between the bands on joints 10 and 11 and edging the band on 10 in front in the same manner as the band on 8. Wart areas low, flattened, rather large, covered with short black hairs. Warts i and ii consolidated, iv and v consolidated, normal for the highest Microlepidopterous type (*Anthrocerina*).

A sack-like evaginated pouch on joint 2 below and behind the subventral wart. A series of paired intersegmental dorsal, and single larger intersegmental lateral glandular dots, pale in the purple markings. Thoracic feet light brown. Head shining brown-black. The spiracle on joint 5 is a little higher up than those on joints 6 to 12, but the wart above it is not modified. Around the spiracle on joints 6 and 11, a circular inflated area is situated, that on joint 11 projecting below in a lip-like prolongation. Width of head about 1 mm.

ENALLAGMA PICTUM Morse.

This species was described (*Psyche*, Aug. 1895) from a single dry example of each sex. Fresh specimens obtained this summer enable me to better characterize the coloration of the male. In flight the living insect is a very noticeable species, the head and thorax appearing of a vivid red. The eyes are deep cinnabar; postocular stripe and pale parts of the thorax light vermilion, palest on sides; legs and sides of segments 1, 2, 3, of abdomen yellow flushed with red; sides of 8, 9, 10, rufous. The ♀ is yellow and deep greenish black.

A. P. Morse.

RHODITES TUMIDUS.

In my article in *Psyche*, August, 1895, on the gall of *Rhodites tumidus*, a mistake was made in the determination of the gall-producer. My thanks are due to Prof. C. P. Gillette for calling my attention to this error. The gall described in the above article be-

longs to *R. bicolor*. The mistake occurred inadvertently in writing down a list of determinations, before they were sent me.

C. H. Tyler Townsend.

EDWARDS'S BUTTERFLIES OF N. A.

In the 16th part of his *Butterflies of North America*, which appeared early in October, Mr. W. H. Edwards has given us one of the most important and interesting of this third series. The three species selected for representation are *Parnassius smintheus*, *Satyrus charon* and *Chionobas gigas*. Every stage of each is represented by the usual wealth and beauty of illustration, which were we not now accustomed to it would strike us with amazement, excepting the last species of which the chrysalis and the last half of the larval life are yet unknown. As to *Parnassius*, no such illustration of a species of the genus has ever been attempted. This Part is particularly valuable, since Mr. Edwards has enriched his text with abundant observations and field notes from his correspondents, so that *Parnassius* extends to 16 quarto pages and *Chionobas* to 11. There is much interesting new matter regarding the formation of the abdominal pouch of the female *Parnassius* and figures are for the first time given of Scudder's peraplast, the supposed male implement in its formation. The *Chionobas* portion contains remarkably full comparisons of the habits and distribution of three species of the genus: *gigas*, *californica* and *iduna*, largely from Mr. W. G. Wright's notes, in justification of their belief in the distinctness of these three forms, denied by Elwes.

Another part will presumably conclude the series, but we must express the hope that the indefatigable author will be encouraged by extended subscriptions to begin another series forthwith. Material is not lacking.

Mr. C. H. Tyler Townsend writes us that his future address will be Las Cruces, N. Mexico.

CHARLES VALENTINE RILEY.

In Mr. Riley's sudden death on September 14, a few days after his 52d birthday, America loses not only its best known entomologist, but one who by his ability, sagacity, example, and the line his studies have taken has done more for the advancement of our special science than any one America has ever reared. Economic entomology had its votaries, and excellent ones too, before he made his mark, but he more than any one else is to be credited with its present extended work in this country and its growing importance

abroad. No doubt this is due in large part to the times in which he lived and the opportunities he created, but it is also due to his keen perception of the importance of obtaining the most thorough knowledge of the life-history of any pest before its attacks can be rationally combatted, and to the value of his own unexcelled researches in this direction. The extent and variety of our knowledge of the biology of North American insects, largely the product of the cultivation of economic entomology here, is hard to realize, and in these Darwinian days it has a purely scientific value difficult to estimate at its true worth.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

Vol. 1. Introduction; Nymphalidae.

Vol. 2. Remaining Families of Butterflies.

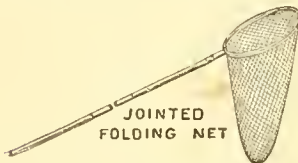
Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo, half levant, \$75.00 net.

HOUGHTON, MIFFLIN & CO.,

4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carls-bader Insect Pins a speciality. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

V. NEW SPECIES OF BEES.

BY T. D. A. COCKERELL.

Phileremulus, n. gen.—Resembling a very small *Phileremus*, but with only one submarginal and two discoidal cells. Marginal short. Body-covering, where present, consisting of scales. Type, *P. vigilans*, n. sp.

Phileremulus vigilans, n. sp.—♂ $3\frac{1}{2}$ mm. long, dull black but appearing griseous from the white scales. Head somewhat broader than long, covered with white scales, which give the vertex a dull grey appearance, but are so dense on all the lower part of the face as to make it beautifully snow-white. Ocelli large and distinct. Eyes nearer together below than above. Antennae further apart than the distance of either from the orbital margin; brown, the scape short, funicle large, flagellum with the second joint shorter than the third, and the third shorter than the first. Mandibles simple, their ends rufous. Thorax rather small, quite thickly covered with white scales, metathorax with a T-shaped area black because free from scales. Scutellum with a longitudinal groove.

Tegulae shining yellowish-rufous. Wings hyaline, iridescent, nervures dark brown. Stigma little-developed; marginal cell short, obliquely subtruncate at tip, which joins costal margin; submarginal large, pyriform, longer than marginal, appendiculate; first discoidal lanceolate, second discoidal wedge-shaped, appendiculate. The wing area enclosed in cells is less than that beyond.

Legs with the femora black except the pale rufous knees, tibiae and tarsi rufous, with white scales. Tibial spurs white.

Abdomen elongate, somewhat depressed, black with the distal margins of the segments pale rufous, and the whole griseous from the coating of white scales. Venter like the dorsum. The abdomen ends in a narrow subacute rufous process.

♀ 3 mm. long. Antennae rather rufous than brown. Abdomen rather broad, considerably shorter than in the ♂, clear rufous, the last two segments blackish-rufous. The

scales become dense only on the distal margins of the segments, thus producing light bands.

Hab.—Las Cruces, N. M., 3800 ft., on sandy ground, visiting flowers of *Pectis papposa* occasionally.

Phileremulus nanus, n. sp., ♀ $3\frac{1}{2}$ mm. long. Differs from the ♀ of *P. vigilans* as follows: The head is a little larger, the mandibles more rufous, the face black, nearly free from scales except at sides, the clypeus not white with scales, the vertex is very broad, antennae shining rufous, basal half of scape blackish, first joint of flagellum as long as the second and third combined; last joint of antennae obliquely truncate, whereas in *P. vigilans* it is hardly noticeably so, one side being merely somewhat flattened.

Marginal cell extremely small. Abdomen rufous, not so distinctly fasciate. Apex black. Fourth segment with three suffused black spots on its distal margin, the space between them slightly golden.

Hab.—Santa Fé, N. M., 7,000 ft., on sandy ground.

This remarkable genus is allied to that section of *Phileremus* represented by *P. pulchellus*, which is found in Santa Fé in August. The reduced venation is doubtless adapted to its short rapid zigzag flight, which is more like that of some of the parasitic hymenoptera than of an ordinary bee. The specimens described were only caught with the greatest difficulty, although both species (especially *vigilans*) were fairly abundant where found. The habit of both species is to fly very rapidly about half an inch above the surface of the sand, frequently settling for an instant only. To catch them with a net is almost impossible, and I was obliged to watch with my finger in my mouth, and secure them by suddenly putting the wet finger-point on them when they settled. Thus I caught the two females of *P. nanus* at Santa Fé on Aug. 10 and 14. They were on a sand bank in

Mr. Boyle's garden. *P. nanus* was never observed on any flower, but where *P. vigilans* is found, there is plenty of *Pectis papposa*, a low-growing yellow-flowered composite. The ♂ of *P. vigilans* was actually swept from the *Pectis*, early in September; and later, individuals of the same species were seen occasionally to visit the flowers for an instant only. The ♀ of *P. vigilans* was caught on Sept. 19.

It must be admitted that the two species are very closely allied, and it may be that the comparatively bare face of the *P. nanus* is due to the contact of my wet finger-tip. But the ornamentation of the end of the abdomen is different, and there is also the difference in the antennae; so that we may safely assume, I think, that we have to do with distinct species.

Phileremus verbesinae, n. sp.—♂ 6-7 mm., form elongate, head and thorax black, abdomen and legs rufous. Pubescence consisting of small white scales, which cover the head and thorax to such an extent that they appear grey. Head broad, face depressed at sides, clypeus rounded and prominent, strongly punctured; clypeus, area between antennae, and sides of face below, practically bare of scales, or the space between the antennae may be scaly. Mandibles rufous.

Antennae dark brown, 12 jointed, last joint normal, first joint of flagellum not quite as long as 2+3, but very nearly so.

Thorax bulging at sides, tubercles elevated, scutellum moderately bilobate, postscutellum distinctly bilobate. Legs rufous, coxae and femora except ends, blackish. Hind tibiae and tarsi hoary from white scales. Tibial spines pale yellowish. Claw small, cleft, the inner tooth smallest.

Tegulae rufous. Wings very short, reaching only to middle of fourth segment of abdomen, yellowish hyaline, area enclosed by the nervures smaller than that beyond them. Nervures dark brown, stigma little-developed: marginal cell extremely short, obliquely truncate; first submarginal large, subpyriform; second submarginal small,

much higher than broad, narrowed above, it is much the size and shape of the marginal, placed transversely, but a little larger. Second submarginal receiving both recurrent nervures, the first at extreme base, the second a little before its apex.

Abdomen granular, rufous, the apex blackish. Segments 1-4 with conspicuous, rather broad bands of white at their distal margins. These bands are not at all constricted in the middle.

Hab.—Las Cruces, N. M., Sept. 20, 1895, four specimens on flowers of *Verbesina encelioides*. This is a most interesting species, showing the nearest approach to *Phileremulus* yet seen in *Phileremus*. With its *Phileremus*-venation, however, go *Phileremus*-habits; for the bees were visiting the flowers just as any bees might, and were caught without difficulty with the finger and thumb. None were seen flying over the sand like *Phileremulus*. On the *Verbesina*, at the same time, I got *Perdita beata*, n. sp., a beautiful yellow species just like *luteola* (which lives on *Bigelovia*) but at least 8 mm. long, with a densely pubescent mesothorax. It will be described fully elsewhere.

Phileremus mesillae, n. sp.—♂, 6 mm. long, short, robust, the abdomen not so long as head and thorax combined; black, with appressed white pubescence. Face covered with pubescence, vertex comparatively bare, scape pubescent, flagellum bare, dark brown. First joint of flagellum not as long as 2+3, 2 longer than 3. Thorax more or less covered with pubescence, which becomes very sparse on hind part of mesothorax, scutellum except hind border, and middle of metathorax. The mesothorax and scutellum are strongly and densely punctured. Scutellum not spined, and only very obscurely bilobate. Legs black, more or less pubescent, tarsi and tips of tibiae ferruginous. Wings hyaline, nervures and stigma dark brown, marginal cell obliquely subtruncate at tip, 2d submarginal about $\frac{1}{2}$ shorter than first, receiving both recurrent nervures, the first about

one-fifth of its length from its base, the second near its apex 2d submarginal narrowing about or hardly one-half to marginal.

Abdomen black, with six rather broad continuous white bands, two on first segment, joined laterally, the others at distal margins of the four following segments. Apex black, broad, rounded.

Hab.—Las Cruces, N. M., April 27, 1894, taken on the occasion of a meeting of the College Field Club.

This insect has been compared by Mr. Fox with Cresson's types, and as he remarks, it resembles *P. montonus* from Nevada, but differs in the entire bands of the abdomen.

Bombomelecta alfredi, n. sp.—♂, about 13 mm. long, black, with dirty white or pale cinereous pubescence. Head broad, clypeus greatly produced; face, cheeks, and occiput densely clothed with long white hairs, mixed with black on cheeks beneath, and on clypeus a purer white, silky and shining. Antennae reaching a little beyond tegulae, black, truncate at tips, second joint of flagellum longer than first.

Thorax with large punctures visible on dorsum, but mostly so covered with long dirty-white pubescence that the surface cannot be seen. Among the hairs, the two short but distinct scutellar spines are visible. The pubescence on the pleura is very long and dense. Legs black, with

sparse black pubescence, mixed with whitish. The anterior and middle femora below are fringed with white hairs, but the posterior femora have no such fringe. The middle tibiae show short white pubescence without. The first joint of posterior tarsi bears in addition to the short pubescence, six long black hairs. The posterior tibiae are broadly dilated to their truncate ends and the innermost spine is longest and slightly curved. The first joint of posterior tarsi is distinctly shorter than the tibia. Tegulae pitch-black, shining, microscopically reticulate. Wings smoky-hyaline, the apical margin broadly smoky. Nervures dark brown. Second submarginal cell narrowing to a point at marginal Venation otherwise as in *B. thoracica* var. *fulvida*.

Abdomen black with minute punctures, first four segments each with a transversely elongate patch of dirty-white pubescence on each side, these patches successively smaller from the first. Tip of abdomen emarginate.

Hab.—Las Cruces, N. M., on a young cottonwood tree by the Agricultural College, April 17, 1895. (Alfred Holt.) By the color and arrangement of the pubescence, this is clearly distinct. The only other *Bombomelecta* found in the Mesilla Valley is *B. thoracica* var. *fulvida*, Cr., on *Lycium* (Jessie Casad).

DORYPHORA (MYCOCORYNA) LIN. EOLATA STÅL.

This insect was found in great numbers on a bush with linear leaves, Aug. 29, 1894, at San Augustine, N. M. Mr. Wickham, who kindly identified it for me, found it on apparently the same plant in the Pinal Mts., Arizona.

The eggs are laid on the leaves, about a dozen together, in two rows, touching, obliquely extending upwards; they are cylindrical, 2 mm. long, chrome yellow. One batch of about 25 eggs found.

Larva shaped as usual in the genus, 7 mm.

long in contraction, jerking from side to side when disturbed. Head pale yellow, with two elongate-pyriform, upwardly-converging, black marks on upper part of face. Body yellowish-white with a lateral series of squarish black marks, nearly forming a band; a narrow dorsal black stripe, wanting on first segment, and also wanting on second (concealed) segment. The junction of the segments marked by black lines. Last two segments mostly black above. Legs mostly black.

The *imago* has the thorax green, and the elytra ochreous marked with black.

T. D. A. Ckl.

VI. NEW HOMOPTERA RECEIVED FROM THE NEW MEXICO AGRICULTURAL EXPERIMENT STATION.—I.

BY CARL F. BAKER, FORT COLLINS, COLO.

In several very interesting lots of Homopterous insects received from Prof. T. D. A. Cockerell, of the New Mexico Agricultural College, were included a number of new species in the families Fulgoridae, Bythoscopidae and Jassidae. In a series of papers of which this is the first, these species will be characterized, and attention called to their affinities and the localities in which they were taken.

Thamnotettix lucida, n. sp.—Pale, clear, slightly yellowish, green, entirely without markings or dark colorations. Elytra hyaline. Length male 5.5 mm.

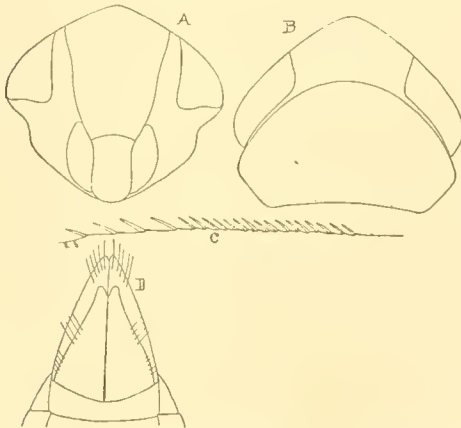


Fig. 1. *Thamnotettix lucida* n. sp. A, face; B, dorsum of head and pronotum; C, spines on inside of hind tibia; D, apex of male abdomen beneath.

Male.—Face a tenth wider than long; length of clypeus once and two-thirds the width at base, slightly constricted just before base, the basal suture strongly curved; lorae as long as clypeus and two-thirds as broad; genae with margin deeply emarginate below eyes, from this to tip of clypeus nearly rectilinear, very narrow below the lorae; front little

more than one-fourth longer than broad, little less than twice the length of the clypeus, sides slightly incurved at antennae, gradually narrowing below. Disc of vertex evenly, slightly convex, with a small depressed area on either side near the base and meeting the face at a very obtuse angle; length at middle once and a half that at the eyes, width between eyes once and five-sevenths the length. Width of pronotum about once and four-fifths the length, the length nearly twice that of the vertex, curvature about five-ninths of the length. Scutellum and venation of elytra normal. Spines on inside of upper two-thirds of hind tibiae regularly arranged and very unusually numerous. While in most others there are but eight or ten spines in this region, in this species there are about 16.

Color light green, slightly tinged with yellowish which is more noticeable on the abdomen. Last abdominal segment with plate, valves, and pygofers light bluish green, the pygofers furnished at tips with numerous strong blunt bristles which are white and conspicuously brown-tipped. Legs pale, some of the spines brown-tipped. Elytra hyaline, apical areoles somewhat translucent.

Described from a single male taken at San Augustine (Ckll. 2142). This insect somewhat resembles *T. atridorsum* in form but is a very much smaller and more delicate species. It is nearly allied to *T. inornata* and *T. aureola*, but differs most noticeably from those species in being entirely without dark markings. *T. flavicapitata* is a smaller yellowish and rufous species, with a shorter vertex and smoky elytra. In the arrangement of spines on the hind tibiae, *T. lucida* differs widely from any *Thamnotettix* I have seen.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 236.

DECEMBER, 1895.

CONTENTS:

THE EPHEMERIDAE AND VENATION NOMENCLATURE (Illustrated).— <i>Vernon L. Kellogg.</i>	311
ON THE NEST AND PARASITES OF PROSOPIS VARIFRONS CRESSON.— <i>A. Davidson.</i>	315
THE NUMBER OF STAGES IN APATELODES TORREFACTA (Illustrated).— <i>Harrison G. Dyar.</i>	316
DEIDAMIA INSCRIPTA.— <i>Caroline G. Soule.</i>	317
SCHISTOCERCA AMERICANA IN NEW ENGLAND.— <i>Frank H. Sprague.</i>	318
THE INSECT COLLECTION OF THE U. S. NATIONAL MUSEUM.	318
PROCEEDINGS OF THE CAMBRIDGE ENTOMOLOGICAL CLUB (Butterflies and Orthoptera of Labrador; a hybrid Basilarchia; development of color in wings; butterfly captures in New England).	319
<hr/>	
SUPPLEMENT TO PSYCHE, I.—CONTRIBUTIONS FROM THE NEW MEXICO AGRICULTURAL EXPERIMENT STATION (New Homoptera received from the N. Mex. Agric. Exp. Station.—I (Illustrated) <i>Carl F. Baker</i> ; The grape-vine Typhlocy-bids of the Mesilla Valley, N. M. (Illustrated).— <i>T. D. A. Ckll.</i> ; <i>C. P. Gillette</i> ; Some new insects, <i>T. D. A. Cockerell.</i>)	13

PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

~~Subscriptions not discontinued are considered renewed.~~

~~Beginning with January, 1891, the rate of subscription is as follows:—~~

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

~~Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.~~

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " " "	1.25	1.00
Half " " " "	2.25	1.75
One " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U. S. A.

Subscriptions also received in Europe by
R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danais archippus</i> . Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichthyology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate .50	
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> , col. pl. Boston, 1833. .25	
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

THE EPHEMERIDAE AND VENATION NOMENCLATURE.

BY VERNON L. KELLOGG, STANFORD UNIVERSITY, CALIF.

That consummation devoutly to be wished, the agreement among entomologists on a rational nomenclature for the veins of the wings of insects seems to be a probability of the near future. Just at present one of the moot points is presented by the wings of the Ephemerae. * Redtenbacher in his elaborate study of wing-venation chose, rather unhappily it now seems, the Ephemera wing as type of the existing generalized wing. In this wing, in addition to the usually distinct and easily recognized five principal longitudinal veins (exclusive of the anal veins), viz. : costa (marginal vein) subcosta, radius, media and cubitus, there are two other apparently equally important and fundamentally distinct longitudinal veins, one lying between radius and media, the other between media and cubitus. These two veins are called by Redtenbacher IV and VI, the already named five being designated by him, beginning with costa, as I, II, III, V, VII. Redtenbacher, believing these veins to be incident to the racial insect wing sought to find them in

all the orders of insects. * Comstock, adopting in the main Redtenbacher's nomenclature, explains the presence of these two veins (IV and VI), naming them pertinently premedia and post-media, differently from Redtenbacher. Professor Comstock pointed out that the veins in question were wanting in the wings of paleozoic insects, and stated his belief that the veins have been secondarily acquired among the May-flies by a straightening out of the zigzag lines between two series of cells. That is, they are essentially *venae spuriae*. † Spuler, studying the ontogeny of the lepidopterous wing found no indication of the two veins, and suggested a system of nomenclature which omits any reference to veins IV and VI of Redtenbacher as independent longitudinal veins. Spuler's conclusions and system are accepted by ‡ Dr.

* Comstock, J. H., Evolution and Taxonomy, in The Wilder Quarter Century Book, pp. 37-114, figs. 1-33, pl. I-III, 1893.

† Spuler, A., Zur Phylogenie und Ontogenie des Flügelgäders der Schmetterlinge. Zeitsch. f. wiss. Zoologie, Bd. LIII, s. 507-646, t. XXV, XXVI.

‡ Packard, A. S., On a Rational Nomenclature of the Veins of Insects, especially those of Lepidoptera, *Psyche*, May, 1895.

* Redtenbacher, Josef., Vergleichende Studien über das Flügelgäder der Insecten, Ann. d. k. k. naturhistorischen Hofmuseums, Wien, Bd. I. s. 153-232, t. IX-XX, 1886.

Packard. In his most recent *writing on the matter, Professor Comstock states that in his present opinion it would be well not to recognize premedia and postmedia as belonging to the group of principal longitudinal veins.

As a note, perhaps of interest, I offer a brief account of certain observations recently made on Ephemeropterid wings. A comparison of the figures of Redtenbacher and Comstock show that although both refer to a premedial and a postmedial vein they differ in their interpretations of what constitutes these veins and their respective branches (see figures 1 and 2, after Redtenbacher and

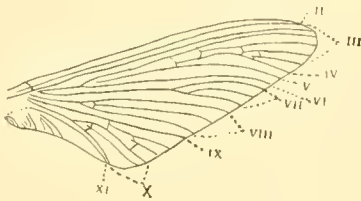


Fig. 1.

Comstock, respectively). What Professor Comstock defines to be vein IV and its branches includes part of Redtenbacher's vein III and all of his veins IV, V, VI, and their branches. Vein V of Comstock is Redtenbacher's vein VII, and Comstock's veins VI and VII are included by Redtenbacher among the anal veins. † Scudder's description

of the venation of the Ephemeropterid agrees with Comstock's in that both make radius (scapularis of Scudder, after Heer) a simple (unbranched) vein, but Scudder does not recognize any independent longitudinal veins

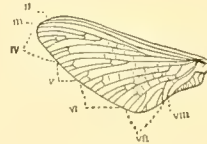


Fig. 2.

between radius and media or between media and cubitus. Comstock's veins IV and V are Scudder's externo-medial, and his veins VI and VII are Scudder's interno-medial. That is, Scudder makes premedia a branch of media, and postmedia a branch of cubitus.

None of these interpretations of the Ephemeropterid venation seems to me the correct one! The presumptuousness of this statement should be less offensive when we recall the fact that no two of the three already offered interpretations agree. A characteristic of radius noticeable in generalized wings and strenuously preserved in the specialized wings, is its branched condition. Just as sub-costa is characterized by its uniformly unbranched condition (excepting in the wings of a few very generalized insects, as the Blattidae), and media is characterized by its tendency to lose its basal half, so radius and cubitus are characterized by the persistence of their branches. Radius in its mode of branching also shows

* Comstock, J. H., The Venation of the Wings of Insects, pp. 75-91, in *The Elements of Insect Anatomy*, by Comstock and Kellogg, 1895.

† Scudder, S. H., *The Pretertiary Insects of North America*, pp. 5-6, 1890.

a recognizable consistency. Broadly stated, the manner of the branching is this: the stem forks rather near its base, the upper branch, which either does not fork again (in more specialized wings) or gives off a few branches (a more generalized condition) appearing to be more directly a continuation of the basal trunk than the lower branch, which usually displays a "branching away" character, and which is almost always repeatedly forked and branched. This repeatedly forking lower branch is the radial sector of authors. In the more generalized venation the sector branches from the radial stem near its base, and is many-forked. The modifications which the sector and its branches exhibit, due to the specializing tendency of the wing toward narrowness with accompanying coalescence and disappearance of vein branches are the reduction in the number (coalescence) of the branches and the movement of the point of origin of the sector farther and farther away from the base of the wing.

Now although the Ephemeropterid wings are in point of specialization in advance (shown by the reduction of the hind wing, and the specialization of the thorax) of the general rank of the family among insects (paired genital openings, etc.), the wings have by no means reached that degree of specialization where radius has become an unbranched vein. In fact, radius in the Ephemeropterid wing is, to my mind, in very generalized condition. The many-branched radial sector departs from the stem very near its base, so near indeed,

that by a slight modification it has become apparently entirely distinct from radius, and, in some May-flies even apparently joined at its base with media. Such an apparent or even real dissociation of a branch from its original stem and re-association with another vein is not an uncommon phenomenon in the modification of venation; note among the Lepidoptera the association of the branches of media, after the base of media has disappeared, with radius and cubitus.

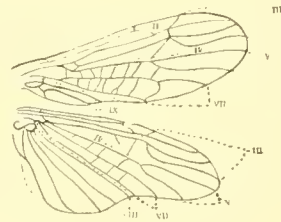


Fig. 3.

Nor is this condition of radius and its sector unique with the May-flies. Among Neuropteroid insects in general the sector usually arises near the base of the radial stem (Odonata, Sialidae *et al.*), and not unfrequently is apparently dissociated from the radial stem, and re-associated with media, as in certain Odonata and Perlidae, and, among unrelated forms, in Embia, Fulgora *et al.* In some cases the base of media is intimately united (coalesces) with the base of radius, as in Nemura (see figure 3). In fact the crowding together of the vein stems at the base of the wing brings about much distortion and modification of these one-time mutually independent and co-important trunks.

I would also designate the two veins called by Redtenbacher VI (postmedia of Comstock) and VII, simply as vein VII. Cubitus as well as radius is characterized by the persistence of its branches. As defined by Redtenbacher cubitus in the Ephemerid wing has lost all of its branches. This is extreme specialization. In my opinion cubitus in the Ephemerid wing forks at the very base producing the effect of two independent longitudinal veins. The same effect is shown in *Nemura* (see figure 3, especially hind wing) and is interpreted by *Redtenbacher exactly as I would interpret the similar condition in the Ephemeridae. *Nemura*, indeed, in the condition of both radius and cubitus is very like the Ephemerid wing and it is interesting to note Redtenbacher's interpretation (fig. 3) of the venation of this wing. No longer constrained by the rigid limits which the application of the theory of original convex and concave veins entailed we can now hardly justify the acceptance of two such variant interpretations of two such essentially similar wings.

In my view, therefore, the veins of the Ephemerid wing should be homologized as indicated in † figure 4. The interpretation does away with any recognition of veins IV (premedia) and VI (postmedia) as independent veins,

* I recognize, of course, that Redtenbacher's interpretations are influenced always by the convex and concave vein theory.

† Evidently, if this interpretation is correct and veins IV and VI are not elsewhere found as original principal veins, the veins should be numbered as follows: I = costa, II = subcosta, III = radius, IV = media, V = cubitus.

either as original principal veins (Redtenbacher) or as *venae spuriae* (Comstock).

More convincing than the argument from analogy for the correctness of this

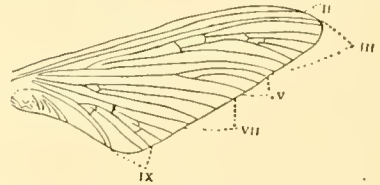


Fig. 4

interpretation is the observed fact that the tracheal trunk (original basis of the vein) of the radial sector can be distinctly traced, at least in observed instances, as a primary branch of the radial tracheal trunk, although the chitinous envelop of the sector's tracheal branch, which gives the vein its visibility to the naked eye, is not present at the base of the sector. In studying the venation of certain Blattid wings I found that the wing could be so mounted that the tracheal trunks (or, more accurately, probably, the **Rippenstränge*," relicts of the original tracheal trunks and identical in course with them), the foundations of the present visible veins, could frequently be seen and traced. At the base of any wing the thick chitin envelop of a vein is often obsolete although the tracheal trunk persists. In a mounted wing of *Hexagenia* sp. I have plainly observed the branching trachea of the sector arising from the radial trunk at

* Korschelt, E., and Heider, K. Lehrbuch der vergleichenden Entwicklungsgeschichte der wirbellosen Thiere, p. 864, 1890.

an appreciable distance from the base of radius. This wing also shows the unity at the base of the wing of the two main branches of cubitus.

In the examination of a considerable number of wings from various orders of insects I have noted that anal veins arise from certain tracheal trunks or often apparently from one main trunk which divides at the base of the wing into several or many branches or rays; and that this main anal trunk is distinct

from the main trunk or trunks which run into the pre-anal area of the wing, and which are the foundations of the principal longitudinal veins of the pre-anal area. In the wing of *Hexagenia* the veins corresponding to those veins marked "anal" in figure 4 are supplied with tracheae from one main trunk, the anal area trunk, while the first vein in front of these anal veins (called by me part of cubitus) does not receive a branch from this main anal trunk.

ON THE NEST AND PARASITES OF *PROSOPIS VARIFRONS* CRESSON.

BY A. DAVIDSON, M. D., LOS ANGELES, CAL.

This bee and *Ceratina dupla* are the most common ones that tunnel in the shoots of the elder and mustard in this locality. The cells are built in stems which the parent herself has hollowed out, and measure on an average 4 lines long, by 2 or 3 wide. They are lined with a thin, transparent layer of silk which is spun by the parent bee, and are filled three-fourths full with the light yellow semi-fluid bee-food. The egg is laid on top of this mass, and the cell is closed by the same silken tissue which, in its turn, forms the base of the succeeding cell. The last of the series, when finished, is further protected by a layer of pith of variable depth. The cells are probably normally built contiguously, but a few sometimes have partitions of pith, which may be the work of more than one bee.

Two broods at least are produced

annually. By splitting the twigs containing the cells I was enabled to watch the larvae pass through their various stages, and in a series gathered on May 5 at Manzana, in the Antelope Valley, all of which were apparently newly constructed, the food was consumed in 8 days after the hatching of the egg. The larvae at this stage are quite active, and in their restlessness a few of them burst through the lining of the cell on the exposed side and made their escape. During this period of activity they void a small quantity of excrement which, being limited to one end of the cell, simulates an artificial partition between the cells.

In from four to six days after the food was consumed they passed into the pupa stage, and on June 9th with two exceptions all had taken their flight, the time occupied in passing

through all the stages being but thirty-five days. Whether one or more broods are raised before the one that lives through the winter, I am unable to say, though it may reasonably be presumed that such is the case. The last brood remains in the larval stage throughout the winter, usually emerging as adults in the latter half of April.

The parasites affecting this insect are all of small size, and one cell in four on an average is affected. Those bred by the writer are as follows:

Chrysis parvula Fabr. Two specimens.

Encyrtus sp? These tiny parasites had attacked the larva of the bee, consuming the whole interior and leaving the skin intact. Within this covering the pupae of the parasite, from 10 to 15 in number, were closely packed. The adults issued in the last week of February and the first week in May.

Aetroxys analis Ashmead n. sp. 11 specimens.

♀. Length 5.5 mm. Bronzy green, scaly punctate, the tip of the abdomen yellowish;

scape and legs, except coxae, ferruginous, the knees, tips of tibiae and tarsi more yellowish. Wings hyaline, the veins pale brown, the marginal vein about one and one-half times as long as the stigmal, the post marginal vein as long as or slightly longer than the marginal. Abdomen very long acuminate, fully twice as long as the head and thorax united.

♂. Length 2 to 2.5 mm. Differs only in the shape of the abdomen which is elongate and only one-third longer than the head and thorax united, while the flagellum is filiform, pubescent, the first joint the longest, joints 3 to 5 subequal, about twice as long as thick.

Mr. Ashmead, in a note appended to this description, says: "The antennae in the ♀ are broken off at the pedicel, and I am therefore unable to tell to what subgenus of *Aetroxys* it belongs. The very long abdomen, which is tipped with yellow, readily distinguishes the species."

These eleven specimens were bred from six cells, five occupying one, and two each of the other three cells. On pupating they adhered together by the tip of the abdomen in one mass. All issued May 29.

THE NUMBER OF STAGES IN APATELODES TORREFACTA.

BY HARRISON G. DYAR, NEW YORK CITY.

I have already referred to the varying number of stages in this species (*Psyche*, vi, 146) as found by different authors; Miss Soule finding five and Dr. Packard six, while I presented evidence indicating eight stages. I returned to the subject last summer, as I succeeded in obtaining eggs by the assistance of

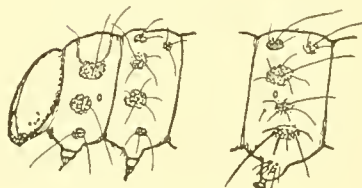
Mr. Jacob Doll from whom I purchased living pupae and Miss Emily L. Morton who very kindly attended to the mating of the moths bred from them. The larvae exhibited five stages, but a consideration of the width of the head makes the whole matter clear. I gave the following series as probable, in my

previous note: .64, .8, 1.0, 1.3, 1.6, 2.1, 2.6, 3.2 mm. The present larvae exhibited .65, .8, 1.3, 2.2, 3.3, thus omitting every alternate stage after the second. In my larva formerly described, the last four measurements of the normal series were actually observed, and the larva must have had as many as seven stages, omitting normal iii, or perhaps eight, including iii. It is probable that in Dr. Packard's example but two stages were omitted, although we cannot say which, as he does not give us measurements of the head. Miss Soule's was doubtless the same as my last.

I will not describe the egg and larval stages in detail, as there is but little to add to the accounts already published. The arrangement of the hairs may be mentioned, as it is decidedly peculiar.

There is no primitive first stage. On hatching, the hairs are abundant, arising from low, flat granular wart areas, whose position is most difficult to determine positively, as they are obscured by the hairs, and when the latter are removed are difficult to distinguish, being merely concolorous granular

areas. After repeated observation, I believe the accompanying cut represents



Apateles torretacta.

their arrangement correctly. The hairs are represented as partly removed. On the abdomen i, ii, iii normal, iv very large and v small, vi large, the base of the leg hairy. On the last two thoracic segments three warts above the stigmatal wart, the middle one moved back out of line with the others, stigmatal and subventral warts normal. I could not determine the exact period at which the secondary hairs appeared; probably in stage ii, though in my notes I state "secondary hairs not seen, if present can not distinguish them from those bending over from the warts." In the last stage, the secondary coating is well developed.

DEIDAMIA INSCRIPTA.

On June 11 I found two larvae on a grapevine, and a few days later five more on *Ampelopsis quinquefolia*. The record is taken from the first two.

Length $\frac{3}{4}$ inch. Head round, green, with 4 very faint yellow face-lines. Body bright green, transversely striated with opaque yellow. 3rd and 4th segments very slightly enlarged, too slightly to be noticed except

by an entomologist. From the outer face-lines to the caudal horn extended subsorsal lines of yellow, edged above with dark green. A stigmatal yellow edge ran from the first segment into the first oblique on each side. There were eight yellow obliques the eighth being under the caudal horn, and running backward from that. Anal shield edged with yellow. Caudal horn long, slender, straight, black, rough. Feet yellow, props green, venter plain green.

June 15. Moulded. $1\frac{1}{2}$ inches long. As before except that the body below the subdorsal lines was thickly granulated with yellow; the caudal horn became green beneath, yellow on the sides, with a black line on the upper side and a black band just below the green tip. The spiracles showed as two blue black lines with white between and a yellowish dot at each end. When disturbed the larvae twitched and jerked from side to side like *abbottii* and *nessus*.

June 20. Moulded. $1\frac{1}{2}$ inches long. As before, except a blue green dorsal line extended from second segment to the horn, the first segment being smoother and greener than any other; and the caudal horn had become pink above and beneath, yellow on the sides and tip, slightly rough. The larvae rested with the head and first three segments thrown back over the abdominal segments, like *myron*.

June 25. The larvae were $2\frac{1}{8}$ inches long. The subdorsal lines had faded, except on the first three and the preanal segments, and had wholly disappeared from the 4th, 5th, and 6th segments. The obliques were much less conspicuous. The caudal horn was shining yellow at the upper end, rough and pink below, short, stout, almost triangular when seen from the front. It was very small in proportion to the size of the larva. The yellow face-lines nearest the median suture could hardly be seen.

June 26. They stopped eating, and their heads and backs turned deep, dull pink.

July 1. Pupated well, the pupae being very strongly marked.

The seven larvae found varied somewhat in color, some being of a very white green instead of the deep yellow green of the first two. Some had but seven obliques instead of eight, and two lost the eighth oblique at the last moult. Three or four had caudal horns green and yellow instead of pink and yellow. Two or three grew to a length of $2\frac{3}{8}$ inches.

Caroline G. Soule.

Brookline, Mass.

SCHISTOCERCA AMERICANA IN NEW ENGLAND.

On Oct. 1st, 1883, I found this species at Wollaston, Mass. No record has ever been made of the capture, for at the time I was not interested in Orthoptera, and did not know the identity of the specimens. It was only recently that an examination by Mr. A. P. Morse of material collected by me years ago revealed the fact of its having been taken at that time.

It was tolerably abundant in one spot on the beach, where it was found among the tall grass below high-tide mark. Not knowing its value at the time, I failed to take more than a single specimen.

A search in the same locality this year failed to reveal any trace of its present existence there, so that it seems probable that it was by some means brought there and gained a temporary foothold. As the locality has been recently built upon to some extent it may have been exterminated by this means.

Frank H. Sprague.

THE INSECT COLLECTION OF THE U. S. NATIONAL MUSEUM.

The staff of the Department of Insects of the U. S. National Museum has been reorganized as a result of the sad death of the former Honorary Curator, Professor C. V. Riley.

The reorganization has been effected by the appointment of Mr. L. O. Howard, Entomologist of the U. S. Department of Agriculture, to the position of Honorary Curator of the Department of Insects; of Mr. Wm. H. Ashmead to the position of Custodian of Hymenoptera; and Mr. D. W. Coquillett to the position of Custodian of Diptera. All museum custodians are honorary officers. Mr. M. L. Linell will remain as general assistant to the Honorary Curator.

The Department is at present in excellent working condition. It contains a very great

amount of material in all orders, and in many unusual directions surpasses any collection in the country. Among others the following are of especial interest:—

1st. The large collection, in all orders, of the late Dr. C. V. Riley.

2d. All of the material gathered during the past 18 years by correspondents, field agents, and the office staff of the Division of Entomology, U. S. Department of Agriculture.

3d. The greater part of the collection of the late Asa Fitch.

4th. The large collection, in all orders, of the late G. W. Belfrage.

5th. The collections in Lepidoptera and Coleoptera made by Dr. John B. Smith down to 1889, together with the types of the Noctuidæ since described by Dr. Smith.

6th. The collection of Lepidoptera of the late O. Meske.

7th. The collection of Lepidoptera of G. Beyer.

8th. The collection of Coleoptera of M. L. Linell.

9th. The bulk of the collection, in all orders, of the late H. K. Morrison.

10th. The collection of Diptera of the late Edward Burgess.

11th. The type collection of Syrphidae made by Dr. S. W. Williston.

12th. The collection of Ixodidae of the late Dr. George Marx.

13th. The collection of Myriopoda of the late C. H. Bollman.

14th. Sets of the neo-tropical collections of Herbert Smith.

15th. The collection of Hymenoptera of Wm. J. Fox.

16th. The collection of Tineina of Wm. Beutenmüller.

17th. The large Japanese collection, in all orders, of Dr. K. Mitsukuri.

18th. The African collections, in all orders, of Dr. W. S. Abbott, Wm. Astor Chanler, J. F. Brady, the last "Eclipse" expedition to West Africa, and of several missionaries.

19th. The large collection from South California of D. W. Coquillett, in Coleoptera, Hymenoptera, Lepidoptera and Orthoptera.

20th. The Townend Glover manuscripts and plates.

In addition to this material, there are minor collections which have been the result of the work of government expeditions, or are gifts from United States consuls and many private individuals.

This enormous mass of material is being cared for by the active and honorary force of the Department, and the perpetuity of the collection is assured. The National Museum building is fire-proof, and this, together with the fact that it is a national institution, renders the Department of Insects perhaps the best place in this country for the permanent deposit of types by working specialists in entomology, and for the ultimate resting-place of large collections made by individuals.

The policy of the Museum at large, with regard to the use of its collections by students, is a broad and liberal one. Students are welcome in all departments, and every facility is given to systematists of recognized standing.

PROCEEDINGS OF THE CLUB.

11 Oct. 1895. The 188th meeting of the Club was held at 156 Brattle St., Mr. A. G. Mayer in the chair. Mr. W. L. W. Field was chosen Secretary pro tem.

Mr. S. H. Scudder stated that he had recently examined a small collection of butterflies taken by Mr. Jewell W. Sornborger on the Labrador coast at Lat. 59° North, being beyond the Moravian settlements and therefore further north than any point from which collections ordinarily come. Although the collection contained only thirteen specimens, eleven species were represented, as follows: *Benthis freija*, *clariclea* and *tricoloris*; *Oenecis oeno*, *jutta* and *polyxenes*;

Agriades aquilo, *Eurymus pelidne* and *nastes*, *Hesperia centaureae* and *Erynnis comma* var. *catena*. A single orthopteran was also brought home—*Melanoplus borealis* (Fieb.). Specimens of the last were shown and it was pointed out that it was distinct from *Melanoplus borealis* Scudd. (*M. fasciatus* Walk.), with which he had formerly supposed it identical.

Mr. Field exhibited a specimen of *Basilarchia* hybr. *arthechippus* Scudd., he had captured in Alstead, N. H. This is the third recorded capture of a hybrid *arthemis-archippus*, the other two having been taken in Canada.

Mr. Mayer exhibited a set of drawings illustrating the development of color in the wings of *Callosamia promethea* and *Anosia plexippus* and explained them at length.

Mr. Scudder mentioned the following interesting captures of butterflies the past season: *Basilarchia arthemis*, taken at Hartford and at Short Beach, Conn., by Mr. Sidney C. Carpenter; and *Hypatus bachmanii* at the latter place, by the same; also *Heodes hypophlaeas fulliola* at Franklin, Penn., by Mr. W. T. Bell; and *Feniseca tarquinus* by different persons in various localities about Boston,—the first recorded captures in eastern Massachusetts.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

Vol. 1. Introduction; Nymphalidae.

Vol. 2. Remaining Families of Butterflies.

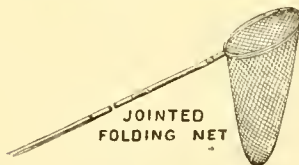
Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo, half levant, \$75.00 net.

HOUGHTON, MIFFLIN & CO.,

4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

Phlepsius neomexicanus, n. sp.—Near *P. superbus* but larger, and having the valves and pygofers in the male greatly produced. Length of male 7 mm.

Male.—Very closely resembling *P. superbus* in form and coloration, except that the elytral reticulation is somewhat heavier. Differs otherwise from that species as follows. Front slightly more than one-fourth longer than broad. Lorae as wide and one-fifth longer than the clypeus. Pronotum considerably less than twice the length of the vertex. Plate short and broad, angular posteriorly. Valves twice as long as broad at base, attenuate toward the tips, outer

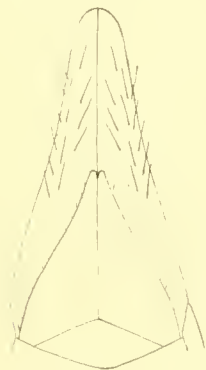


Fig. 2. *Phlepsius neomexicanus* n. sp.; male genitalia.

edges provided with fine white hairs. Pygofers very long and robust, twice the length of the valves, blunt at tips, provided on lower surface below the tips with a number of short white spines arranged in three longitudinal rows. *

Described from a single male from San Augustine (Ckll. 2123). This species belongs in that group of *Phlepsius* having the head narrower than the pronotum. Its distinct clypeus, large size, and lack of lobate commissural line, separate it from *spatulatus*, *ovatus*, and *exultus*. From the remaining species, *superbus*, it is distinguished by the above described characters.

Phlepsius inornatus, n. sp.—Differing from all other species of the genus in being entirely destitute of elytral reticulations or other markings. Length of male 6 mm.

Male.—Head narrower than the pronotum. Face a twelfth wider than long; clypeus one-half longer than broad, somewhat constricted before the base, basal suture strongly curved, apex slightly concave. Lorae as long and two-thirds as broad as clypeus; margin of genae rather slightly incurved below the eye, below this strongly convex, thence slightly incurved to tip of clypeus. Front an eleventh longer than broad, somewhat less than twice the length of the clypeus, broad below, the sides very slightly incurved at the antennae. Disc of the vertex flat, length at middle once and a half that next the eye, width between the eyes once and a half the length. Width of the pronotum two and a third times the length, the length about once and two-thirds that of the vertex, curvature nearly two-fifths of the length, posteriorly irregularly transversely wrinkled. Scutellum and elytral venation normal. Plate not visible, valves two and a half times longer than broad at base, slightly narrowed to apex, blunt at tips, without hairs. Pygofers one-half longer than valves, pointed at



Fig. 3. *Phlepsius inornatus* n. sp.; male genitalia.

tips, their whole outline subtriangular, provided on disc of lower surface with several rather long whitish spines arranged in a single longitudinal row.

Color very pale yellowish, deeper on the abdomen. Pronotum with five very indistinct longitudinal whitish bands. Elytra translucent, pale milky white, with indistinct smoky clouds on the discs of some of the

apical and anteapical areoles. Veins white, claval suture brownish. Face and legs tinged with greenish, some of the white tibial spines brown tipped. Tarsal joints at apices dark. Dorsal abdominal segments except lateral and apical margins blackish.

Described from a single male taken at San Augustine (Ckll. 2140).* In form, this insect very closely resembles *P. superbus* and in structure is strictly congeneric with

it. It differs very widely, however (and this is a generic difference according to Van Duzee's synoptic table of the genera), in that it does not possess the elytral reticulations or other markings so characteristic of the genus. On a very superficial examination it might be taken for a *Chlorotettix*, but its general form, stronger build, and lengthened vertex are strictly Phlepsiid.

VII. THE GRAPE-VINE TYPHLOCYBIDS OF THE MESILLA VALLEY, N. M.

At Las Cruces and Mesilla, N. M., the grape-vine suffers, as in other parts of the U. S., from the attacks of small Typhlocybidæ, in most seasons not seriously destructive, but occasionally very abundant and troublesome. Two species are found on the Mission Grape (*Vitis vinifera*) at Las Cruces in about equal numbers, often on the same leaves. After making a slight study of them, I determined that they were different from the eastern forms, and apparently undescribed. This October I collected a number and sent them to Prof. Gillette, who reports that one is *Typhlocyba coloradensis* (Gill.), hitherto only recorded from Colorado, but perhaps properly regarded as a variety of *T. comes* Say. The other is a new species of *Dicraneura*, described below. The genus, Prof. Gillette says, has only two hitherto-described species in U. S., one of these being not from the U. S. proper, but from Alaska.

T. D. A. Ckll.

Dicraneura cockerellii, n. sp. General color light straw yellow, a bright red band crossing the elytra before the middle; length, 3 mm.

Head—Vertex strongly produced and almost acute in front, the angle being somewhat less than a right angle, as long as the

pronotum; color straw-yellow without distinct markings, in some specimens washed with dilute sanguineous with light spots on the posterior margin next the eyes. *Pronotum*: The breadth is twice the length, moderately concave behind, color like that of the vertex and, when washed with sanguineous, there is a distinct whitish spot on the middle of the anterior margin next the vertex. *Scutellum* without distinct markings

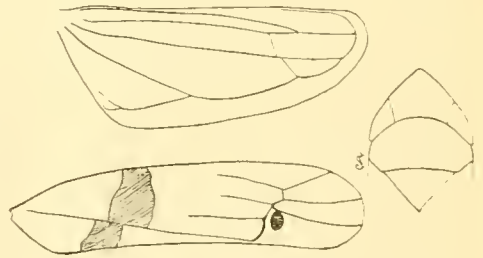


Fig. 4. *Dicraneura cockerellii* × 20.

and agreeing with the vertex and pronotum in color. *Elytra* pale straw yellow crossed by a narrow band of bright cherry red varying some in depth of color but plainly discernable in all mature specimens. The band crosses just before the middle of the clavus, and that portion of the band that is above the claval suture is pushed forward so that only about half of its width comes against that portion which is upon the corium; just beyond the cross nervures is a jet black spot lying in the

* San Augustine is a branch on the east side of the Organ Mts. All the species above described were taken on Aug. 28, 1894.

inner apical cell. The venation of the wing is peculiar in that the posterior apical cell is very small. All beneath pale yellow.

Described from 25 specimens, male and female, sent me by Prof. T. D. A. Cockerell who took them at Las Cruces, N. M.

This is one of the most beautiful Typhlocy-bids that I have ever seen and I take pleasure in dedicating it to its discoverer.

C. P. Gillette.

Agr. College, Ft. Collins, Colo.

VIII. SOME NEW INSECTS.

BY T. D. A. COCKERELL.

COCCIDÆ.

Crypticerya, n. subg.—Similar to *Icerya* s. str., but not forming an ovisac, and without the waxy tufts of subg. *Crossotosoma*. Adapted for living under bark. Type, *Icerya roseæ* Riley & Howard.

Proticerya, n. subg.—Similar to *Icerya* s. str., but adult ♀ with only 9-jointed antennae. Ovisac large. No conspicuous waxy tufts. Type, *Icerya rileyi*, n. sp.

Icerya rileyi, n. sp.—♀ dull red, covered with white and yellowish mealy powder, a few small easily deciduous lateral waxy tufts. Ovisac 10 mm. long, 5 broad, white with a slight yellowish tinge, smooth, not fluted, obscurely longitudinally grooved beneath. Antennal formula of a specimen from Mesquite, 9 (35) 21 (46) (78), of one from Larrea, 9321 (4578) 6. These differences are not specific, the antennae are variable. Legs and antennae black. For the ♂ and larval characters see *Canad. Entomologist*, 1894, p. 34. No further description is given at this time, as it is hoped to describe and figure the various stages from fresh material hereafter. The insect will be very easily recognized by the characters now cited, especially if reference is also made to the descriptive notes of Prof. Townsend, *Bull.* 7, N. M. Agr. Exp. Sta., p. 15.

Hab.—Las Cruces, N. M., common on Mesquite (*Prosopis*) and rather rare on Creosote bush (*Larrea*). It is attacked by

Laetilia and an apparently new species of *Coccinellidae*. This interesting species was to have been described by Dr. Riley had he lived; in his opinion, it represented a valid new genus. The ant. *Dorymyrmex pyramicus* Rog., attends it.

Aspidiotus prosopidis, n. sp.—♀ scale about $\frac{1}{2}$ mm. diameter: slightly convex, from circular to very broad pyriform, slightly shining, pitch black; exuviae large, uncovered, ridged, black or slightly greenish or brownish, central. The exuviae are remarkably large for the size of the scale. Removed from the bark the scales leave a broad whitish ring, with no black ring.

♂ scale oval, larger than that of the ♀, white, with yellowish exuviae towards one end. The ♂ scales are not ridged, and are of the same texture as those of the ♀.

♀ extremely small, after boiling in soda transparent, tinged with yellowish-brown, circular in outline, not visibly segmented, anterior end with a large rounded protuberance such as is seen in *A. personatus*. Mouth-parts well-developed. Skin of anterior portion transversely reticulately wrinkled. No grouped ventral glands. Lobes extremely small, two pairs, median rounded, nearly as far apart as the diameter of one. Second lobes also rounded, but broader and lower than the median, nearly as far from them as the diameter of one. A spine close to each lobe, and three on the margin beyond, at long intervals.

Plates hardly visible. Anal orifice about as far from base of median lobes as its longer diameter.

A ♀ contains two long-oval embryos, which are extraordinarily large, more than half as long as the diameter of the ♀. The last joint of the antenna of the embryo is as long or a little longer than the three before it together.

Hab.—On Mesquite (*Prosopis*), numerous infesting the small twigs. Found by Prof. Toumey about 4 miles west of Phoenix, in Salt River Valley, Arizona, Sept. 1895. This singular little species has the scale completely enveloping the ♀, and so would fall in Signoret's subgenus *Targionia*. In several characters it resembles *A. personatus*, but it is very distinct from any species described. It might have been thought that the specimens were not adult, had not matured embryos been found. It is found on the leaves as well as the twigs.

Dactylopius pandani, n. sp.—♀ 3 mm. long, $1\frac{1}{2}$ broad, pale yellowish brown. Legs and antennae very pale yellowish brown. Margin with stout cottony tufts as in *D. citri*. Dorsum covered with white meal.

♀ turns reddish on boiling in soda, but gives no crimson color. It becomes almost colorless, but the contained embryos remain bright yellow. Antennae 8-jointed, joints with whorls of hairs, joint 1 unusually long, even a little longer than 2; 2 subequal with 3; 4 to 7 equal and shortest; 8 about as long as 1. Formula (18) (23) (4567), but it might almost as well be written (1832) (4567.)

Rostal loop reaching to level of base of second pair of legs. Legs ordinary, tibia of anterior legs about $\frac{1}{2}$ longer than tarsus, of middle legs only about $\frac{1}{4}$ longer. Femur + trochanter a little longer than tibia + tarsus. Claw small. Digitules slender, those of claw with conspicuous round knobs, those of tarsus with very small knobs. Trochanter with a long bristle. Posterior tubercles hardly noticeable, each bearing a bristle only about $\frac{1}{4}$ longer than those of the anal ring. Anal

ring with the usual 6 bristles. Eyes prominent, elevated on a stout base. Six patches of small spines on cephalic margin.

Hab.—At the sheathing bases of the leaves of a young *Pandanus*, from Washington Island, Mendana or Marquesas Group. Found by Mr. Alex. Craw in the course of his quarantine work. It has the lateral waxy tufts short and stout as in *citri*, not long and slender as in *longispinus*. From *citri* it differs by the much shorter bristles of posterior tubercles, and in the antennae, the 5th joint being if anything slightly longer than the 4th or 6th. The length of the first antennal joint is a noticeable feature. It is a pleasure to record the first Coccid from the Marquesas.

MUTILLIDAE.

Sphaerophthalma cargilli, n. sp. ♀.

Mutilla sp., Townsend, Journ. Instit. Jamaica, Vol. 2, p. 168. (1895.)

Length 10 mm.; head rather large, rounded, cheeks unarmed; thorax constricted at sides; abdomen pyriform, not much longer than thorax, first segment broad and sessile on the second. Eyes black, prominent; head densely clothed with silvery-white hairs, three or four long black hairs on the upper orbital margin; antennae rufous, flagellum darker. Thorax black, with short dense black pubescence; dorsum of metathorax rufous, with an oval blackish central shade. Upper anterior corners of metathorax with a blunt tooth. Legs rufous, with very sparse inconspicuous pale hairs. First abdominal segment rufous, its apical margin black, its basal portion with a few whitish hairs, its apical portion with sparse long black hairs. Second segment large, densely covered with short appressed black pubescence, with two transversely oval snow white spots on the dorsum, separated from each other by nearly twice the greatest diameter of either, and about as far from the proximal as the distal margin of the segment. Third, fourth and fifth dorsal segments covered with silvery

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 237.

JANUARY, 1896.

CONTENTS:

NOTES ON THE ACRIDIDAE OF NEW ENGLAND. — II. TRYXALINAE, — I (Plate 7). — <i>A. P. Morse.</i>	323
THE ARCTIC LYMANTRIID LARVA FROM MT. WASHINGTON, N. H., DASYCHIRA ROSSII CURT. — <i>Harrison G. Dyar.</i>	328
NOTES ON THE SPECIES OF EXORISTA OF TEMPERATE NORTH AMERICA — C. II <i>Tyler Townsend.</i>	329
NOTES ON SMERINTHUS CERYSI KIRBY. — <i>F. L. Harvey.</i>	331
HART'S AQUATIC INSECTS OF ILLINOIS.	332

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

5.70513

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

ps Subscriptions not discontinued are considered renewed.

ps Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

ps Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " " "	1.25	1.00
Half " " " "	2.25	1.75
One " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by
R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danais archippus</i> . Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichmology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> , col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

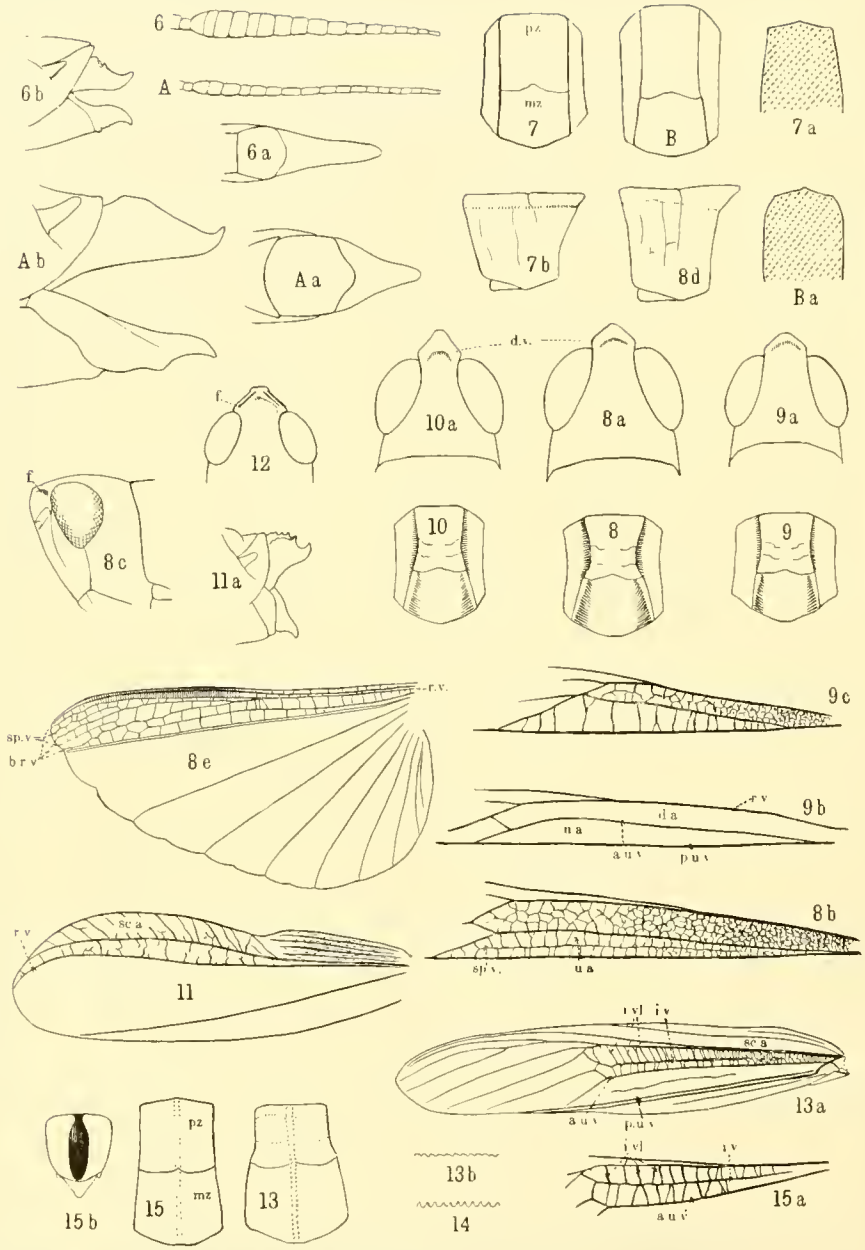
H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.



MORSE. — NOTES ACRID. N. E., II. — TRYXALINAE.

EXPLANATION OF PLATE VII.

- Fig. 6. *Pseudopomala brachyptera* ♀, antenna.
 " 6a. " " ♂, tip of abdomen from below.
 " 6b. " " ♀, " " " " side,
 " A. *Tryxalis brevicornis* ♂, antenna.
 " Aa. " " ♂, tip of abdomen from below.
 " Ab. " " ♀, " " " " side,
 " 7. *Dichromorpha viridis* ♂, pronotum from above.
 " 7a. " " ♂, " " section,
 " 7b. " " ♂, " " from side.
 " B. *Clinocephalus elegans* ♂, pronotum from above.
 " Ba. " " ♂, " " section.
 " 8. *Orphula maculipennis* ♀, pronotum from above.
 " 8a. " " ♂, head from above.
 " 8b. " " ♀, tegmen, discoidal and ulnar areas,
 " 8c. " " ♀, head from side.
 " 8d. " " ♀, pronotum from side.
 " 8e. " " ♀, wing.
 " 9. " *acqualis* ♀, pronotum from above.
 " 9a. " " ♂, head from above.
 " 9b. " " ♀, tegmen, discoidal and ulnar areas,
 " 9c. " " ♂, " " " " " "
 " 10. " *olivacea* ♀, pronotum from above.
 " 10a. " " ♂, head from above.
 " 11. *Chloealtis conspersa* ♂, tegmen.
 " 11a. " " ♀, tip of abdomen from side.
 " 12. *Stenobothrus curtipennis* ♀, head from above.
 " 13. *Mecostethus lineatus* ♀, disc of pronotum.
 " 13a. " " ♂, tegmen,
 " 13b. " " ♂, teeth of rasp,
 " 14. " *gracilis* ♂, " " "
 " 15. " *platypterus* ♀, disc of pronotum.
 " 15a. " " ♂, intercalary venules.
 " 15b. " " ♂, tip of abdomen from below.

a. u. v. = anterior ulnar vein.
 b. r. v. = branches of radial vein.
 d. a. = discoidal area.
 d. v. = depression of vertex.
 f. = foveola.
 i. v. = intercalary vein.
 i. vl. = intercalary venules,

mz. = metazona.
 p. u. v. = posterior ulnar vein.
 pz. = prozona.
 r. v. = radial vein.
 sc. a. = scapular area.
 sp. v. = spurious vein.
 u. a. = ulnar area.

PSYCHE.

NOTES ON THE ACRIDIDAE OF NEW ENGLAND.—II. TRYXALINAE.—I.

BY ALBERT P. MORSE, WELLESLEY, MASS.

This subfamily is nearly related to the Oedipodinae, the division between them being somewhat arbitrary and depending upon personal opinion. In New England there are two distinct groups, one of typical Tryxalinae, the other consisting of a genus, *Mecostethus*, closely approaching the Oedipodinae, as shown especially in the structure of the tegmina and stridulating apparatus, but also in the form of the vertex and pronotum.

With a single exception, in every member of the subfamily here treated the male is provided with a stridulating apparatus for producing sounds serving to attract the other sex. These sounds are produced while the insect is at rest by rubbing the hind femora against the tegmina, the sound being due to the vibration of the tegmina caused by the friction of a row of fine teeth against an opposing surface. The teeth are usually borne on the internal ridge of the femur, but in *Mecostethus* the intercalary vein of the tegmen, and sometimes its adjoining venules, bears the rasping surface, the ridge of the femur being smooth. In this connection it should be said that several Oedipodinae have this vein more or less roughened

or even distinctly toothed, especially *Encoptolophus sordidus*, and stridulate at rest as well as during flight, as I have observed the above-mentioned species and *Circotettix verruculatus* to do. This sound-producing apparatus varies specifically, and each kind of locust doubtless has its distinctive note which is appreciated by particular ears. The notes are also varied in some degree at the will of the performer. Surrounded by them on every side, for some are among the commonest of insects, how few there are who ever give a second thought to these little serenaders in the grass! Here is a wide and extremely interesting field awaiting observers which has hitherto been cultivated almost alone by Mr. Scudder, who has published a noteworthy paper upon the subject in the 23rd Report of the Entomological Society of Ontario, references to which will be found under several of our species.

Of this subfamily ten species are known to occur in New England, and I have treated here two additional ones which have been taken by Beutenmüller on Long Island in the near vicinity of New York and which will probably be found in Conn. Of the ten two were

described by Harris in his Report, and seven by Scudder in his Materials. So variable are some of these species in color and structure that it is not surprising that several additional names were applied to forms which further study has shown to be one species.

Some doubt still remains as to the proper specific names to be borne by certain species, but since nothing less than a study of the fauna of the localities from which the types were procured and a comparison when possible with the types will finally settle the specific terminology, such a course involving an amount of research impracticable at present, I have retained the current names.

It was to be expected, as it has proved, that changes would be required in the generic appellations hitherto borne by several of our species. Thanks to the masterly Revision of Brunner von Wattenwyl (Rév. d. syst. d. orth., — Ann. d. Mus. civ. d. Genova, ser. 2a, vol. xiii, 1893) the American student of orthoptera can now align his work more closely in this respect with that of European contemporaries. Nevertheless, in applying to the American fauna the generic diagnoses therein set forth much caution is necessary, owing partly to the extreme brevity of characterization, and partly because forms will be met with either unknown to that author, unknown to occur in this hemisphere, or for some reason not included. The substitutions are: *Orphula*, for three species usually spoken of as *Stenobothrus*; and *Mecostethus*, for those hitherto called *Arcyptera* or

Stethophyma. In addition, it has seemed necessary to establish new genera for those forms commonly known as *Opomala brachyptera* and *Chlocallis* (or *Chrysochraon*) *viridis*, and one less known species.

In addition to most of the works listed in Part I of these Notes, Comstock's Introduction, Smith's Orth. of Maine and Orth. of Conn. (full titles may be found in my Preliminary List, — Psyche, '94, pp. 102-108), and Beutenmüller's Orth. of New York (Bull. Amer. mus. nat. hist., vi, 253-276, '94) are cited.

The technical terms used will need no explanation to the student of orthoptera and with the aid of the drawings will be readily understood by others. In this connection it may be of interest to state that the author has in contemplation an Introduction to the Acrididae of a more popular character than these Notes can of necessity be.

The following paper is based upon the material in my collection, and the notes thereon, consisting of over 4000 specimens chiefly collected in person, and comprising examples of both sexes and every form, reversional or dimorphic, known to occur in New England. I have also examined Mr. Scudder's collection, which is of especial interest in containing the types of several species.

Since the publication of Part I continued study of the genus *Tettigidea* indicates the specific identity of our two forms and their distinctness from *T. lateralis* and *polymorpha* (see Journ. N. Y. ent. soc., Sept., '95). Consequently our species must receive

Harris' name *parvipennis*, which was applied to the short-winged form, and I have proposed *pennata* to distinguish the long-winged form. The elimination of one species causes the first of the present group to be numbered 6.

In conclusion I desire to express my great obligation to Mr. Scudder for the opportunity so freely afforded for examining his collection and for aid rendered in consulting the literature of the group.

KEY TO SUBFAMILIES AND TRYXALINÆ.

- a. Pronotum covering all or nearly all of the abdomen; pulvilli absent from between the tarsal claws. TETTIGINÆ.
- aa. Pronotum normal, not covering the abdomen; pulvilli present.
 - b. Prosternum not spined,—flat, convex, or at most with an obtuse tubercle.
 - c. Hind margin of pronotum not or but little produced,—truncate, convex, or very obtusely angulate. Face usually retreating, and angulate at meeting with vertex. TRYXALINÆ.
 - cc. Hind margin of pronotum strongly produced,—acute, right-angled, or nearly so. Face usually nearly or quite vertical, and rounded at meeting with vertex. OEDIPODINÆ.
 - bb. Prosternum with a prominent conical or cylindrical spine projecting ventrad to the level of the distal end of coxa. ACRIDINÆ.

TRYXALINÆ.

- 1. Antennae distinctly ensiform. (Figs. 6, A.)
 - 2. Prosternum obtusely tuberculate. ♂ with rasp on inside of hind femora, and terminal segment of abdomen twice as long as wide (Fig. 6a); ♀ with ovipositor short, bearing a stout tooth on external margin of each valve (Fig. 6b). Wings and tegmina usually abbreviated. (Gen. 5, *Pseudopomala*, gen. nov.) Sp. 6, *Ps. brachyptera*.
 - [2¹. Prosternum not tuberculate. ♂ without rasp and terminal segment shorter (Fig. Aa); ♀ with ovipositor long, distinctly exerted, and without teeth as above (Fig. Ab). Wings and tegmina fully developed. *Tryxalis brevicornis*.]
- 1¹. Antennae linear.
 - 3. Tegmina without well-developed intercalary vein. (Cf. Figs. Sb, 13a.)
 - 4. Foveolae not visible from above,—often shallow or wanting.
 - 5. Antennae short, about equal to head plus pronotum. Tegmina with scapular area not dilated. Wings functional (though sometimes quite small), provided with opaque thickening on veins of front margin at apical third (Fig. Se), in ♂ a coarsely and regularly reticulated space behind it.

6. Sides of pronotum elongate, the length on dorsal margin greater than the depth (Fig. 7b). Lateral carinae nearly or quite parallel and disc unicolorous (Figs. 7, B). Foveolae absent.
7. Sides of pronotum nearly vertical, flat above, meeting disc at nearly a right angle; lateral carinae parallel throughout (Figs. 7, 7a). (Gen. 6, *Dichromorpha*, gen. nov.). Sp. 7, *D. viridis*.
- [7¹. Sides of pronotum convex above; carinae slightly divergent on metazona (Figs. B, Ba). (*Clinocephalus*, gen. nov.)
C. elegans sp. nov.]
- 6¹. Sides of pronotum not elongate (Fig. 8d). Lateral carinae more or less divergent before and behind, and disc usually parti-colored on metazona (Figs. 8, 9, 10). Foveolae usually present on front margin of vertex (Fig. 8c). . . . (Gen. 7, *Orphula*.)
8. Vertex of head about rectangular, or a little acute in ♂; a little narrowed between eyes; its central depression removed from apex one-third (♂) to one-fourth (♀) the width of the vertex; foveolae distinct, narrowly triangular. Lateral carinae of pronotum strongly incurved, and the distance between them at hind margin much greater than at front margin. Prozona and metazona (Fig. 7) about equal on midline. Tegmina passing hind femora; apex scarcely tapering, sides sub-parallel; ulnar area in ♂ usually closely reticulated (sometimes with spurious vein), but little wider than discoidal area; ♀ with ulnar and discoidal areas of equal width, the anterior ulnar vein parallel to radial and the ulnar area divided by a long spurious vein. Apex of wings usually with well-developed spurious veins between branches of radial vein. (Figs. 8-8e). Sp. 8, *O. maculipennis*.
- 8¹. Vertex of head blunt, rounded, obtuse (♀), or rectangular (♂); scarcely narrowed between eyes; its central depression close to apex; foveolae shallow, triangular, scarcely discernible. Lateral carinae of pronotum little incurved, the distance between them but little greater at hind than at front margin, especially in ♀. Prozona longer than metazona. Tegmina about reaching end of hind femora, often shorter, sometimes longer, tapering toward apex; ulnar area in ♂ coarsely, often regularly, reticulated, the anterior ulnar vein strongly approximated to the radial; in ♀ usually slightly but distinctly nearer the radial, the widest part of the ulnar area wider than the discoidal area, spurious vein poorly developed or absent. Apex of wings rarely with spurious veins between the branches of radial. (Figs. 9-9c). . . . Sp. 9, *O. aequalis*.

- ♂. Vertex of head acute, the sides often concave in ♂, distinctly narrowed between eyes, the central depression far removed from apex (at least one-half the width of the apex in ♂, somewhat less in ♀); foveolae distinct but rather shallow, narrowly triangular. Lateral carinae little incurved but the distance between them much greater at hind than at front margin. Prozona longer than metazona. Tegmina passing hind femora, tapering toward apex; ulnar area in ♂ expanded distally, much wider than the discoidal and rather closely reticulated, the anterior ulnar vein strongly approximated to radial; in ♀ the anterior ulnar vein sub-parallel or somewhat nearer the radial, the ulnar area wider than the discoidal, but the spurious longitudinal vein less developed than in *maculipennis*. Apex of wings rarely with well-developed spurious veins. (Figs. 10, 10a). Sp. 10, *O. olivacea*.
- 5¹. Antennae long, depressed, of ♂ twice, of ♀ one-and-a-half times as long as head plus pronotum. Wings abortive, or very rarely functional and in that case lacking opaque spot on costal margin. ♂ with lateral lobes of pronotum shining black and distal part of scapular area of tegmina dilated (Fig. 11); ♀ with ovipositor short, little exerted, the upper valves enlarged and strongly toothed at base (Fig. 11a). (Gen. 8, *Chloealtis*.) Sp. 11, *Ch. conspersa*.
- 4¹. Foveolae visible from above as deep, linear impressions (Fig. 12). (Gen. 9, *Stenobothrus*.) Sp. 12, *St. curtipennis*.
- 3¹. Tegmina with well-developed, elevated, intercalary vein (Figs. 13a, 15a). (Gen. 10, *Mecostethus*.)
9. Lateral carinae of pronotum distinctly divergent behind. Prozona shorter than metazona. Anterior distal intercalary venules (especially in ♂) oblique (Fig. 13a). Sternum 9 of ♂ not black medially.
10. Scapular area of tegmina with a conspicuous pale streak at base. Intercalary vein of ♂ with low, dull teeth (Fig. 13b). Sp. 13, *M. lineatus*.
- 10¹. Tegmina without pale streak as above. Intercalary vein of ♂ with high, acute teeth (Fig. 14). Sp. 14, *M. gracilis*.
- 9¹. Lateral carinae of pronotum sub-parallel. Prozona and metazona of equal length. Scapular area of tegmina without pale streak. Anterior distal intercalary venules nearly transverse. Sternum 9 of ♂ black on mid-line. (Figs. 15-15b.) Sp. 15, *M. platypterus*.

THE ARCTIC LYMANTRIID LARVA FROM MT. WASHINGTON,
N. H. (*DASYCHIRA ROSSII* CURT.?)

BY HARRISON G. DYAR, NEW YORK, N. Y.

About twenty years ago, Mr. Grote recorded (*Psyche*, 1, 131) the capture on Mt. Washington, above timber line, of an Arctic form of Lymantriidae which he referred to as a variety of *Larja rossii* Curtis. Last summer a number of larvae occurred to me on *Vaccinium* and *Betula* near the summit which I believe to be the larvae of this species. Others were found by Mrs. A. T. Slosson and, near the top of Mt. Adams, by Master Richard Seager. The larvae do not agree with Dr. Packard's description of *Larja rossii* (*Amer. Nat.* xi, 52) taken by the Polaris expedition in northern Greenland, but neither did his moths quite correspond, and he may have had before him examples of *Dasychira groenlandica* in which the hind wings are colored as he describes. The original locality for *rossii* in Boothia is much nearer to our own region than is northern Greenland, and true *rossii* has been recorded from Labrador by Christoph and Möschler; hence it seems probable that the Mt. Washington race should prove more like these. The moths are actually so, showing the yellowish color on the hind wings.

There seems little doubt but that these Arctic forms are branches of a race represented in Europe by *Dasychira selenitica*. If we remove from the larva of *selenitica* the slender hair

pencils which arise from joints 2 and 12, we should have a very close approximation to the larva described by Dr. Packard; and if we further modify the same larva by adding tufts on joints 10 and 11, like those already present on joints 5 to 9 and 12, we should have practically the Mt. Washington larva.

Curtis describes the larva of *D. rossii* as follows: "Large and hairy, of a beautiful shining velvety black, the hairs being somewhat ochereous; there are two tufts of black on the back, followed by two of orange." Unfortunately this meagre statement leaves the question open as to whether *D. rossii* is like Dr. Packard's larva or mine. Perhaps the "two black and two orange tufts" refers to the younger stages; it cannot refer to either Dr. Packard's mature larva or to mine. In the rest of the description there is no mention of the absence of tufts from joints 10 and 11, and the presumption would be that the larvae were uniformly tufted like my Mt. Washington ones. However, I recognize that too much weight should not be given to omissions in such imperfect descriptions.

The following is a description of the Mt. Washington larvae: Head rounded, velvety brown-black, densely hairy; clypeus black, smooth; a reddish shade on the posterior side of head; width 3.2 mm. Warts normal

for the Lymantriidae: three above the stig-
matal wart on joints 3 and 4; wart i mod-
erately large on abdomen; wart iv very
small, behind the spiracle; leg plates dis-
tinct. Dorsal eversible areas on joints 10
and 11 normal, whitish, more or less con-
cealed by the hair, often completely so.
Body black with a frosty gray shade; hair
thick, all barbed, some heavily feathered
but none plumed. Tufts from warts i on

joints 5 to 9 and 12 a little more closely
bunched, but no true tufts and no pencils.
Hair gray, mixed with black, with bright yel-
low hairs on the lower side of wart ii on
joints 5 to 13 and at the bases of all the hair
bunches on the thorax. Subventral hair
bunches small. The gray hairs are densely
feathery on warts i to v, the black and yel-
low ones only spinulose. Hair not very
long, quite even but not regularly so.

NOTES ON THE SPECIES OF EXORISTA OF TEMPERATE NORTH AMERICA.

BY C. H. TYLER TOWNSEND, LAS CRUCES, N. MEX.

The following twelve species of *Exo-
rista* all belong to the middle and
eastern United States with one excep-
tion, *E. lagoae* being from Guanajuato
on the Mexican tableland. They com-
prise all the species that I have so far
been able to recognize from the tem-
perate portions of North America.
None of the twenty-seven Mexican
species described by Mr. v. d. Wulp
are included. They mostly belong to
the neotropical fauna. I am under
many obligations to Mr. S. H. Scudder
for sending me, some years ago, the
types of the dipterous parasites men-
tioned in his *Butterflies of the Eastern
United States and Canada*. It was a
study of these, and comparison of them
with other types which I then possessed,
that enabled me to prepare the follow-
ing table of *Exorista*, as well as a
similar one of the allied genera *Masi-
cera* and *Phorocera*. I have examined
all the species mentioned in the table.

Table of Species.

- | | |
|--|---|
| 1. Palpi wholly black or dark brown-
ish | 2 |
| Palpi wholly or partly yellow or
rufous yellow | 5 |
| 2. Second abdominal segment with
both discal and marginal macro-
chaetae | 3 |
| Second segment with only marginal
macrochaetae | 4 |
| 3. Anal segment unusually bristly,
rather strongly and thickly so
<i>hirsuta</i>
Abdomen with only the usual
bristles <i>nigripalpis</i> | |
| 4. Anal segment brassy yellow polli-
nose <i>futilis</i>
Abdomen shining black and silvery,
without brassy pollen on anal
segment <i>theclarum</i> | |
| 5. Second and third segments with both
discal and marginal macrochaetae
. | 6 |

- Second and third segments with only marginal macrochaetae 8
6. Abdomen without any red on the sides, anal segment brassy *blanda*
Abdomen distinctly red on the sides 7
7. Second and third segments broadly red on sides, fourth wholly red or reddish yellow, hind tibiae thinly sub-ciliate. *scudderi*
Second and third segments narrowly reddish on sides, fourth without reddish or yellowish, hind tibiae not sub-ciliate, palpi blackish basally *phycitae*
8. Hind tibiae thickly and conspicuously ciliate, without longer bristles 9
Hind tibiae not ciliate, at most with bristles that are not flattened, or else with some longer bristles in the cilia 10
9. Prevailing tinge of body brassy yellowish or orange *ciliata*
Prevailing tinge dark bluish *datanae*
10. Hind tibiae with a fringe of bristles, appearing sub-ciliate, a strong bristle beyond the middle and one or two at tip longer than the rest *lagoae*
Hind tibiae with only scattered bristles 11
11. Anal segment orange or rufous, middle and hind tibiae with some scattered strong bristles
platysamiae
Anal segment black and silvery, without reddish, tibiae with weak bristles *cudryae*

Exorista nigripalpis, n. sp.—With median and marginal macrochaetae, but not otherwise bristly, thus differing from *hirsuta*. The abdomen is also more rounded, shining black, approaching that of *theclarum*. Palpi black. Eyes not thickly hairy. Differs from *theclarum* chiefly in possessing discal bristles on the abdominal segments. It is intermediate between *theclarum* and *hirsuta*. Size about the same, 5 or 6 mm. From Illinois (?). Type in University of Kansas collection.

The temperate American species of *Exorista* which I have not yet been able to examine are: *E. leucaniae* Kirkp., *cecropiae* Riley, *doryphorae* Riley, *deilephilae* O. S., and *infesta* Will. The others mentioned in the Osten Sacken Catalogue are Walker's species, and none of them has been recognized. *E. flavicauda* Riley is a *Frontina*. *E. chrysophanii* Towns is a synonym of *theclarum*. If *E. deilephilae* has the hind tibiae neither ciliate nor sub-ciliate, it will fall with *platysamiae* in the table, and may be distinguished at once from that species by the sides of the abdomen being broadly red. *E. proserpina* Will., Scudd. Butt. New England, 1919, considered as a possible variety of *blanda*, may or may not be a good species or even variety.

The ♀ specimen described by me on page 364, Trans. Am. Ent. Soc., 1891, I am inclined to regard as the same species, *ciliata*, to which I there doubtfully referred it. It would certainly seem at first that the differences described were specific, but still greater

ones are known in this and allied genera to be only sexual. We need a careful study of secondary sexual characters in tachinid genera.

NOTES ON SMERINTHUS CERYSII KIRBY.

BY F. L. HARVEY, ORONO, ME.

In his Monograph of the Sphingidae, p. 222, Prof. J. B. Smith says the early stages of the above species are entirely unknown. We are not aware that anything has since been published and presume the following notes may prove interesting.

On May 13, 1895, we received a pair of *S. cerysi* from Mr. Albion Townes, Winthrop, Me. They were mating when captured and remained together for two hours. The next morning there were several eggs in the box. The female continued to lay eggs until May 17, making the period of ovulation about five days. The number of eggs laid was about 160. The eggs began to hatch about May 27 and continued to emerge for about five days making the egg period 15 days.

Mr. Ora W. Knight, who had the care of most of the larvae and succeeded in carrying some through all of the changes, made the following notes:

"Placed the larvae in a gauze net upon *Salix sericea* Marshall. They were fed in this way until June 25, when I was obliged to take them home and they were afterwards fed upon picked leaves. They did not thrive so well and many died, not having strength to pupate. Seven entered the pupa state about July 13. Of

these only five emerged, and they unusually small. The great mortality may have been in part due to insufficient food, but this species seems to be very tender, which accounts for its scarcity in nature."

Prof. Carl Braun secured a female on willow in his garden, Bangor, Me., which laid nearly 200 eggs, and succeeded in getting about 50 pupae from which only one male and one female emerged. His specimens were fed while young upon willow and after the last molt upon poplar.

Mr. Knight has found the larvae of this species feeding upon Balm of Gilead. The larvae are subjected to the depredations of parasites.

The following description of the eggs and larvae were made by the writer.

Eggs pale green, oblate spheroid, much flattened, 2 mm. long.

Larvæ just hatched, 4 mm. long. Apple green, horn pale green, when hatched, but turning black inside of two hours. First molt on the seventh day, when the horn became lighter colored. The other molts we did not observe.

Mature larvæ apple green, about 38 mm. long, covered with minute granulations. Yellow stripe on each side of head. Seven oblique pale yellow stripes on each side of the body. The posterior wider and brighter,

extending to the rose pink slightly granulated horn. Along each side above the oblique stripes and extending from the head to the posterior oblique stripe is a yellow band. The nature of this band is the principal mark by which the larvae of this species is distinguished from that of *S. geminatus*. The practiced eye readily distinguishes between the above species by this band. Fore legs pink, caudal shields darker green than the rest of the body. Head and dorsum of next segment not granulated. Spiracles yellow with a carmine areola.

AN EXCELLENT beginning toward the natural history of our aquatic insects has just been published by C. A. Hart in the bulletin of the natural history laboratory of Illinois. We trust it is a forecast of the work to be done at the biological experiment station of the University of Illinois, where Mr. Hart is entomologist, and next summer's programme of which has just been issued. The paper is chiefly devoted to Diptera, especially Tipulidae, Tabanidae and Stratiomyidae, and is rendered much more useful by the liberal use of keys and by excellent half-tone plates.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

Vol. 1. Introduction; Nymphalidae.

Vol. 2. Remaining Families of Butterflies.

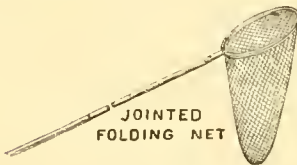
Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo, half levant, \$75.00 net.

HOUGHTON, MIFFLIN & CO.,

4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.



MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.



PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 238.

FEBRUARY, 1896.

CONTENTS:

HABITS AND PARASITES OF A NEW CALIFORNIAN WASP.— <i>A. Davidson.</i>	335
NOTES ON THE WINTER INSECT FAUNA OF VIGO CO., IND.—IV. CARABIDAE.— <i>W. S. Blatchley.</i>	336
FINAL NOTES ON ORGYIA.— <i>H. G. Dyar.</i>	340
NOTES ON THE ACRIDIDAE OF NEW ENGLAND.—II. TRYXALINAE.—II.— <i>A. P. Morse.</i>	342
NEW SPECIES OF PAPIRIUS.— <i>J. W. Folsom.</i>	344
THE CAMBRIDGE NATURAL HISTORY.—INSECTS.	346
PROCEEDINGS OF THE CAMBRIDGE ENTOMOLOGICAL CLUB (Election of members; officers for 1896; the apterous species of <i>Podisma</i> in Europe and America; tobacco improved by attacks of <i>Epitrix</i> ; butterfly captures; development of the scales in <i>Lepidoptera</i> ; parallel markings in <i>Bembidium</i>).	346
<hr/>	
SUPPLEMENT TO PSYCHE, I.—CONTRIBUTIONS FROM THE NEW MEXICO AGRICULTURAL EXPERIMENT STATION (Some new insects, <i>T. D. A. Cockerell</i> ; a <i>Ceroplastes</i> and its parasite, <i>T. D. A. Ckll.</i> , <i>L. O. Howard</i> ; preliminary diagnoses of new <i>Coccidae</i> , <i>T. D. A. Cockerell</i>).	17

PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]



Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE,

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U. S. A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danais archippus</i> . Boston, 1880, 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichthyology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> . col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

HABITS AND PARASITES OF A NEW CALIFORNIAN WASP.

BY A. DAVIDSON, M. D., LOS ANGELES, CAL.

While on a visit to Wilson's Peak, one of the highest mountains of the Sierra range north of Los Angeles, (5000 feet) I gathered some twigs of *Nama parryi* (a half shrubby perennial common on the mountain) in which some kind of wasp had burrowed, and which contained cocoons that were unfamiliar to me. The greater number of the cells were empty, but from those that remained there emerged six wasps and four parasites which Mr. Wm. H. Ashmead kindly examined and pronounced to be new.

The cocoons are half an inch long by one-eighth of an inch wide; in shape and external appearance they closely resemble a finely-grained case of the common caddis-fly, being covered on the outer surface with a layer of fine sand, and having one end truncate while the other is rounded. The cell-divisions in one specimen are composed of the pith of the plant. In the other the partitions consist of thin discs of sand. The wasp, presumably after provisioning each cell, adds a quantity of sand before sealing it up and this is afterwards utilized by the larvae in the construction of its cocoon. There are, in the Los Angeles district, at least two or three different kinds of wasps that

utilize hollow stems and fill them with grains of sand to protect the larvae, but the wasp in question is peculiar in that it not only uses sand in this manner, but in addition partitions off one cell from another with it. The wasps emerged from June 22 to July 1, about three weeks after being collected; what the larvae had fed on could not be ascertained, since there were no particles of food in any of the burrows. The parasites hatched out in the first week of July from perfect cocoons of the wasp, one from each, and obviously must have attacked the pupae. Appended is Mr. Ashmead's description of both wasp and parasite.

Odynerus rufobasilaris Ashm., sp. n.

♀. Length, 7 mm. Black, coarsely rugoso-punctate, the emargination of eyes, upper margin of clypeus, and angles of the metathorax clothed with an appressed glittering pubescence. Clypeus convexly elevated, with a slight median sinus anteriorly. Mandibles and antennae entirely black, the flagellum incrassated. Anterior angles of pronotum much dilated, acute. Basal abdominal segment, except the apical margin, red; the anterior margin of pronotum (interrupted at the middle), two spots on scutellum, the hind margin of the tegulae, a spot beneath, the apical margin of the first and second dorsal segments of abdomen and the apical margin of the second ventral segment

creamy white; legs black, with the anterior knees, more or less of their tibiae, apical half of middle and hind femora beneath and their tibiae beneath, red. Wings subfuliginous, their veins black.

Epistenia odyneri Ashm. sp. n.

♀. Length, 6 mm. Metallic green with the sides of thorax, hind coxae and first abdominal segment beneath, blue or blue green, the whole surface umbilicately punctate, clothed with a white pubescence. Flagellum beneath rufo-piceus; knees honey

yellow, the tibiae and tarsi dark fuscous, almost black, the hind tibiae behind fimbriate with long stiff bristles. Wings hyaline, the veins blackish, the marginal and post marginal veins of an equal length and fully three times as long as the short stigmal vein. Abdomen conico-ovate one-third longer than the head and thorax united, with lateral carinae.

Described from one specimen bred from the cells of *Odynerus rufobasilaris* described above.

NOTES ON THE WINTER INSECT FAUNA OF VIGO COUNTY, INDIANA.—IV.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

As the future articles of this series will deal with the Coleoptera, and as the sandy banks of the old Wabash and Erie Canal furnished a most liberal quota of the winter hiding places for the Carabidae, as well as for the Coleoptera in general, a few words of description of these banks will not be out of place.

In the greater part of its course through Vigo County, this canal was constructed at high water mark, adjoining the river terraces on the eastern side of the Wabash River; though in but few places is it near the bed of the river, wide bottoms, cultivated in summer, intervening.

The tow path was on the river side of the canal and in many places (especially near some large ponds in the bottoms) vast beds of sand have been piled up against it by the annual freshets. On these beds of sand, drift-wood

from time to time accumulates, beneath which scores of species of Coleoptera find an agreeable summer or winter home.

To the late Dr. Frederick Stein* of this city and to Mr. H. F. Wickham of Iowa City, Iowa, I owe many of the identifications of the beetles named in this and future articles. The arrangement and nomenclature followed is that of Henshaw's "List of the Coleoptera of North America."

COLEOPTERA.

CARABIDÆ.

Among the winter insects occurring in Vigo County no family surpasses the Carabidae in number of species, or in

*Dr. Stein died in April of last year. He was an enthusiastic student of Coleoptera, and his collection of that order was the largest in Indiana.

individuals. Their life being spent almost wholly upon the ground, the appearance of frost and cold weather but causes them to burrow more deeply into the vegetable mold or sand beneath the logs, stones, and other materials which furnish them a ready shelter during summer days. Hence, to one familiar with their habits, it will be no surprise to learn that of 217 species known to occur in the county, specimens of 77 were taken during the winter months; and I doubt not that a more careful and systematic search than I was enabled to make will disclose fully one half of those inhabiting the county to be partially or wholly represented in winter by the mature form.

1, *Scarites subterraneus* Fab. A single specimen, Jan. 1, from sand, beneath a log, on side of canal. This and the variety, *substriatus* Hald., are common in similar localities in early spring.

2, *Clivina ferrea* Lec. Dec. 29, Feb 10. One each date beneath log in upland woods. Also common in March along the canal.

3, *Panageus fasciatus* Say. Uncommon. Taken on three different occasions in winter only from beneath logs along the canal.

4, *Bembidium dorsale* Say. Feb. 11.

5, *B. variegatum* Say. Dec. 25.

6, *B. intermedium* Kirby. Dec. 25—Feb. 14.

7, *B. sp.?* Jan. 1.

8, *B. quadrimaculatum* Linn. On numerous dates.

9, *B. sp.?* Jan. 21.

Of 15 species of this genus found in the county the above are all that were taken in winter. They occurred either singly or in pairs beneath logs and chunks in low, damp places.

10, *Tachys proximus* Say. Feb. 2.

11, *T. nanus* Gyll.

12, *T. flavicauda* Say. Jan. 6.

13, *T. sp.?* Jan. 7.

14, *T. incurvus* Say. Jan. 21.

Of these *T. nanus* winters in numbers beneath the close fitting bark of recently felled oak, tulip (*Liriodendron*), hickory and other logs. The others are scarcer and are usually found singly beneath chunks and stones in damp localities.

15, *Patrobus longicornis* Say. On two different occasions, Dec. 25—Jan. 1, beneath logs along the sandy margin of canal.

16, *Pterostichus lucublandus* Say.

17, *P. ebeninus* Dej.

18, *P. caudicalis* Say.

19, *P. tartaricus* Say.

20, *P. mutus* Say.

21, *P. patruelis* Dej.

22, *P. femoralis* Kirby.

Pterostichus is represented in the county by 18 known species. Of these *lucublandus* and *femoralis* are by far the most common. Of the above 7 taken in winter all were beneath logs and chunks; *caudicalis*, *tartaricus*, *mutus*, and *patruelis* only along the sandy margins of the canal—the others in upland woods.

23, *Amara basillaris* Say. Two from beneath mullein leaves, Jan. 13. Other species of this genus undoubtedly

hibernate, having been seen in early March, but not in winter.

24, *Loxandrus rectus* Say.

25, *L. erraticus* Dej.

26, *L. agilis* Dej.

These three species represent the genus in the county. In winter they are found singly or in pairs beneath half buried logs,—preferably those along the sandy sides of canal.

27, *Diplochila laticollis* Lec.

28, *D. obtusa* Lec.

Of these, *laticollis* is rare in winter, *obtusa* rather common; both beneath logs in sandy localities. *Obtusa* often forms a shallow, protective pit in the sand or mold similar in appearance to that of the common ant lion.

29, *Badister pulchellus* Lec. A handsome Carabid, rare in Vigo Co. Taken but once, Jan. 6, from beneath a log in low ground. One other specimen from same locality on March 26.

30, *Calathrus gregarius* Say.

31, *C. opaculus* Lec.

Gregarius is common in winter beneath logs in dry upland woods, while *opaculus* has but one winter record—"Jan. 5, from beneath mullein leaves."

32, *Platynus brunneomarginatus* Mann. Dec. 18.

33, *P. extensicollis* Say. Feb. 21.

34, *P. decorus* Say. The elytra of this species vary much in color. Feb. 8.

35, *P. pusillus* Lec. On numerous occasions.

36, *P. melanarius* Dej. Jan. 1, Jan. 18.

37, *P. cupripennis* Say. Jan. 6.

38, *P. nutans* Say. Jan. 7.

39, *P. octopunctatus* Fab. Jan. 6.

40, *P. obsoletus* Say. Jan. 1-Feb. 14.

41, *P. aeruginosus* Dej. Dec. 18.

42, *P. rubripes* Zimm. Dec. 29.

43, *P. punctiformis* Say. Jan. 5.

44, *P. lutulentus* Lec. Dec. 23.

Of the 19 species of *Platynus* occurring in Vigo Co., the above 13 were found in winter. *Decorus*, *cupripennis*, *punctiformis* and *lutulentus* are so rare at all seasons that I have no more than three specimens of each of them; the others, especially *pusillus*, *melanarius* and *rubripes* are very common. All were found beneath logs, chunks, pieces of rail, etc., usually singly, but *pusillus*, *melanarius* and *obsoletus* gregarious, along the canal and in upland woods. Two or three specimens of *octopunctatus* were taken each winter on a high sandy hillside near the river.

45, *Olisthopus parmatus* Say. Two specimens only have been taken, one from beneath a chunk in a clearing Jan. 6.

46, *Casnonia pennsylvanica* Linn. This odd-looking beetle can be found beneath pieces of rail along the upland fence rows of the old Virginia rail fences on almost any day in winter.

47, *Galerita janus* Fab. Common enough in summer. But one in winter, Jan. 1, beneath log on side of canal. Our only representative of the genus.

48, *Labia grandis* Hentz.

49, *L. atriventris* Say. Dec. 29.

50, *L. viridipennis* Dej. Dec. 28.

51, *L. bivittata* Fab.

Of these, *grandis* and *bivittata* are

in winter common beneath chunks in the corners of rail fences about which piles of dead leaves have drifted. *Atriventris* is scarce in winter and *viridipennis* rare at any season. beneath logs in upland woods. Four other species occur in the county: viz., *viridis* Say; *tricolor* Say; *scapulus* Dej.; and *furcatus* Lec.

52, *Cymindis americana* Dej. Rare. One from beneath a log near a stream, Dec. 25.

53, *Apenes sinuata* Say. Also rare, but three having been seen by me at any time. Two of these were taken in winter, Dec. 1-Feb. 14, from beneath logs.

54, *Brachynus fumans* Fab. Of 6 species of "bombardiers" native to the county this is the only one taken in winter. A single specimen which "shot" twice before surrendering was found Jan. 1, beneath a log on side of canal. From April 10th to June the species is excessively common at same place. Does an occasional specimen hibernate or was this one prematurely called forth from its pupal cradle by the several days of mild weather which had preceded its discovery?

55, *Chlaenius erythropus* Germ.

56, *C. sericeus* Forst. Dec. 8.

57, *C. nemoralis* Say. Feb. 20.

58, *C. pennsylvanicus* Say. Jan. 3.

Of thirteen species inhabiting the county, the above represent the ones recorded in winter. The last three were taken on but one occasion each from beneath logs near the borders

of swamps. *Erythropus* twice, Jan. 1, Feb. 22, from under logs on canal bank, a place where it is excessively common on the first warm days of March.

59, *Anomoglossus pusillus* Say. One specimen, Jan. 21, from a chunk on side of canal.

60, *Agonoderus pallipes* Fab.

61, *A. partiaris* Say.

Both frequent in winter beneath driftwood near water, and on the wing very early in spring.

62, *Harpalus pennsylvanicus* DeG.

63, *H. compar* Lec.

64, *H. longior* Kirby.

65, *H. montanus** Lec.

The first three beneath logs in dry upland fence corners at various dates in winter. The last one but once, Dec. 18, from a similar locality.

66, *Stenolophus conjunctus* Say.

67, *S. ochropezus* Say.

68, *Bradycellus rupestris* Say.

69, *Tachycellus atrimediis* Say.

70, *T. badiipennis* Hald.

The last five hibernate in numbers beneath logs and rubbish in dry or sandy places, and are very common on the wing during the first warm days of March and April.

71, *Anisodactylus rusticus* Say.

72, *A. baltimorensis* Say.

73, *A. terminatus* Say. Dec. 25.

74, *A. agilis* Dej. Dec. 18.

75, *A. sp.?* Jan 13.

76, *A. lugubris* Dej. Dec. 18.

* I doubt the correct determination of this species. It was so named for me by Dr. Stein.

77, *A. interstitialis* Say.

Rusticus, *baltimorensis* and *interstitialis* are rather common throughout the winter. The others are rare at any time and in winter were taken

but once on the dates mentioned. All hibernate beneath logs, usually those in sandy localities. Six additional species of the genus have been taken in the county.

FINAL NOTES ON ORGYIA.

BY HARRISON G. DYAR, NEW YORK CITY.

Since my former papers in *Psyche* on our species of *Notolophus* (formerly *Orgyia*), I have bred several of the western forms with the view of establishing their relationships. The species have been carried through several generations and I have thus had them continuously before me for three years. The following conclusions have been arrived at.

***Notolophus vetusta* Boisd.**

gulosa Hy. Edw.; *cana* Hy. Edw.

I recognize but one species in California. I have bred a large number of the larvae of the lupine feeding form (*vetusta*) raised from eggs kindly sent me by Mr. T. G. O. Mueller, Mr. Beverly Letcher and Dr. H. H. Behr. They do not differ from those of *N. gulosa* which I have already described and I found them by no means fastidious as to their food plants. The characters noted by the late Henry Edwards to separate them, I find to be only individual ones, present in varying degrees in different examples from broods of both *vetusta* and *gulosa*. The differences in the moths also are of the same character. I formerly stated (*Psyche*, vi, 40) that Mr. Edwards had con-

founded the moths. I see now that this was probably not the case, but that he bred from larvae on lupine the form that I bred from larvae on oak, and the contradiction was due to insufficiency of material in both Mr. Edwards' hands and my own. In the case of *cana*, I showed that there were two black tufts in the young larva, whereas *gulosa* had but one such. During my breeding of *gulosa* among numbers of larvae raised from the egg, a few appeared with the two black tufts. These were isolated and the resulting moths paired together. The larvae from their eggs the next season were all of the *cana* form. The larvae, however, from the moths from which all the *cana* forms had been eliminated varied again the next year, producing about 3 per cent *cana*. Now if we consider that all the other species of *Notolophus* have the two anterior tufts colored alike, it becomes apparent that this is a case of reversion in *gulosa* and so the greater stability of the *cana* form is accounted for. The sea-coast form, *vetustagulosa*, is thus seen to be a modified off-shoot of the more generalized one inhabiting the interior of California;

but it has not yet diverged from it in a specific degree, since a reversion may be readily obtained. The moths of *cama* were described as different from the coast form, but the only two males which I have seen are so considerably unlike and so near to *vetusta* that I do not hesitate to consider their differences as simply varietal.

Notolophus antiqua Linn.

nova Fitch; *badia* Hy. Edw.

I have bred the English form from eggs kindly sent me by Mr. J. R. Wilson. The larvae were exactly like our New York ones; but exhibited four stages for male and five for female larvae, as seems to be possible in the case of all the species of this genus. The side tufts appeared in stage iv or traces in some larvae as early as stage iii. I can thus positively confirm the identity of *antiqua* and *nova*. The moths were alike. As to the Vancouver Island *badia*, I have bred these from the eggs originally obtained there for three years. It will be remembered that *badia* is characterized by the absence of the side tufts. However, among the large number obtained, I not infrequently found traces of the side tufts or even a well developed pencil, especially in large female larvae. When present, the tufts had exactly the same characters as in normal *antiqua*, and it appears that we have in *badia* a form in which the side tufts (a lately acquired character in the genus) appear later than usual or even not at all. That is *badia* represents a more generalized condition than in the dominant

race which extends over so wide an area. That it cannot be a degenerate form, in which the tufts are disappearing, is shown by the fact that they appear only in the last stage, and most frequently in females, which have an additional stage. In a degenerate form we should expect to see the pencils, when present, appear in stage iv, as usual, and become obsolete in the later stages. I think that the fact of the actual presence of the tufts in *badia*, though not universal, together with their ready fertility with normal *antiqua*, must compel us to place *badia* as a local race of *antiqua*, though a more distinct one than in the case of the Californian species just described. The moth of *badia* often differs markedly from the *antiqua* pattern, though not constantly so.

Notolophus leucostigma A. & S.

leucographa Geyer; *intermedia* Fitch; *borealis* Fitch; *obliviosa* Hy. Edw.; *inornata* Beut.

The first four of these synonymic names refer to descriptions or figures of the moth. In *Psyche* (vi, 420, note) I referred *inornata* to this species. Mr. Beutenmüller, however, has not accepted the synonym, but states (*Journ. N. Y. ent. soc.*, ii, 30, note) that "the larva is totally distinct from the well known *leucostigma*." I have, therefore, carefully compared Mr. Beutenmüller's description with specimens of *leucostigma*. His description runs as follows: ". . . Body above mouse color, with three rows orange tubercles along each side. Each tubercle pro-

vided with a bunch of silvery gray hairs. . . . From the eighth segment to the end of the body there is a broad black stripe. . . . Underside yellowish green . . ." I have omitted parts of the description which apply equally to *leucostigma*. Now in *leucostigma* the ground color is gray or "mouse color," but the dorsal black band is edged by a wide yellow stripe. If this stripe be

absent or greatly reduced in *inornata*, as the description implies, it would give to the larva a very different appearance, "totally distinct" perhaps as Mr. Beutenmüller says; but I cannot convince myself that we have to do with more than a variety or possibly a local race of *leucostigma*. The yellow markings are variable in *vetusta* and *antiqua*.

Synopsis of the Larvae of Notolophus.

- Head yellow, colors in general pale *definita*
- Head red.
 - A distinct yellow subdorsal band *leucostigma*
 - Gray marks predominant, the yellow band not noticeable var. *inornata*
- Head black.
 - Warts crimson, brush-like tufts dark along the crest, the yellow lines along the sides broken into spots.
 - One black tuft in young larva *vetusta*
 - Two black tufts in young larva var. *cana**
 - Warts orange, brush tufts unicolorous, yellow or white, side lines usually continuous.
 - A lateral black hair-pencil from joint 6 *antiqua*
 - No lateral black pencil var. *badia**

NOTES ON THE ACRIDIDAE OF NEW ENGLAND.—II. TRYXALINAE.—II.

BY ALBERT P. MORSE, WELLESLEY, MASS.

5. PSEUDOPOMALA gen. nov.

by Stål (= *Metaleptea* Brunner, Rev. p. 118), and in the absence of adequate description of structural characters and being the generic type a somewhat full description is appended.

Type: *Opomala brachyptera* Scudd. This species belongs to a genus not tabulated by Brunner in his Revision which is allied to *Truxalis* as defined

In my preliminary list I referred this

* I regret that the rule of priority prevents giving the specific position to the more generalized form

species to the Opomalinae, as its generic title indicated. But it is not an *Opomala*, nor does it belong to that group. The prosternum is tuberculate, it is true, but to a less extent than in *Mecostethus*, while the presence of a highly developed rasp on the hind femora shows conclusively that it belongs to the *Tryxalinae*.

6. *Pseudopomala brachyptera*

Scudd. Figs. 6, 6a, 6b.

Opomala brachyptera. Scuddler, 454,—1862.

Opomala brachyptera. Thomas, 63. Fernald, 35. Morse, 13, 106. Beutenmüller, 291.

Body slender, nearly linear. Antennae ensiform, equal (♀) or one and a half times (♂) as long as head and pronotum. Head conic: its length on top about three-quarters of pronotum. Crown horizontal (♀) or slightly ascending (♂). Vertex laminate, extending in front of eyes as long (♀) or longer (♂) than its width; its anterior margin parabolic; a broad-based median ridge, well-developed anteriorly, disappearing posteriorly opposite front border of eyes, curving slightly downward in front to run smoothly into the front margin of vertex; a shallow channel on each side of this from eye to front. Eyes longer than the vertex, about equal to the infra-ocular part of the cheeks at anterior border. Profile strongly reclinate, nearly straight, rounded above. Frontal costa slightly narrowed at union with vertex, shallowly sulcate, sides nearly parallel, slightly divergent below. Pronotum tricarinate; dorsum slightly tectiform, truncate before and behind, sides parallel; metazona two-thirds as long as prozona. Lateral lobes transverse, front margin nearly straight, retreating; lower

margin sinuate; hind margin concave below, the posterior angle about square. Prosternum bearing an obtuse tubercle. Metasternal lobes subcontiguous, ♂, not distant. ♀. Hind femora slender; of ♂ bearing a long stridulating rasp of fine teeth on the distal three-fourths of the basal half. Hind tibiae with 12 to 19 spines on exterior margin, apical spine not present. Tegmina usually abbreviated; of ♂ two-thirds or three-fourths as long as hind femora, rounded at apex, pellucid on distal two-thirds, the scapular area dilated, regularly reticulated with oblique veinlets. Tegmina of ♀ acuminate, opaque, scarcely reticulate, about as long as head and pronotum. Wings abortive, half as long as tegmina. Individuals occur with fully developed wings and tegmina nearly or quite reaching apex of hind femora; in these the apex of the tegmina is rounded. For this form the name *reversa* is here proposed. Genital segment of ♂ twice as long as wide; extending twice the length of the anal plate horizontally backward, lower margin slightly ascending, sides straight, extreme tip a little rounded, reaching or slightly passing the apex of hind femora. Ovipositor of ♀ short, scarcely exerted, external margins with a stout tooth, upper valves denticulate at base. The end of abdomen equals or (usually) passes the tip of hind femora a little, sometimes several mm.

Antenna.	Head + Pron.	Hind fem.	Teg.
♂ 11.5-14.5	7.3- 8.6	13.5-15.5	9-12 3
♀ 8.5-20	9.6-11.4	14 -19	7-12
	Long-winged, teg.	Body.	
	♂ 15.5-17	23.5-27	
	♀ 18 -22	27.5-29.5	

Light brown (♂) or pale drab (♀) with darker, brownish, longitudinal markings. Paler (♂ yellowish) below. Tips of antennae, hind tibiae, knee joints, and tibial spines with more or less fuscous. Tibial groove of hind femora greenish yellow. Tegmina of ♀ opaque, of ♂ with distal two-thirds pellucid. Tegmina and dorsum of head and pronotum sometimes

with small, irregularly disposed fuscous dots. Individuals sometimes have the longitudinal markings much more distinct

than usual, presenting a markedly fasciate appearance; this form is not uncommon at West Chop, M. V.

NEW SPECIES OF PAPIRIUS.

BY JUSTUS WATSON FOLSOM, CAMBRIDGE, MASS.

Papirius hagenii, n. sp.

Head translucent orange ochraceous, orange around mouth; eyes black; a few stiff, white bristles upon vertex and face. Antennae nearly as long as body, orange, becoming purplish on last two segments; basal segment naked; second four times the first in length, a few hairs distally; third equalling the second plus one-half the first, verticillate; terminal segment twice the basal, whorled as usual. Thorax yellow. Abdomen oval in dorsal aspect, dark purple, almost black, covering the sides and meeting the pale ventral surface with a well-defined but zig-zag margin; on posterior half of dorsum, a yellowish brown pattern, very variable (sometimes almost absent) but consisting fundamentally of a median elongated mark widening behind and one quarter the length of the abdomen, lying between four rounded triangular spots, the anterior pair of which are more or less three-lobed. These five spots may be separate, but the three anterior usually unite into a figure having a large posterior median lobe, three lateral lobes and a large anterior median sinus; the two posterior spots may unite to form a long, irregular crescent before the apex of the abdomen; abdomen with a few short, white bristles on apical half; many two or three times longer upon the yellow anal tubercle. Legs yellow, paler at base; tibia spiny; claws transparent, slender, rather straight, little curved inside; superior claw with a sharp tooth inside, one third from apex; second tooth obscure, in the middle; inferior claw two thirds the other in length, with one stout, knobbed tenent hair, twice as long,

fixed to its inner side except at the tip, which is free. Furcula (Tullberg's name for the spring) extending to mouth, stout, pale yellow at base, becoming white distally; manubrium (basal segment) over two thirds the dentes (middle segments) in length; dentes three times mucrones (apical segments), each dens with a row of long spines on either side; mucrones cylindrical, apex rounded, minutely serrate beneath; ventral abdominal surface with an oval, yellow swelling either side the manubrium and two similar but much larger ones placed obliquely and anteriorly. Average length, 1.3 mm.; maximum, 1.5 mm.

Described from over twenty specimens collected by me in October and early November, 1895, at Arlington, Mass. This active, uncommon species occurred in pine woods under damp, decaying twigs and needles.

Papirius pini, n. sp.

Chestnut brown, except for white claws, mucrones and bristles. Head paler; eyes black; a few short, stiff bristles upon a protuberance on vertex and down sides of face. Antennae four-fifths the length of body; basal segment stout, naked; second four times as long, a few long hairs distally; third equalling the first two, with distal half of seven false sub-segments and three less evident, swollen terminal ones; each sub-segment with a pair of hairs; a few hairs near base of third segment; fourth equal to basal, with short hairs. Abdomen ovate dorsally, dilated at sides; dorsum darker, with several long white bristles anteriorly

and very short bristles posteriorly; anal tubercle with long, stiff bristles. Legs long, slender, spiny, especially on tibia; superior claw long, rather straight, clearly bidentate inside, with a sharp tooth in the middle and another midway between it and the tip; a third tooth on the outside, nearly opposite the last; inferior claw with straight, tapering sides and an apical hair hardly longer than the other claw; the extreme tip of the claw is really free from the hair; on the inside of the inferior claw, near the base, is a dilation whose apex bears a short bristle. Furcula pale, extending beyond ventral tube; manubrium stout; each dens with a row of long spines on either side; mucrones tapering, one-third length of dentes, coarsely serrate beneath. Average length, 1.6 mm.

Described from twelve specimens found during October and until middle November at Arlington, Mass.

This species eats wet, decaying wood on the under side of pine logs, its color being mimetic. The last specimens found, before severe frost, were all females, which laid numerous eggs in captivity when given natural conditions of moist food, air and darkness. These eggs, laid singly, were spherical with strongly flattened base, translucent white, smooth, .2 mm. in diameter, .15 mm. high and with embryo quite undeveloped several days after deposition.

Papirius testudineatus, n. sp.

Dark purple, almost black, with conspicuous wax-yellow patterns. Head large; face with large markings and a few short bristles; vertex with a few longer bristles and a stirrup-shaped mark on middle; behind this, a long, broken, transverse band; eyes black; antennae seven-tenths the length of body, purplish; basal segment twice as thick as second, crenate apically; second on anterior edge of first, five times as long, somewhat petiolate, with a few hairs; third equalling

first two, slightly petiolate, gradually forming false sub-segments distally, of which seven are evident, followed by three swollen ones, the penultimate sub-segment being much dilated; terminal segment equal to basal in length; third and fourth segments with whorls of long hairs. Abdomen ovate dorsally, with a large pattern composed principally of thick median longitudinal and oblique bars; on anterior third of dorsum, a median bar whose posterior end meets the vertices of two widely V-shaped marks, one on either side; behind this, a roughly scissor-like pattern with two long oblique branches on either side and a short, median anterior lobe; on apical half of dorsum, a roughly anchor-shaped marking and two large, pale yellow tubercles, one on either side; dorsum with a few long bristles anteriorly, many shorter ones posteriorly; sides with large roundish and elongated spots; anal tubercle large, with several large spots and many long, stiff bristles. Legs very long, slender, hairy, with broad alternate bands of purple and yellow except on tibia; claws white; superior claw long, of rather uniform width, bent only towards tip, divided on the inside nearly into thirds by two prominent teeth; inferior claw half as long, long conical, free at extreme tip but apparently prolonged into a bristle a little longer than the claw; a short bristle on inside of inferior claw at its base. Furcula long, nearly reaching the mouth, purplish; each dens with a row of long spines on either side; mucrones white, cylindrical, apex rounded, one-third length of dentes, serrate beneath. Length, 2.2 mm.

Four specimens of this species were found in company with *P. fini* and also laid a few eggs in captivity. These eggs differed from those of *P. fini* only by being a little larger.

Types of the above species have been deposited in the Cambridge Museum of Comparative Zoölogy. I wish to thank Mr. Samuel Henshaw, of the museum, for his kindness in supplying me with types as well as literature of Thysanura.

THE CAMBRIDGE NATURAL HISTORY: INSECTS.

The fifth volume of the Cambridge Natural History (Macmillan) treats of Peripatus, Myriapods and a portion of the Insects, the other portion being left for another volume. The insects are done by Dr. David Sharp, but the present volume contains only the Aptera, Orthoptera, Neuroptera, and a part of the Hymenoptera. The classification of the orders adopted is given on pp. 172-173, and differs but slightly from the old Linnean divisions, while the classifications proposed by Packard and by Brauer are fully explained and acutely criticised. No explanation whatever is given of the low position assigned the Hymenoptera in the series adopted, which seems wholly indefensible. Apart from this, the work promises when completed to be the most useful introduction to the study of insects which exists, and it is a veritable storehouse of interesting facts. Nothing but praise can be given to the method, the execution and the judicious attitude of the writer; it is, moreover, a very readable book, couched in excellent English. As a general rule it is very equal in excellence, though some points are elaborated with more care than others equally important; while the woodcuts are numerous, largely new, admirably executed, and distinctly illustrative of the text. Four introductory chapters treat respectively of the external structure, the internal structure, the development of the individual and classification; in the first, the treatment of the venation and of the genital armor is unsatisfactory, these subjects being dismissed in a very few words. The several orders are next taken up, first as a whole, and then family by family, the order of subjects treated being in general that of the introductory chapters, followed by remarks on the distribution of the insects in question both in space and time, and closing in some cases with a table of genera. It is well up to date. References are abundant and sufficient, and we have noted but exceedingly few inaccuracies.

Figs. 45 and 46 are wrongly credited. Altogether it is a most desirable book for the entomologist's library.

THE GRAND PRIZE for the physical sciences has been awarded by the French academy of sciences to Mr. Charles Brongniart for his recent work on fossil insects of Commenyry.

PROCEEDINGS OF THE CLUB.

10 Jan., 1896.—The 189th meeting was held at 156 Brattle St., Mr. S. Henshaw in the chair.

Messrs. Justin W. Folsom and Herbert V. Neal, both of Cambridge, were elected to active membership.

The several annual reports were read.

The following officers for 1896 were chosen: President, H. S. Pratt of Haverford, Penn.; secretary, R. Hayward; treasurer, S. Henshaw; librarian, S. H. Scudder; members at large of the executive committee, A. P. Morse and S. H. Scudder.

Messrs. Henshaw and Scudder were appointed a committee with full powers, to revise the list of exchanges of the Club at the close of vol. 7 of *Psyche*.

Mr. S. H. Scudder exhibited the American and European species of *Podisma* in his collection and drew special attention to the apterous forms, which were represented in America by two species possessing a tympanum on the sides of the first abdominal segment; while in Europe there were not only two species with a tympanum but five species without, all found at high altitudes or latitudes. One of our species, best known from Mt. Washington, N. H., has also been found at high elevations in Maine, Massachusetts and New York, and at Sudbury, Ontario; in the latter place at the general level, though Sudbury itself has a considerable elevation; the second American species has only been found near Ithaca, N. Y., at less than 500' above the sea. The species of *Podisma* generally, both winged and apterous, were usually found at high levels, generally above or near the forest line.

Mr. Scudder also exhibited the work of what was presumed to be *Epitrix parvula* on tobacco leaves, received from Mr. S. E. Elmore of Hartford, Conn.; according to him, this insect "eats a small bit from the leaf of growing tobacco, leaving a light brown spot upon the leaf when ready for market; these spots materially increase the market value of the crop. . . . If they could be successfully cultivated it would be a boon to the tobacco grower." Webster states that the insect is regarded as injurious to the tobacco in Ohio. One of the members immediately produced a cigar showing these spots on the wrapper, but did not state whether he paid an extra price on their account.

Mr. Scudder further reported the capture of *Basilarchia arthemis* by Mr. R. N. Davis of Archbald, Penn., on Bald Mount near Scranton, Penn., 2385' above the sea; and of *Calidryas philea* by Mr. W. T. Bell of Franklin, Penn., at that place, far beyond its usual range, though in the West it has been reported as far north as Wisconsin.

Mr. A. G. Mayer stated that it has been

shown by Schäffer, van Bemmelen, Urech and Haase that the order of appearance of the colors in the pupal wings of Lepidoptera is as follows: at first the wings are perfectly transparent, then they become pure white, then yellowish, and finally the mature colors begin to appear upon them. He said that he had found that the scales develop during the transparent stage. The white stage is caused by the protoplasm shrinking out of the scales leaving them in the condition of little hollow bags, so that they diffract the light. In the yellow stage the pigment first appears: this pigment is made by something analogous to a blood clot, for the plasma of the blood enters the scales and forms the pigment. The blood of the chrysalis contains a large amount of serum albumen.

Mr. R. Hayward showed specimens of *Bembidium mundum*, *B. quadrimaculatum* and two undescribed species and remarked on the very close resemblance between them in markings, the four belonging to three distinct groups.

Just Published, by Henry Holt & Co., New York.

Scudder's Brief Guide to the Commoner Butterflies.

By SAMUEL H. SCUDDER. xi + 206 pp. 12mo. \$1.25.

An introduction, for the young student, to the names and something of the relationship and lives of our commoner butterflies. The author has selected for treatment the butterflies, less than one hundred in number, which would be almost surely met with by an industrious collector in a course of a year's or two year's work in our Northern States east of the Great Plains, and in Canada. While all the apparatus necessary to identify these butterflies, in their earlier as well as perfect stage, is supplied, it is far from the author's purpose to treat them as if they were so many mere postage-stamps to be classified and arranged in a cabinet. He has accordingly added to the descriptions of the different species, their most obvious stages, some of the curious facts concerning their periodicity and their habits of life.

Scudder's The Life of a Butterfly. A Chapter in Natural History for the General Reader.

By SAMUEL H. SCUDDER. 186 pp. 16mo. \$1.00.

In this book the author has tried to present in untechnical language the story of the life of one of our most conspicuous American butterflies. At the same time, by introducing into the account of its anatomy, development, distribution, enemies, and seasonal changes some comparisons with the more or less dissimilar structure and life of other butterflies, and particularly of our native forms, he has endeavored to give, in some fashion and in brief space, a general account of the lives of the whole tribe. By using a single butterfly as a special text, one may discourse at pleasure of many: and in the limited field which our native butterflies cover, this method has a certain advantage from its simplicity and directness.

THE SEVENTH VOLUME OF PSYCHE

Began in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

Vols. 1-6, Complete, Unbound, - Now sold for \$29.00.

Vols. 1-6, and Subscription to Volume 7, - - \$33.00.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

Vol. 1. Introduction; Nymphalidae.

Vol. 2. Remaining Families of Butterflies.

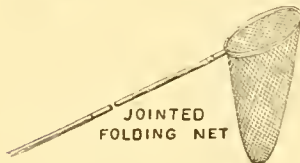
Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo, half levant, \$75.00 net.

HOUGHTON, MIFFLIN & CO.,

4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

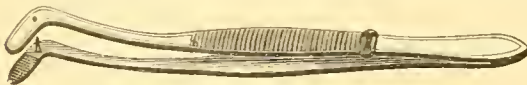
MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

pubescence except that the third has a broadly triangular black central patch, the apex of which is directed hindwards. Apex rufous. Second segment at sides and ventrally strongly punctured, dorsally the surface cannot be seen because of the pubescence.

Hab.—Gordon Town, Jamaica. (Dr. Cargill.) Communicated by Mr. L. O. Howard. Type in U. S. Nat. Museum. A very beautiful and distinct species.

CHRYSIDIDÆ.

Holopyga semirufa, n. sp.—Length about or slightly over 3 mm.; head and thorax bright green, occiput and metathorax deep purple. Antennæ very dark brown, the scape green. Pro- and meso-thorax shining slightly reddish brassy in some lights. Metathorax with a very little green mid-

dorsally. Wings clear, nervures dark brown. Abdomen moderately shining, entirely rufous. Legs rufous, anterior and middle femora and tibiæ darker, anterior femora green except the end.

Whole insect strongly punctured, the punctures finer on the abdomen. Third segment of abdomen entire. Claw with two teeth within. Marginal cell open at apex; no discoidal cells, the outline of the second is very faintly and imperfectly indicated. Metathorax with a strong spine on each side. Hind ocelli about as far from one another as each from orbital margin.

Hab.—Las Cruces, N. M., close to the Agricultural College, Sept. 11, 1895, on *Bigelovia wrightii*. Recognized at once by its rufous abdomen and legs. The type is Ckll. 5012.

IX. A CEROPLASTES AND ITS PARASITE.

Ceroplastes euphorbiae, n. sp.—♀ scale 3¼ mm. long, 3 broad, 2¾ high. Wax white, rather thick, firm, not divided into plates. The plate-nuclei or knobs, however, are very distinct, each on a small dark pink patch. Obscure bands of white secretion descend from the lateral ones. Denuded, the ♀ shows a well-formed caudal horn, about the shape of the last joint of one's little finger, but rather more tapering. The material being rather insufficient, the microscopic characters were not very well made out. The antennæ appear to be only 6-jointed, but it is the fourth joint, not the third, that is much the longest. The second and third are next longest and subequal, the second perhaps a little the longer. The fifth is quite short. Derm with round gland-pits. Legs ordinary, femur a little longer than tibia, tibia longer than tarsus. Digitules with large knobs. A detached leg exhibited a prodigiously long tarsal digitule, at least twice as long as the tarsus itself.

Half grown examples have the wax divided into plates, but the sutures are not

darkened. Quite young ones are pink with all the knobs conspicuously white.

Hab.—Red Hill District, Jamaica, Oct. 28, 1895, on the twigs or branches of *Euphorbia hypericifolia* L., sent by Dr. M. Grabham.

This little species has some resemblance to *C. thevingi* Ckll., but will be known by its white wax, with the knobs on dark pink patches. From *C. floridensis* Comst., it will be known by its higher form, and the dark knobs of the adult, situated on dark pink patches. From *C. euphorbiae* I bred a parasite, which Mr. L. O. Howard describes as a new genus and species of Aphelinine Chalcididae. His description follows. *T. D. A. Ckll.*

Aneristus, n. gen.—Resembles *Coccophagus*. Flagellum of antenna strongly flattened. Scape short, inserted just above the mouth and reaching to the middle of the face; pedicel short, triangular, as long as broad. Funicle joint 1 twice as long as pedicel, somewhat longer than broad.

Funicle joints 2 and 3 each shorter than 1, and 3 shorter than 2; each about as broad as is joint 1 at tip. Club distinctly 3-jointed, a little broader than funicle joint 3; joints 1 and 2 of club subequal in length and each as long as funicle joint 3. Joint 3 of club about as long as 2, somewhat narrower at base than 2, pointed at tip. In other respects resembles *Coccophagus*, except that the hind tibiae are considerably flattened and have a row of short stiff bristles above. Middle tibial spur long and slender, nearly as long as first tarsal joint.

Aneristus ceroplastae, n. sp.—Female. Length, .8 mm.; expanse, 1.6 mm.; greatest width of forewings, .27 mm. Mesonotum finely and closely shagreened, with sparse, rather long dark pile; eyes hairy; color black, slightly shining, all coxae and femora black; front and middle tibiae and all tarsi pallid, hind tibiae black. Wings with a very large discal infuscated patch, covering nearly half the wing area.

Described from 2 specimens reared by T. D. A. Cockerell from *Ceroplastes* on *Euphorbia hypericifolia* from Jamaica.

L. O. Howard.

X. PRELIMINARY DIAGNOSES OF NEW COCCIDAE.

BY T. D. A. COCKERELL.

The writer having lately prepared descriptions of various new Coccidae, which will appear in sundry bulletins, reports, proceedings of local societies, and so forth, it is deemed expedient to bring together some account of them here. This is done for the convenience of students, who sometimes complain of the difficulty of keeping track of scattered descriptions; and also to secure earlier publication, as some of the fuller accounts may be (indeed, have already been) much delayed. While the full details are not now given, there is sufficient descriptive matter, it is hoped, for the ready identification of the species. The species collected in Japan by Mr. Takahashi were obtained for the Department of Agriculture and transmitted to me by Mr. L. O. Howard. Those collected by Prof. C. H. T. Townsend are also the property of the Department. Those obtained by Mr. Craw were collected at San Francisco in the course of his quarantine work. Full particulars concerning all of the Takahashi, Townsend and Craw species will be given in a forthcoming Bulletin of the Department of Agriculture. The West Indian forms will probably receive full publication in Trinidad.

Dactylopius olivaceus, n. sp.—♀ long 3½, lat. 2½, alt. 1½ mm. (in alcohol). Dark olive-brown, with mealy powder. Legs shorter than their distance from one another, very stout, coxa extremely large, digitules all filiform. Antennae brown, slender, 8-jointed, 8 very long. Formula S (123) (67) 54. Hairs of anal ring very small. Posterior tubercles obsolete. On *Yucca*, Ciudad Perfirio Diaz, Mexico (Townsend). Rather like *D. glaucus*, Maskell.

Eriococcus dubius, n. sp.—♀ with sac a little over 3 mm. long, sac loosely felted, white, with a slightly yellowish tinge. Dried ♀ very dark reddish-purple. Antennae 7-jointed, formula 34 (12) 756. Legs moderately slender, digitules ordinary. Posterior tubercles small but cylindrical. On some shrub, Valles, Mexico (Townsend). Very near to *E. coccineus*, Ckll., but apparently distinct.

Phenacoccus pergandei, n. sp.—♀ with sac 8 mm. long, 3 broad. Sac white, firm, partly overlapping the wrinkled orange-brown ♀. Antennae 9-jointed, formula 32 (14569) (78). Tarsus less than half as long as tibia. Digitules of claw of fair size, expanding rather gradually to their bulbous

ends. Claw long, not much curved. On leaves of "Gumi," Japan (Takahashi). It has much the appearance of *Pulvinaria camellicola*.

Conchaspis angraeci v. hibisci, v. nov.—Scale perhaps a little larger, grayish-white, with the apex tilted over on to the side. Strong ridges, about 3 in number, run from the apex towards the opposite margin. Antennae 4-jointed. On *Hibiscus* sp., Tamauilipas, Mexico (Townsend).

Lecaniodiaspis (Prosopophora) quercus, n. sp.—♀ scale long, $3\frac{1}{2}$, lat. $2\frac{1}{2}$, alt. $2\frac{1}{4}$ mm., pale ochreous, obscurely carinate, segmentation fairly evident. Antennae 7-jointed, formula (34) (25) (67) 1. On *Quercus* sp., Tokio, Japan (Takahashi). Very like *P. rufescens*, but more convex. It might be taken at a glance for an *Eriococcus*, being about the color of the sacs of *E. eucalypti*. Mask.

L. (P.) celtidis, n. sp.—♀ scale long, 3, lat. $2\frac{1}{2}$, alt. $1\frac{1}{2}$ mm., broad-oval, convex, above very light ochreous, conspicuously frosted with white secretion. Antennae 8-jointed, formula 4 (35) (61) (72) 8. Eggs pale pink. On *Celtis occidentalis*, San Antonio, Texas (Townsend). The eggs in *L. yuccae* are yellowish.

Sphaerococcus (Pseudolecanium), n. subg.) *tokionis*, n. sp.—Scale irregular, more or less oval, about 6 mm. long, dark brown, shiny, producing a little cottony matter. The adult ♀ is simply a sac full of larvae; the margin has well-developed capitate spines. Larvae suggesting those of *Kermes*. Cephalic end with a row of about 10 tubular glands, hind extremity with blunt spines. On twigs of bamboo, Japan (Takahashi). Rather like *S. bambusae*, Mask., but not showing the distinct caudal segments of that insect.

Lecanium imbricatum, n. sp.—♀ scale about 4 mm. long, oval, moderately convex, reddish-brown, much wrinkled when dry; more or less covered, especially at sides, with a thin, fragile glassy coat. Derm

thickly beset with large brown glands, which viewed laterally are broadly fusiform. Anal ring with 8 long hairs. Antennae very short, thick, rudimentary, joints not distinguishable. Legs rudimentary, very short and stout. ♂ scales as usual in genus, rugose. On *Mimosa*, Alta Mira, Mexico (Townsend). Belongs to a neotropical group.

L. nanum, n. sp.—♀ scale like a very small *L. hesperidum*, thus like *L. minimum*, Newst., but antennae 7-jointed, joints obscure, formula 3 (27) 14 (56). Derm with small scattered round gland-dots, legs very small, the four digitules about of equal size, those of tarsus not extending beyond those of claw. Anal plates short and broad, reddish-brown. With young *Icerya rosae* in covered runs of an ant on leaves of "Balata," Trinidad (Hart). The ♀s, though so small, contained embryos.

Pulvinaria aurantii, n. sp.—Looks like *P. psidii*, Mask., but that has the marginal spines more numerous and very much smaller, the femur and trochanter larger, etc. In *aurantii* the antennae are 8-jointed, 3 longest. Legs ordinary, tarsus much shorter than tibia, digitules of claw very large and stout, with large knobs. Rostral loop very short. On orange, Tokio, Japan (Takahashi).

P. broadwayi, n. sp.—♀ reddish-brown, about $1\frac{1}{2}$ mm. long in shrivelled condition, on and surrounded by an oval cushion of white secretion, about 3 mm. long. Antennae 8-jointed, formula 3 (28) (41) (56) 7. Legs rather stout and large, tibiotarsal articulation unusually distinct. Claw strong, much curved. Digitules of claw stout, extending beyond its tip, with large knobs; tarsal digitules slender, nearly twice as long as those of claw. Margin with very numerous stout but rather short pale brown spines. On twigs of a plant not identified, but seemingly Anacardiaceous. Botanic Gardens, Grenada (Broadway). Sent by Mr. Ulrich. Easily known by the cottony matter surrounding the ♀.

P. (Takahashia, n. subg.) japonica, n. sp.—A most extraordinary species, with the ovisac enormously elongating, lifting the ♀ insect into the air, so that the whole might be compared to a bent finger, the nail represented by the ♀. Antennae short and stout, 7-jointed, 3 much longest. formula 3 (71) (25) (46). Tarsal digitules extending about as far as tip of claw, digitules of claw extending a little beyond. The length of the ovisac is about 17 mm. On Mulberry, Tokio, Japan (Takahashi).

Ceroplastes mexicanus, n. sp.—Scale with wax long, 6, lat. 5, alt. $3\frac{1}{2}$ mm.; wax rather thin, grayish-white with an ochreous tinge, smooth, without noticeable ridges or grooves, separated into plates, the sutures between the plates not differently colored from the rest of the wax. Plate-nuclei small, dull dark purplish with a central spot of white secretion. Antennae apparently 7-jointed, formula 43 (12) (567). Digitules of claw stout, with large round knobs. Caudal horn rudimentary; dorsum of ♀ simply convex. On Catalpa, San Luis Potosi, Mexico (Townsend). Somewhat allied to *C. cirripediformis*, Comst.

Aspidiotus townsendi, n. sp.—♀ scale 1- $1\frac{1}{2}$ mm. diam., circular or slightly oval, quite flat, thin, grayish-white or nearly transparent; exuviae central or nearly so, covered, round, pale orange, with the first skin sublateral on the second. ♂ scale similar but smaller and elongate, with the exuviae towards one end. ♀ orange, subcircular, sometimes reniform, 4 groups of ventral glands, cephalolaterals 4 to 8, caudolaterals 5. Two pairs of rounded lobes, median largest, not contiguous. Plates forming a scaly fringe. Piedras Negras, Mexico, on leaves of an undetermined plant (Townsend). Near to *A. uvae*, Comst.

A. nigropunctatus, n. sp.—♀ scale subcircular to suboval, 3 mm. diam., only slightly convex, dirty gray; exuviae sublateral, pitch black, with a narrow reddish margin. Exuviae covered by a film of white

secretion, easily deciduous. ♀ orange-brown, oval, 5 groups of ventral glands, 4 pairs of lobes, saccular glands between the lobes, many oval dorsal pores. Median lobes close together but not touching. Plates not conspicuous. On bark of some tree, San Luis Potosi, Mexico (Townsend). Near to *A. obscurus*, Comst.

A. yuccae, n. sp.—♀ scale small, about 1 mm. or a little more in diameter, oval, moderately convex, dirty whitish, with the covered inconspicuous pale brown exuviae to one end. When rubbed, the exuviae appear shiny dark brown or black, very conspicuous. ♀ nearly circular, 3 pairs of lobes, all low; the median ones largest, rounded, broad, not contiguous, the other two pairs rudimentary. Spine-like plates, much longer than the lobes. Anal orifice less than its length from hind end. No grouped ventral glands seen. On Yucca, Ciudad Porfirio Diaz, Mexico (Townsend). Near to *A. bowreyi*, Ckll.

A. duplex, n. sp.—♀ scale about $2\frac{3}{8}$ mm. diam., subcircular, moderately convex, dark blackish-brown with the large round exuviae nearly to one side and orange. ♀ pale orange, 4 pairs of lobes, the median very large, with parallel sides, the others small; plates scale-like. 5 groups of ventral glands, caudolaterals of about 30, cephalolaterals 42, median 2. Tokio, Japan (Takahashi). Near to *A. theae*, Mask. *A. duplex* was also found by Mr. Ehrhorn on camellia in a Japanese nursery at San Francisco, and by Mr. Craw on orange trees from Japan.

A. secretus, n. sp.—♀ scale white, shiny, exuviae shiny, very pale yellow, rather large, not covered, placed to one side. ♀ nearly round, mouth-parts far posterior; 3 pairs of lobes, median large, strongly diverging, 2nd lobes obscurely trilobed, 3rd lobe a long way from the second. Apparently no plates, and no groups of ventral glands. Crowded under the epidermis of bamboo, Tokio Japan (Takahashi).

A. albopunctatus, n. sp. or var.—♂ scale

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

PS Subscriptions not discontinued are considered renewed.

PS Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.
Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

PS Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danaus archippus</i> . Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichthyology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> . col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

THE HIBERNATION OF APHIDES.

BY CLARENCE M. WEED, DURHAM, N. H.

[Annual address of the retiring president of the Cambridge Entomological Club, 14 February, 1896.]

In latitudes where winter is a period of protracted cold, a successful mode of passing through it is of first importance to all animals that cannot follow the swallow with the changing season. Such creatures must not only endure the low temperatures to which they are subjected, but also must so protect themselves that a certain proportion of them, at least, shall escape the attacks of the various enemies that are abroad during this long period of forced inactivity. With insects successful hibernation is of vital importance, and each species appears to have chosen (largely through the action of natural selection) the safest method of passing through. A vast number of them hibernate in the egg state; many in the larval state; many as pupae; and a considerable proportion as adults. Not infrequently the same species may hibernate in two or more of these conditions. In such cases it is evident that if the insect in one stage suffers more loss than in the other, the latter — other things being equal — will gradually replace the former as the hibernating condition.

The aphides furnish an interesting illustration of the various methods the different species of a single family may

adopt to pass the winter. The normal life-history of these little creatures may be briefly summarized as follows. In the spring there hatches from an egg deposited the autumn previous, a little aphid that sucks the sap of its food plant for a number of days — sometimes a fortnight — before it becomes full-grown. During this period of growth, it molts or sheds its skin a number of times to provide for its rapidly increasing size. This insect is sometimes called the stem-mother. She is always wingless. Soon after reaching maturity she commences to give birth to living young, continuing the process usually for several days. These young are most commonly born naked, but in some species they are surrounded by a thin pellicle which ruptures soon after birth. They resemble the stem-mother in general appearance, being of course much smaller. Each soon begins sucking sap on her own account, and in the course of ten days or a fortnight becomes mature. It then begins bringing other aphides into the world: these soon mature and give birth to a third generation. All of the individuals of these early broods are parthenogenetic females giving birth to living young without the

presence of males. Many of them are provided with wings but the majority are wingless. This method of reproduction is continued throughout the warm season, but on the approach of cold weather a true sexual generation is produced, the males of which may be either winged or wingless while the females are always wingless. Sexual union between these two forms takes place, and the females deposit true eggs. These pass through the winter, and in spring hatch into stem-mothers which renew the cycle of existence.

The great majority of aphides pass through the winter in the egg state. This is doubtless the safest way, for even supposing the viviparous or sexed forms capable of enduring intense cold, they would be much more liable to be eaten by birds, scattered by winds or washed away by floods, than the eggs. The latter are nearly always at least partially secured against these vicissitudes, although doubtless millions of them perish from exposure to the elements, or are gobbled up by the hungry beaks of chickadees and other winter birds. But as a rule the eggs are so small and so carefully stowed away, that a sufficient number to propagate the species survive all perils.

Perhaps as simple a method of providing for the eggs as any is that adopted by a handsome yellow Callipterus (*C. discolor* Monell) which I studied in Illinois a few years ago. This species lives on the under side of oak leaves, particularly the Burr Oak (*Quercus macrocarpa*) generally on

limited colonies. In autumn a sexed generation is produced, the males having wings and the oviparous females being provided with a long, tapering ovipositor by means of which they push the eggs through the dense pubescence on the under side of the leaf, generally fastening it firmly against the mid-rib. Many of these leaves remain on the tree until quite late in spring; and it is fair to presume that a sufficient proportion of the aphides hatch before the leaves fall off, climb upon the twigs and begin sucking at the buds, although this has not so far as I know been observed. The eggs are certainly safer hidden in the pubescence of the leaves, from observation by birds, than they would be upon the twigs.

From fastening the egg to the leaf to attaching it to the bark of the twig is a short step, and one which appears to have been taken by a majority of the aphides affecting trees and shrubs. In many cases it has naturally resulted from the insects being compelled to migrate to the twigs by the early falling of the leaves. In many of the states in the valleys of the Mississippi and its tributaries where the Box Elder or Ash-leaved Maple (*Negundo aceroides*) is abundant, its foliage is often infested by a small aphid of the genus Chaitophorus (*C. negundooides*). In autumn the sexed forms leave the falling leaves and congregate in great numbers on the twigs. The males are wingless little creatures with slender flattened bodies, barely two millimeters in length, and

long legs and antennae. The egg-laying females are larger and have much broader bodies. They deposit their eggs irregularly upon the bark of the twigs, especially about the buds. The eggs are elliptical-ovoid, less than one millimeter long, greenish or yellowish brown when first laid, but gradually changing to shining black.

There is a pretty little aphid (*A. enonymi*) living upon the under surface of the leaves of the shrub called Burning Bush (*Enonymus atropurpureus*). In autumn the oviparous females congregate on the twigs and deposit their eggs in the crevices about the buds. A curious little Callipterus which I found commonly on the leaves of Beech in central Ohio a few years ago also repairs to the bark for oviposition, but is much more careful in concealing the eggs. The viviparous colonies are found late in summer and early in autumn on the under sides of the leaves, with more or less flocculent matter about them. The sexed forms develop during October, and the oviparous females wander over the bark of the twigs, limbs, and trunk, in search of crevices in which to deposit their eggs. When a suitable place is found the egg is laid, and is then driven into position by the following method. The insect so places herself that her hind legs easily touch the egg; then standing on her four front legs, she brings the two hind ones down upon the egg in rapid succession, striking with considerable force. This serves the double purpose of pushing the egg into place,

and of drawing out a viscid secretion with which it is covered into a thread-like silvery film so similar to the surrounding bark that it is difficult to detect the difference. A minute and a half to two minutes are spent in this process.

Recent observations have shown that a number of species of aphides live upon various trees during autumn, winter, and spring, but for the summer season migrate to more succulent herbaceous plants. The best authenticated example of this is the Hop Aphid (*Phorodon humuli*) which was carefully studied both in Europe and America by Dr. C. V. Riley. The life-history of the species is briefly this. The insect passes the winter in the egg state on plum trees. In spring each egg hatches into a small aphid that sucks the sap from the expanding leaves. This is the so-called stem-mother. She becomes full-grown in a week or two and then begins bringing forth living young at an average rate of about three each day, continuing the process until she has become the mother of a hundred or more rapidly developing aphides. Each of these in turn gives birth to other young in the same way. Three generations of these parthenogenetic forms are produced upon the plum, the last becoming winged and deserting the trees to search for hop plants. On finding them these winged migrants light upon the under sides of the leaves where they start colonies; and the species continues developing upon the hop plant throughout the summer. In early autumn an-

other winged generation is produced, which migrates back to the plum (on which account these forms are sometimes called return-migrants), where each settles upon a leaf and gives birth to three or more young that develop into sexual oviparous females. About the same time winged males are produced upon the hops. They also migrate to the plum where they mate with the oviparous females. The latter deposit the winter eggs upon the twigs about the buds; and on the advent of cold weather all forms but the eggs perish. There is no doubt that a considerable number of the aphides commonly affecting trees and shrubs have a somewhat similar history. For instance our common apple aphid (*A. mali*) spends the summer upon grasses, where they continue breeding until autumn, when they return to the apple, and the winged females establish colonies of the wingless egg-laying form upon the leaves. The males fly in from the summer host-plant. The eggs are then laid on the twigs and buds and the cycle for the year is completed.

The aphid commonly affecting cherry trees (*Myzus cerasi*) has a similar history. It winters over on the twigs in the egg state. Early in spring the young aphides hatch and crawl upon the bursting buds, inserting their tiny sap-sucking beaks into the tissues of the unfolding leaves. In a week or ten days they become full-grown and begin giving birth to young lice, which also soon develop and repeat the process, increasing

very rapidly. Most of the early spring forms are wingless but during June great numbers of the winged lice appear, and late in June or early in July they generally leave the cherry, migrating to some other plant, although we do not yet know what that plant is. Here they continue developing throughout the summer, and in autumn a winged brood again appears and migrates back to cherry. These migrants give birth to young that develop into egg-laying females which deposit small, oval, shining black eggs upon the twigs.

While the aphides affecting deciduous trees commonly live upon the leaves and deposit eggs upon the buds, the rule is reversed in the case of some species found upon conifers. For instance the large Lachnus (*L. pini*) occurring upon the twigs of Scotch Pine deposits eggs in longitudinal rows upon the leaves. The handsome White Pine Lachnus (*L. strobi*) has also a similar habit. Like most plant-lice, this species reproduces viviparously, or by giving birth to living young, during the summer, but on the approach of cold weather the sexual individuals are produced. During October these are usually the only forms present, the oviparous females being congregated in great numbers upon the bark of the smaller branches, with their heads directed towards the trunk of the tree. When disturbed they move about rapidly, usually attempting to conceal themselves on the other side of the branch.

At such times they also wave their long hind legs in the air, probably to frighten away predaceous or parasitic enemies. The males are winged and the oviparous females wingless. The eggs are deposited in longitudinal rows on the White Pine leaflets. Each egg is not quite one-tenth of an inch long, elongate-oval, brownish when first extruded but soon changing to shining black.

Besides the aphides living upon leaves and ovipositing upon twigs, and those living upon twigs and ovipositing upon leaves, there are many species which both live and oviposit upon the twigs. Several such forms occur upon willow, the prettiest one being the Spotted Willow Aphid (*Melanoxanthus salicis*). This insect lives over winter in the egg state on the bark of willow twigs. Early in spring the eggs hatch into young plant-lice which insert their tiny beaks into the tender bark and suck out the sap. They grow rapidly, and each one soon becomes the mother of several young aphides. The generation from the egg are all wingless, but those of the second generation probably develop into both winged and wingless forms, which are also viviparous. Successive broods continue to appear throughout the entire summer, all being viviparous, and some having wings while others have none. By mid-

summer they have often increased so enormously as to cover all the twigs of infested trees, making them appear filthy and unsightly, as well as impairing their vitality by extracting the sap. In autumn a sexed generation is produced, the males of which may be either winged or wingless. In Ohio I have found only winged males, while in New Hampshire I found both forms, the apterous ones being much the more

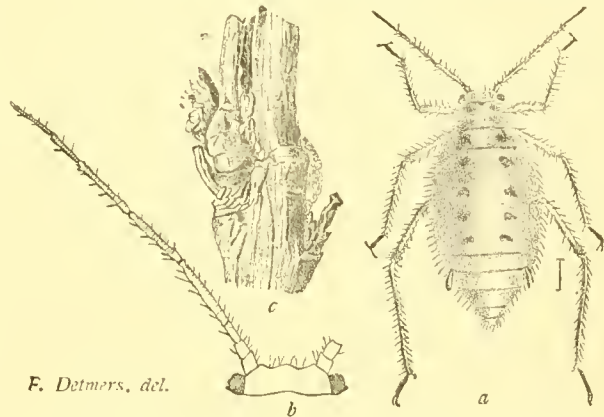


Fig. 1. Flocculent Willow Aphid: *a*, oviparous female—enlarged; *b*, head and antennae of same—greatly enlarged; *c*, eggs on willow bark—one-half larger than natural sizes.

abundant. The oviparous females congregate in one or a few places for purposes of oviposition. In such situations they often cover the bark with their eggs. When first laid each egg is coated with a sticky liquid that dries into a thin, grayish, irregular covering, closely resembling the willow bark in appearance.

Another species, closely resembling the spotted one, and called the Flocculent Willow Aphid (*M. flocculosus*) lives upon the Gray Willow in floccu-

lent colonies, so closely resembling the bark that they are difficult to detect. The males of this species are wingless. The oviparous females seem to take more care than do the spotted ones in depositing their eggs in the crevices of rough bark where the peculiar whitish covering of each helps greatly to conceal it.

There are two other aphides of the genus *Melanoxanthus* which live upon willow twigs but differ from those mentioned above in habits of oviposition. The Bicolored *Melanoxanthus* (*M. bicolor*) is a rather rare species found in many of the western States. The males are winged, and the yellowish brown oviparous females deposit their eggs in the crevices about the buds: the latter after a short exposure to the air become shining black with none of the flocculent covering found on the eggs of the other species. The most abundant member of the genus is that sometimes called the Willow Grove Aphis (*M. salicis*) which is similar to the spotted form, but without the conspicuous white spots. It lives in large colonies on the twigs and branches. The winged males and oviparous females develop in autumn, and the latter oviposit on the twigs about the buds.

One of the largest aphides living upon twigs is the Sycamore Lachnus (*L. platanicola*) which occasionally becomes extremely abundant in many sections of the United States. The sexed forms appear early in autumn, and eggs are deposited in enormous numbers upon the bark.

Some of the aphides affecting herba-

ceous plants complete their yearly cycle upon them. The large reddish brown species (*Nectarophora rubbeckiae*) so commonly found upon composite plants of the genus *Solidago* and *Lactuca* is one of these. In studying its autumn history in Illinois a few years ago, I found that the sexed forms developed during October, the males having wings. Eggs were occasionally deposited upon the old stems of wild lettuce (*Lactuca canadense*), but much more commonly upon the under leaf surface of the young, first-year plants of *Lactuca* and the closely allied *Muhlenbergia*. Evidently the chances of survival and future development are better in the case of the eggs deposited upon the leaves of young biennials or perennials, than of those fastened to the old stems which are liable to be broken off and blown or washed away, so that if the eggs survived the young aphides would not be likely to find suitable food at hand. In such cases a system of natural elimination must tend toward the preservation of the forms ovipositing upon the young plants.

Perhaps the most remarkable fact connected with the hibernation of aphides is that of the preservation of the eggs through the winter in the nests of ants. This was discovered long ago by Huber, and has since been abundantly confirmed by Schmarda, Lubbock and others. Huber's account is so interesting, and apparently so little known, that I quote it at some length* :—

* The Natural History of Ants by M. P. Huber. Translated by J. R. Johnson. London, 1820, pp. 240-245.

One day in November, anxious to know if the yellow ants began to bury themselves in their subterranean chambers, I destroyed with care one of their habitations, story by story. I had not advanced far in this attempt, when I discovered an apartment containing an assemblage of little eggs, which were for the most part of the color of ebony. Several ants surrounded and appeared to take great care of them, and endeavored, as quickly as possible, to convey them from my sight. I seized upon this chamber, its inhabitants, and the treasure it contained.

The ants did not abandon these eggs to make their escape; a stronger instinct retained them. They hastened to conceal them under the small dwelling which I held in my hand, and when I reached home I drew them from it to observe them more attentively. Viewed with a microscope they appeared nearly of the form of ants' eggs, but their color was entirely different. The greater part were black; others were of a cloudy yellow. I found them in several ant-hills, and obtained them of different degrees in shade. They were not all black and yellow; some were brown, of a slight and also of a brilliant red and white; others were of a color less distinct, as a straw color, greyish, etc. I remarked they were not of the same color at both extremities.

To observe them more closely I placed them in the cover of a box faced with glass. They were collected in a heap like the eggs of ants. Their guardians seemed to value them highly; after having visited them they placed one part in the earth, but I witnessed the attention they bestowed upon the rest: they approached them slightly separating their pincers; passed their tongue between each, extended them, then walked alternately over them, depositing I believe a liquid substance as they proceeded. They appeared to treat them exactly as if they were the eggs of their own species; they touched them with their antennae, and frequently carried

them in their mouths. They did not quit these eggs a single instant; they took them up, turned them, and after having surveyed them with affectionate regard conveyed them with extreme tenderness to the little chamber of earth I had placed at their disposal. They were not, however, the eggs of ants; we know that these are extremely white, becoming transparent as they increase in age, but never acquire a color essentially different. I was for a long time unacquainted with the origin of those of which I have just spoken, and by chance, discovered that they contained little pucerons; but it was not these individual eggs I saw them quit, it was other eggs which were a little larger, found in the nests of yellow ants, and of a particular species. On opening the ant hill I discovered several chambers containing a great number of brown eggs. The ants were extremely jealous of them, carrying them away, and quickly, too, to the bottom of the nest, disputing and contending for them with a zeal which left me no doubt of the strong attachment with which they regard them.

Desirous of conciliating their interests as well as my own, I took the ants and their treasure and placed them in such a manner that I might easily observe them. These eggs were never abandoned. The ants took the same care of them as the former. The following day I saw one of these eggs open, and a puceron fully formed, having a large trunk, quit it. I knew it to be a puceron of the oak; the others were disclosed a few days after, and the greater number in my presence. They set immediately about sucking the juice from some branches of the tree I gave them, and the ants now found within their reach a recompense for their care and attention.

This recompense consisted in the liquid "honey-dew" excreted by the aphides.

Huber following Bonnet thought that these aphid eggs consisted simply of a pellicle containing a developed aphid, that "the insect in a state nearly perfect quits the body of its mother in that covering which shelters it from the cold in winter, and that it is not as other germs are, in the egg surrounded by food, by means of which it is developed and supported." But this is erroneous, as these are true eggs, a fact which has already been pointed out by Lubbock and many other naturalists.

A species of aphid living upon the English Daisy was found by Sir John Lubbock to deposit, in autumn, eggs upon the leaf-stalks. These eggs were taken by the common yellow ants to their formicaries where they were "tended by them with the utmost care through the long winter months, until the following March, when the young aphides which hatch are brought out and again placed upon the young shoots of the daisy." This eminent naturalist adds: "This seems to me a most remarkable case of prudence. Our ants may not perhaps lay up food for the winter; but they do more, for they keep during six months the eggs which will enable them to procure food during the following summer, a case of prudence unexampled in the animal kingdom."

The instances above cited relate to aphides living upon plants outside of the nests of the ants. But there are certain species living underground in care of the ants, whose eggs are similarly tended. For many years an insect called the Corn Root-aphid (*A. maidi-*

radicis) was destructive to Indian corn in many of the western States. It was found from spring to autumn upon corn roots, always tended by the little Brown Ant (*Lasius sp.*) which dug channels for it and cared for it in every way. The winter history of this aphid had proven a decided enigma to entomologists. No one had been able to find it during winter in any stage. Some years ago, while investigating this subject under the direction of Professor S. A. Forbes, one day late in April, I came across a mass of aphid eggs in a nest of the ant just mentioned—the formicary occurring in an old corn field in central Illinois—which were carried to the State Laboratory of Natural History. They hatched the next day into aphides that subsequently developed into the species in question. Many similar observations were subsequently made at the conclusion of which I summarized the life-history of the insect as follows:—

During the first warm days of spring, usually before the ground is plowed, there hatch from the eggs small greenish lice that are transferred by the ants to the roots and radicles of *Setaria* and *Polygonum*, where they are carefully tended by the ants. In about a fortnight these young have become adult stem-mothers and give birth to quite a number of young. In the meanwhile the ground has probably been plowed, and some crop sowed. In case this crop is corn the ants transfer the lice to the corn roots; but if it is oats or wheat they may continue to rear the lice on *Setaria* and *Polygonum*. The young from these stem-mothers become adult in about a fortnight, and some of them are apterous and others winged. The winged

specimens fly to other hills either in the same or neighboring fields, where the ants are waiting to receive them and proceed to establish colonies. This second generation bring forth viviparous young (mostly wingless); and generations of viviparous females continue to develop on corn roots throughout the summer. In autumn the true sexes are produced (both being apterous), and the eggs are deposited by the oviparous females in the mines of the ant colonies. These eggs are cared for by the ants through the winter, and the young lice that hatch from them in spring are provided for as already described.*

While the above observations are sufficient perhaps to indicate that the great majority of aphides spend the winter in the egg state, it is by no means true that they all do so. There are many species in which so far as we can judge no sexed individuals or eggs are ever developed. One of these, which is often extremely abundant on the branches of alders in New England is the flocculent aphid (*Pvmphtigus tessellata*). This insect abounds throughout the summer months in the condition of parthenogenetic females; and in autumn enormous numbers of little aphides are produced. These migrate down the branches and trunk to the bases of the shrubs, where on the larger roots or among the leaves and rubbish they settle down for the long and dreary New England winter. No doubt millions of them perish or are washed away, but in spring those that are left crawl up the alder stems, and finding satisfactory positions insert their

beaks through the bark and begin to feed and grow. In a short time they mature and give birth to young. They secrete a large amount of flocculent material, causing affected branches to appear as if covered with a cottony vegetable growth. They are not usually attended by ants, and the large amount of "honey-dew" they excrete encourages the growth of a black fungus.

It has already been explained that the divers methods of hibernation adopted by the aphides may be explained by the principles of natural selection. With these insects we have all the essentials for the working of the method of elimination which permits only the fittest to survive. Individuals are produced in such enormous numbers that a large proportion of them may well be sacrificed without injury to the species.

The habit of migrating in summer from trees to herbs may also be explained in a similar manner. By so migrating the aphides obtain at least three important advantages, viz.: (1) escape from enemies; (2) more succulent food; (3) lessening the injury to, or even saving from destruction their host-plant. By returning to the trees when the herbs begin to die, they find a comparatively safe place for the deposition of their eggs. In both the spring and autumn migrations the laws of natural selection would find opportunity to operate.

To bring out more clearly the bearing of the laws of natural selection upon

* Bulletin Illinois State Laboratory of Natural History, v. III, art 3.

the facts of aphid hibernation as we find them to-day, we will briefly review the methods outlined in the previous pages and apply to each these principles.

For our present purpose Professor Lloyd Morgan's term 'natural elimination'* is more lucid than Darwin's 'Natural Selection.' Reduced to its simplest form this theory rests upon the fact that "in every generation of every species a great many more individuals are born than can possibly survive; so that there is a perpetual battle for life going on among all the constituent individuals of any given generation. Now in this struggle for existence, which individuals will be victorious and live? Assuredly those which are best fitted to live: the weakest and least fitted to live will succumb and die, while the strongest and best fitted to live will be triumphant and survive."†

Among the lower animals it is often not so much a struggle between the individuals of a species, as it is with other species and the natural conditions of existence; not so much a matter of what Morgan calls selection proper,—involving the element of individual or special choice,—as it is a matter of natural elimination. "And the factors of elimination are three: first, elimination through the action of surrounding physical or climatic conditions, under which head we may take such forms of disease as are not due to living agency; elimination by enemies, including para-

sites and zymotic diseases, and thirdly, elimination by competition."*

In applying these factors to explain the hibernation of aphides we must bear in mind the prodigious powers of multiplication possessed by these insects,—because of which the autumn progeny of a single stem-mother may amount to millions of individuals. We must also remember that on account of the crowding caused by this rapid rate of multiplication, it must often happen that the oviparous females are compelled to deposit their eggs in all sorts of situations upon the food-plant; and that to-day, even when no crowding occurs, the oviparous females often exhibit a considerable diversity in habits of oviposition.

The eliminating agencies with which most aphides in their hibernating condition have to contend appear to be chiefly confined to the action of climatic conditions and natural enemies. A large proportion of the eggs deposited upon smooth bark without special protection must be blown off by winds, or washed away by rain or melting snow and ice. Species which like the Oak Callipterus and the White Pine Lachnus live upon trees the leaves of which remain upon the branches until the following spring have a decided advantage in oviposition because their eggs are less exposed to dangers of this kind than those which are simply consigned to the bark. This is particularly true of

* Animal Life and Intelligence, p. 80.

† Romanes, Scientific Evidences of Organic Evolution, p. 3

* Morgan, l. c., p. 80.

the oak species, the eggs of which are much more snugly ensconced than those of the Pine Lachnus. In the case of many bark-depositing species, which develop on the leaves, it is easy to see that the elimination of the unfit is still taking place, and that there is an enormous waste of individuals which might be saved by a more perfectly developed old-fashioned 'instinct.' The Apple Aphis, for example, perishes in great numbers every autumn by the falling of leaves containing developing colonies of the oviparous form; such leaves not only bear immature specimens of this form, but often also adults which have not migrated to the twigs with sufficient promptness. This loss is due largely to the lateness of the arrival of the return migrants to the apple foliage, and would be to a considerable extent at least prevented by the earlier development of the latter upon their summer host. The oviparous forms also exhibit even now considerable diversity in sites chosen for oviposition, many eggs being deposited upon smooth bark, although the great majority are placed about buds or in the interstices of rough bark. The action of elimination must evidently tend toward the preservation of the latter and the destruction of the former.

The case of the Beech Callipterus described above is evidently an illustration of a much more perfectly developed instinct than is exhibited by the ordinary twig-depositing species. In this case each egg is carefully placed

in a specially chosen site, and is then not only securely fastened in position, but also concealed from view.

The four species of *Melanoxanthus* mentioned on preceding pages as living upon willow twigs furnish an interesting illustration of the gradual perfection of habits of oviposition of species of one genus. The first species (*M. saliciti*) oviposits on smooth bark and about the buds, eggs being developed in great numbers. The second species (*M. bicolor*) confines itself as a rule to the region of the buds; in both these the eggs are plain black with no protective covering. In *M. salicis* a decided step in advance has been taken: the oviparous forms congregate upon the gray bark of the trunk and larger branches and deposit their eggs side by side over a considerable area. The sticky covering with which most aphid eggs are provided when first extruded is here abnormally developed. It serves to hold the eggs more firmly in place and also, on drying, leaves a thin gray coating which gives an appearance so similar to the surrounding bark that the eggs are visible only by the closest scrutiny. In *M. flocculosus* this is carried a step farther, the protective covering being more perfectly developed and the insects apparently choosing rougher bark where there are more interstices in which to conceal the eggs.

It is less easy to account for the origin of the method of hibernation adopted by those species whose eggs are kept through the winter by ants in their nests. It seems most prob-

able that the ants first acquired the habit in the case of the underground species like the corn root-aphis. The oviparous females of this form wander through the galleries of the formicary, occasionally extruding an egg and then die. Of course any suggestions as to how the first eggs came to be carried through the winter can only be speculative. It apparently is not impossible that the ants noticed some quality about the eggs as they were first extruded which led them to recognize them as a part of their food-giving pets; or possibly the first eggs were overlooked and allowed to pass the winter where the mother aphid deposited them, and been discovered in spring at the time the aphides were hatching; or the eggs may have been first stored up for food, and the surplus left over in spring have hatched. However the habit may have originated it evidently is so useful to all it would be fostered. Having once become an established routine of the ants' yearly cycle, it is not difficult to imagine that they would recognize the eggs of aphides

living above ground, especially those living in covered outside tunnels of the ants, and thus gradually develop the habit of carrying the eggs in and the resulting young out.

Passing now for a moment to the group of aphides whose hibernating condition is exemplified by the Woolly Aphis of the alder (p. 359) it is easy to see how natural elimination may have brought about the existing conditions. This species appears never to develop any eggs: consequently it must pass the winter in some living stage. The colonies of viviparous forms are constantly bringing forth multitudes of living young which of course are more abundant in autumn than at any other season. The crowding produced by numbers would often compel them to wander over all parts of the shrub. Those reaching late in autumn the bases of the main stems would stand a much better chance of surviving the effects of wind, snow, rain and ice than those on other parts of the tree. This constant elimination of the unfit and the 'inherited memory' of the fit would lead to present conditions.

OVIPOSITION AND HATCHING OF *THANAOS JUVENALIS*.

May 16, 1894, I followed a specimen of *T. juvenalis* which was apparently searching for a food plant among the scrub oaks of Middlesex Fells at Malden, Mass. The insect flew down to the base of a small, six-inch seedling of *Quercus alba* and laid a single egg upon the stem of the plant, an inch from the ground, among the tender, reddish,

scale-like leaves. The act of oviposition lasted about ten seconds, during which the insect's wings were folded back to back, her fore-feet grasping the stem, while the mid- and hind-feet were rubbed quickly together and along the sides of the abdomen, appearing to assist the process of egg-laying. This occurred on a warm, sunny day, an hour before noon. The egg, delicately greenish when laid, soon became white and within twenty hours was orange in color. Seen

laterally, it was well-rounded, broadest just above the little-flattened base, with low, longitudinal, raised ribs connected by delicate, transverse ridges. The longitudinal ribs were sixteen in number, of which four pairs, each consisting of two ribs uniting near the summit at a sharp angle, enclosed within the four loops thus formed from one to three shorter ribs. Diameter, 1.27 mm. Nine days after deposition the egg began to hatch, one rainy forenoon, having become darker and finally of a brassy color, the shell being transparent between the ribs. The larva intermittently gnawed an opening at the micropyle, then started a second hole which at length coalesced with the first one. Although the aperture thus formed was large enough, the larva did not emerge but began two more openings on the side of the egg-shell. The shell had become shrunken and distorted, meanwhile. I watched the progress of hatching, or rather, lack of progress, for two days, at intervals. The caterpillar's method of work was to eat for ten minutes

and then to rest for forty-five, and when I made investigations during an unusually long rest, I found that the larva had died.

At Prospect Hill, Waltham, Mass., June 10, 1894, I enclosed a suspicious acting *T. juvenalis* alive in a small pasteboard box in which she soon laid a single egg, the hatching of which I did not witness, however. This female also had been fluttering about seedling white-oaks in an inquisitive way.

Justus W. Folsom.

NOTES.—A new monthly journal of entomology has appeared in Tokyo, Japan, under the title *Konchū Gaku Zasshi*, or Journal of Insect Science. The first number was issued in October last and is wholly in Japanese excepting an English title and the statement that the plate represents insects injurious to rice and mulberry.

In the Kansas University Quarterly for January, W. A. Snow gives a list of N. A. Asilidae supplementary to Osten Sacken's Catalogue.

Just Published, by Henry Holt & Co., New York.

Scudder's Brief Guide to the Commoner Butterflies.

By SAMUEL H. SCUDDER. xi + 206 pp. 12mo. \$1.25.

An introduction, for the young student, to the names and something of the relationship and lives of our commoner butterflies. The author has selected for treatment the butterflies, less than one hundred in number, which would be almost surely met with by an industrious collector in a course of a year's or two year's work in our Northern States east of the Great Plains, and in Canada. While all the apparatus necessary to identify these butterflies, in their earlier as well as perfect stage, is supplied, it is far from the author's purpose to treat them as if they were so many mere postage-stamps to be classified and arranged in a cabinet. He has accordingly added to the descriptions of the different species, their most obvious stages, some of the curious facts concerning their periodicity and their habits of life.

Scudder's The Life of a Butterfly.

A Chapter in Natural History for the General Reader.

By SAMUEL H. SCUDDER. 186 pp. 16mo. \$1.00.

In this book the author has tried to present in untechnical language the story of the life of one of our most conspicuous American butterflies. At the same time, by introducing into the account of its anatomy, development, distribution, enemies, and seasonal changes some comparisons with the more or less dissimilar structure and life of other butterflies, and particularly of our native forms, he has endeavored to give, in some fashion and in brief space, a general account of the lives of the whole tribe. By using a single butterfly as a special text, one may discourse at pleasure of many; and in the limited field which our native butterflies cover, this method has a certain advantage from its simplicity and directness.

THE SEVENTH VOLUME OF PSYCHE

Began in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

Vols. 1-6, Complete, Unbound, - Now sold for **\$29.00.**
 Vols. 1-6, and Subscription to Volume 7, - - - **\$33.00.**

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

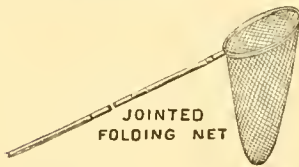
- Vol. 1. Introduction; Nymphalidae.
 Vol. 2. Remaining Families of Butterflies.
 Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo, half levant, \$75.00 *net*.

HOUGHTON, MIFFLIN & CO.,

4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.

JOHN AKHURST,

A XIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.
 78 Ashland Place,

BROOKLYN, N. Y.

black, conspicuous, exuviae marked by a white dot surrounded by a whitish ring. ♀ scale extremely inconspicuous. No groups of ventral glands. 2 pairs of lobes. On twigs of orange seedlings from Japan (Craw). In all its characters this is almost exactly like *A. perniciosus*, and would have been assumed to be that but for the locality and food-plant. It is another "physiological species," like *A. coloratus* or the West Indian form of *A. aurantii*. The true *perniciosus* never attacks orange trees in California, nor is it found on the deciduous fruit-trees from Japan which have passed through Mr. Craw's hands, nor in Takahashi's collections.

Chionaspis difficilis, n. sp.—♀ scale about 2 mm. long, irregular, from round to subelongate, moderately convex, white; exuviae to one side, 2nd skin black or nearly so, 1st skin pale straw yellow. ♂ scale white, tricarinate. ♀ orange-rufous, becoming bluish-green when boiled in soda. 5 groups of ventral glands, caudolaterals 43, cephalolaterals 41-43, median about 37. Median lobes large, diverging; second and third lobes notched; plates spine-like, large. On *Elaeagnus* from Japan (Craw). This is a very *Diaspis*-like *Chionaspis*.

C. latus, n. sp.—Allied to *C. braziliensis*, with a tricarinate white ♂ scale, and a broad pyriform red-brown ♀ scale. The broad flat scale readily distinguishes it. On leaves of orange, Tokio, Japan (Takahashi).

C. bambusae, n. sp.—♀ scale white, elongate-pyriform, exuviae pale straw yellow, second skin with an orange spot at the tip. In size, shape and color it is like *C. vaccinii*, but it differs in the number of glands in the ventral groups, etc. On leaves of bamboo, Tokio, Japan (Takahashi).

Mytilaspis carinatus, n. sp.—♀ scales

something like *M. citricola*, but narrower and with a pronounced median longitudinal keel. 4 groups of ventral glands, of about 4 orifices each. Lobes small. Some large spine-like plates. Saccular glands along the pygidial margin. Rows of elongate pores marking the obsolete segments. On a plant like *Anthurium* from Central America (Craw).

M. crawii, n. sp.—♀ scale narrow, about $2\frac{1}{2}$ mm. long and $\frac{1}{2}$ mm. wide, slightly curved, pale orange yellow, exuviae concolorous. Four groups of ventral glands, caudolaterals of 3, cephalolaterals of 4. Median lobes very large, rounded at ends, their edges finely serrate. Beneath the epidermis of leaves of *Elaeagnus* from Japan (Craw).

Parlatoria theae, n. sp.—♀ scales on bark, very inconspicuous, about $1\frac{3}{8}$ mm. long, oval in outline, slightly convex, pale ochreous, with the 2nd skin black or nearly so. Removed from the twig they leave a white mark. ♀ (after boiling) colorless, lobes pale ochreous. Median lobes trilobed. 4 groups of ventral glands, with a single median one. Caudolaterals 8, cephalolaterals 20. On tea-plant, Japan (Takahashi).

P. theae var. *viridis* v. nov. vel n. sp.—♀ scale about $1\frac{1}{2}$ mm. long, nearly circular, but the exuviae projecting at one side. Scale white with a more or less pronounced grayish yellow tinge, exuviae dark greenish to black. ♀ (in soda) bluish-green with the pygidial area pale orange and the region about the mouth suffused with brown. Five groups of ventral glands, caudolaterals 16 to 17, cephalolaterals 9 to 16, median 1 to 4. On bark of twigs of an ornamental plant from Japan (Craw). The tips of the median lobes are more produced than in *theae*.

XI. SOME SPECIES OF OXYBELUS FOUND IN NEW MEXICO.

BY T. D. A. COCKERELL AND C. F. BAKER.

Oxybelus quadricolor, n. sp.—Female: About 10 mm. long, black with red and creamy-white markings, strongly punctured. Head rather large, somewhat broader than

long seen from in front, closely punctured, the punctures very fine and close on the face. Mandibles black, or so dark brown as to seem so. Pubescence short, and inconspicuous except on front, sordid silvery. A tubercle on vertex. Occiput simply punctate. Antennae with flagellum becoming dark reddish-brown. Thorax closely punctured; prothorax with two elongate marks on superior margin, and the tubercles, white; mesothorax with the anterior portion dull red, the red extending about as far backwards as the level of the tegulae in the median line, but laterally narrowly beyond the tegulae; on the red portion with a weak median carina. Scutellum and postscutellum each with a median carina, that on the former rather weak. Squamae yellowish-white, with the external margins semi-transparent and radiately wrinkled, the terminal points stout and gently curved. Spine quite small, concave above, rapidly narrowed to an acute point, the sides straight. Metathorax above strongly, subreticulately, obliquely ridged; median area triangular, closed above, microscopically roughened within but shining and crossed by three or four weak transverse striae, acutely angled below, passing into a rather short median carina; lateral faces striato-punctate, the striae subobsolete below, strong above. Tegulae shining orange-brown, with an opaque whitish spot on anterior half. Wings hyaline, nervures piceous, marginal cell bluntly pointed, the apex directed away from the costal margin. Legs black, spurs dark brown; middle femora with a white spot at tip beneath; middle and posterior tibiae with a short white streak at base above, anterior tibiae with a very narrow white stripe extending about two-thirds of the length from the base but sometimes obsolete. Abdomen with interrupted cream-colored bands on segments 1-4; on the first segment the band is reduced to two transversely elongate patches, somewhat further apart than the transverse diameter of either; puncturing coarse and sparse on discs of segments, fine and close about margins. Pygidium rufous.

Hab.—Santa Fe, N. M., July 6, 1895, on a white flowered Umbellifer (Ckll., 3353). The specimen had previously visited an Asclepiad, as shown by the pollen masses adherent to the legs. Another example from Fort Collins, Colorado (Baker) differs in that the spine is longer, the points of the squamae more produced, and the puncturing coarser. Another from Las Cruces, N. M. (C. Rhodes, 149).

Oxybelus heterolepis, n. sp.—Male: About 7 mm. long, closely but rather coarsely punctured, black with yellow markings. Head about as broad as long seen from in front, strongly punctured, front and face covered with silvery pile. A slight protuberance on the vertex, but no well defined tubercle. Mandibles pale yellow except the dark tips. Antennae with the terminal half of the flagellum becoming rufous. Thorax without any red, closely punctured. Prothorax entirely black, except the pale yellow tubercles, in the middle of which is a dark (really hyaline) spot. Cheeks, pleurae and tubercles with short silvery pubescence; vertex and thorax above with short black pubescence. Scutellum and post-scutellum each with a median carina, that on the latter somewhat prominent throughout its length. Squamae with long slightly curved terminal points, semitransparent, yellowish white, separated by a distance as great as the base of either. Spine moderately elongate, narrow, practically straight, parallel sided grooved above, brownish, with the tip rounded and entire. Metathorax reticulate above; median area short, smooth within, open above, rounded below and passing into a long median carina; lateral faces striato-punctate. Tegulae and extreme base of wings rufous, the former with an obscure whitish spot. Wings hyaline, nervures dark brown, marginal cell obliquely truncate. Legs black, with the apices of all the femora reddish yellow, the tibiae yellow externally, and the tarsi yellow becoming rufescent at ends. The yellow of the middle tibiae is at about its middle half interrupted by a

rounded incursion of the black. Abdomen with weak lateral spines on segments 3-6; finely punctured, shining. Broadly interrupted yellow bands on segments 1-5, the interruption in each case takes the form of a broad wedge of black, so that the yellow marks come closest together at their distal margins, being thence obliquely truncate: this is most perceptible on the first two segments.

Hab.—Albuquerque, N. M., June 30, 1895, between the town and the University (Ckll., 3242).

Var. *defectus* n. var.—Abdominal bands reduced to spots, rounded or not obliquely truncate inwardly. The legs are darker, lighter portions inclining to rufescent in some specimens. Albuquerque (Ckll., 3231, 3243, 3229, 3239).

O. heterolepis was taken at Albuquerque on June 30 in some numbers, almost surely on flowers of *Fallugia paradoxa*, though unfortunately no record was kept of this. Most nearly related to *packardii*. In this species, however, the spine is not at all narrowed towards the tip; the lateral faces of metathorax are very sparsely punctured and the striae strong. It also differs in the shape of the squamae and the puncturing of the abdomen. If, on the examination of larger series, the var. *defectus* should prove distinct, it can be separated under the varietal name.

Oxybelus trifidus. n. sp.—Male: About 4.5 mm. long, black with dull orange markings, rather finely and closely punctured. Head about as broad as long seen from in front; front comparatively narrow, it and the face covered with silvery pile; vertex closely and roughly punctured; no tubercle. Mandibles yellow except the tips; terminal half of the flagellum rufescent. Prothorax all black, the margins of the tubercles only, slightly pallid. Mesothorax and scutellum strongly and coarsely punctured, on the mesothorax posteriorly becoming striato-punctate. Scutellum and postscutellum each

with a median carina. Squamae separated by a distance less than their breadth; large, broad, white, semitransparent, with rather strong acute lateral points which are bent under the squamae and about equal their tips. Spine short and very broad, of the *emarginatus* type, but the emargination filled in by a broad plate, so that the spine becomes actually trifid, or one might say truncate with two notches. Metathorax above with strong oblique ridges; median area elliptical, scabrous within, passing below into a median carina of moderate length; lateral faces striato-rugose. Tegulae and extreme bases of wings orange rufous. Wings hyaline, nervures brown, marginal cell obliquely truncate. Femora black except the orange-rufous tips beneath. Tibiae and tarsi dull orange-rufous, the middle and hind tibiae black on the inner side. Abdomen shining black, very closely and finely punctured, short blunt spines on lateral margins of segments 5 and 6 only. Narrow, interrupted orange bands on segments 1-4, those on 3 and 4 being linear, and very broadly interrupted. Segments 1-2 silvery margined posteriorly.

Hab.—Santa Fe, N. M., Aug. 1, 1895 (Ckll., 3997). This species is perhaps as nearly related to *mexicanus* as any. In the form of the spine and some other characters it differs from any described N. A. species.

Oxybelus coloradensis Baker.—A specimen of this species taken at Las Cruces (Ckll., 2436), was determined as *emarginatus* by Mr. Fox.

Oxybelus packardii Rob.—One at Albuquerque (Ckll., 4533). This was on *Cleome serrulata*, Aug. 15, 1895. At that date no *heterolepis* were found.

Oxybelus cornutus Rob.—Las Cruces, N. M., on *Solidago canadensis* Aug. 24, 1894 (Ckll., 2002) and Albuquerque, N. M., June 30, 1895, with *heterolepis*.

Oxybelus quadrinotatus Say.—Santa Fe, July and August; variable.

XII. NEW HOMOPTERA RECEIVED FROM THE NEW MEXICO AGRICULTURAL EXPERIMENT STATION.—II.

BY CARL F. BAKER.

Eutettix pulchella, n. sp.—Size and general appearance of *Eutettix (Phlepsius) strobi* Fb.

Male: Face two-thirteenths wider than long. Clypeus a half longer than broad, sides gently incurved towards the base, broadened beyond to nearly the width at base, tip truncate. Lorae a fifth longer and three-fourths the width of the clypeus. Genae broadly evenly emarginate below the eyes. Front a fourth longer than wide, two and a third times the length of the clypeus. Vertex rather sharply transversely depressed before the tip, the lip thus formed not strong but very obtusely rounded as viewed from the side; very obtusely rounded in front, length at middle but little greater than that at the eyes, width between the eyes two and an eighth times the length. Pronotum two and one-sixth times wider than long, length nearly twice that of the vertex, curvature seven-twelfths of the length. Plate short, very obtusely angled. Valves somewhat attenuate towards the tips, about four times the length of the plate, clothed on the outer edge with numerous long fine hairs and a few short weak spines.

Color: All beneath pale yellow, with very faint indications of transverse arcs on the front. Vertex back of groove, pronotum and scutel, even shining brown, the brown being thickly covered with small pale dots. The band on vertex may send forward four short more or less distinct points which are equidistant from the eyes and each other. Elytra whitish subhyaline, with brown areas which are thickly covered with fine pale vermiculations. These areas occur as follows: On all of clavus except outer margin of basal two-thirds; from apical third of clavus a clearly defined band passes to costal

margin of elytra, towards which it becomes narrower; from the middle of this band a subobsolete band extends to end of elytra, terminating in tips of two outer apical cells. The brown areas on basal half of elytra have sharply defined rather heavy contours. The nervures in basal half of corium are colorless, in apical half brownish. Dorsum of abdomen broadly black. Some of the leg spines darker. Length 4.5 mm.

San Augustine (Ckll., 2128, 2134, and 2144). I have also collected this species at Fort Collins, Colorado. The Colorado specimens vary from the typical form in having the brown above very dark, almost black, in being very much darker below, and in other minor points. The specimens of this species, with others of *seminuda*, a western variety of *seminuda*, and of *Phlepsius strobi*, form a most interesting series. *Strobi* must be placed in *Eutettix*, with the species of which genus it certainly shows the closest relationships. I hope the female will soon be obtained.

Thamnotettix tenella, n. sp.—Size and general appearance of *Thamnotettix caricis*, but the vertex is not so produced, and the general color is pale sordid yellowish. Length female 3.25 mm.

Female: Face little more than one-seventh wider than long. Front one-third longer than wide, little more than two times the length of the clypeus, sides slightly incurved at the antennae. Lorae as long and two-thirds as wide as the clypeus. Genae broad below the lorae, gently obtusely angled outwardly, from this to the angle of the eye, straight. Clypeus gently narrowed at the base, at the extreme tip somewhat narrowed and truncate. Vertex a third longer at the middle than next the eyes, the length three-



PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 240.

APRIL, 1896.

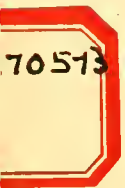
CONTENTS:

THE NEW ENGLAND MELANOPLI.— <i>Samuel H. Scudder</i>	367
ON COLEOPTERA FOUND WITH ANTS; THIRD PAPER.— <i>H. F. Wickham</i>	370
INSECT-VISION: PLATEAU'S EXPERIMENTS.	372

SUPPLEMENT TO PSYCHE, I — CONTRIBUTIONS FROM THE NEW MEXICO AGRICULTURAL EXPERIMENT STATION (New Homoptera received from the New Mexico Agricultural Experiment Station, II, cont., <i>C. F. Baker</i> ; new species of <i>Prosopis</i> , <i>T. D. A. Cockerell</i>).	25
--	----

PUBLISHED BY THE
 CAMBRIDGE ENTOMOLOGICAL CLUB,
 CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.
 [Entered as second class mail matter.]



Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

PS Subscriptions not discontinued are considered renewed.

PS Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

PS Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.38
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danais archippus</i> . Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichthyology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> . col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

THE NEW ENGLAND MELANOPLI.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

Some years ago (Proc. Bost. soc. nat. hist., xix, 281-286, 1878) I published a table for the determination of the New England species of *Melanoplus*, of which I enumerated six species. Several errors are to be found in the table, leading to much confusion, and I therefore offer here another, more in harmony with a revision of all the *Melanopli* of North America I shall shortly publish with illustrations. At the same time the other species of the group *Melanopli*, embracing all our New England Acrididae excepting *Schistocerca*, are added, including some species not then known to inhabit New England. Most of the additional species are due to the industrious and discriminating collections of Mr. A. P. Morse, in whose Preliminary List of the Acrididae

of New England (*Psyche*, vii, 102-108) all the thirteen species here enumerated will be found but sometimes under different names, my revision showing the necessity of several alterations. As the reasons for the changes will appear in my forthcoming paper, I will merely add here a list of the changes by reference to Morse's List.

<i>Morse's List.</i>	<i>Present List.</i>
Hesperot. viridis.	Hesperot. brevipennis.
Pezot. glacialis.	Podisma glacialis.
Pezot. scudderii.	Melanopl. scudderii.
Pezot. manca.	Melanopl. mancus.
Melanopl. junius.	Melanopl. extremus.
Pezot. borealis.	Melanopl. fasciatus.
Melanopl. bivittatus.	Melanopl. femoratus.
Paroxya atlantica.	Paroxya floridana.

The *Melanoplus rectus* of my former table is *M. fasciatus* of the present.

Table of the Genera of N. E. Melanopli.

- a¹. Pronotum much deeper than broad; subgenital plate of ♂ furnished with an apical postmarginal tubercle HESPEROTETTIX (*brevipennis*).
- a². Pronotum but little deeper than broad; subgenital plate of ♂ with no apical tubercle, or if present it involves the apical margin.
- b¹. Without trace of tegmina or wings PODISMA (*glacialis*).
- b². With longer or shorter tegmina and wings.
- c¹. Face less declivent than in the alternate category; dorsum of pronotum only half as long again as the average breadth even in the ♂; antennae, even in the ♂, shorter than the hind femora and not more than twice as long as the pronotum alone MELANOPLUS.

c². Face more declivent than in the alternate category; dorsum of pronotum twice as long as the average breadth, at least in the ♂; antennae, at least in ♂, generally longer than the hind femora, and much more than twice as long as head and pronotum together *PAROXYA (floridana)*.

Table of the N. E. Species of Melanoplus: Males.

- a¹. Tegmina no longer or scarcely longer than the pronotum.
- b¹. Interspace between mesosternal lobes fully twice as long as broad; median carina as distinct on the prozona as on the metazona; cerci stout, less than three times as long as middle breadth *scudderi*.
- b². Interspace between mesosternal lobes somewhat longer than broad; median carina less distinct on the prozona than on the metazona; cerci slender, at least four times as long as middle breadth *mancus*.
- a². Tegmina much longer than the pronotum, generally surpassing the abdomen.
- b¹. Furcula very much longer than the last dorsal segment from which it springs, usually a third as long as the supraanal plate.
- c¹. Subgenital plate with the apical margin notched *atlanis*.
- c². Subgenital plate with the apical margin entire.
- d¹. Distal half of cerci less than half as broad as the extreme base; interspace between mesosternal lobes twice as long as broad *femur-rubrum*.
- d². Distal half of cerci more than half as broad as the extreme base; interspace between mesosternal lobes not much longer than broad *extremus*.
- b². Furcula feebly developed, generally shorter, at most scarcely longer, than the last dorsal segment from which it springs.
- c¹. Cerci of nearly equal width and simple throughout *fasciatus*.
- c². Cerci of very unequal width or irregular shape.
- d¹. Cerci apically furcate with unequal forks, the lower the smaller and sometimes reduced to little more than an angulation; apical margin of subgenital plate with no median tubercle.
- e¹. Furcula distinct, consisting of a pair of spines as long as or slightly longer than the last dorsal segment; lower fork of cerci subobsolete; base of lateral margin of subgenital plate incurved *minor*.
- e². Furcula obsolete; lower fork of cerci slender, but half as long as upper fork; base of lateral margin of subgenital plate not incurved *collinus*.
- d². Cerci apically expanded and lobate; apical margin of subgenital plate with a median tubercle.
- e¹. Interspace between mesosternal lobes nearly twice as long as broad; prosternal spine long; cerci boot-shaped *femoratus*.
- e². Interspace between mesosternal lobes subquadrate; prosternal spine short; cerci terminating in a transversely oval tumid lobe *punctulatus*.

Table of the N. E. Species of Melanoplus: Females.

- a¹. Tegmina no longer or scarcely longer than the pronotum.
- b¹. Interspace between mesosternal lobes quadrate or slightly longer than broad; median carina as distinct on the prozona as on the metazona; basal tooth of lower valves of ovipositor blunt and rounded *scudderi*.
- b². Interspace between mesosternal lobes distinctly transverse; median carina less distinct on the prozona than on the metazona; basal tooth of lower valves of ovipositor sharp, rectangular *maucus*.
- a². Tegmina much longer than the pronotum, often surpassing the abdomen.
- b¹. Lower valves of ovipositor apically more or less distinctly decurved, with a distinct median tooth on the lower outer margin; prosternal spine moderate or long, generally about as high as the mesosternum.
- c¹. Interspace between mesosternal lobes longitudinal or quadrate.
- d¹. Rather large; prozona distinctly longitudinal; line of division between the dorsal and lateral areas of the closed tegmina marked by a yellow stripe generally extending forward to mark the lateral carinae of the pronotum. *femoratus*.
- d². Medium sized; prozona quadrate or transverse; no yellow stripe on tegmina or lateral carinae.
- e¹. Median carina of pronotum generally indistinct or wholly wanting on the prozona; prosternal spine as seen from in front tapering, generally bluntly pointed at tip *atlantis*.
- e². Median carina of pronotum generally distinct on the prozona; prosternal spine nearly cylindrical, as seen from the front scarcely tapering except at extreme tip, which is generally bluntly rounded, sometimes a little enlarged *femur-rubrum*.
- c². Interspace between mesosternal lobes distinctly, sometimes strongly transverse.
- d¹. Interspace between mesosternal lobes strongly transverse; tegmina generally shorter than the abdomen; median carina almost as distinct on the prozona as on the metazona; interval between eyes above narrower than in the alternate category.
- e¹. Hind femora with no transverse bands; metazona obscurely and bluntly ruguloso-punctate *extremus*.
- e². Hind femora with dark oblique fasciation; metazona distinctly and sharply ruguloso-punctate *fasciatus*.
- d². Interspace between mesosternal lobes but little transverse; tegmina always as long as the abdomen; median carina distinctly dulled on the prozona; interval between eyes above broader than in the alternate category.

e¹. Rather slender bodied; outer edge of upper valves of ovipositor with a single or no denticulation at the base of the scoop; hind tibiae normally glaucous but sometimes red *minor*.

e². Rather stout bodied; outer edge of upper valves of ovipositor crenulato-denticulate on the basal half of the scoop; hind tibiae coral red. *collinus*.

b². Lower valves of ovipositor straight, with feeblest signs of a median tooth; interspace between mesosternal lobes strongly transverse; prosternal spine short, not nearly reaching the level of the mesosternum *punctulatus*.

Two of our species, *M. extremus* and *M. fasciatus*, are distinctly and strikingly dimorphic, occasionally occurring with tegmina surpassing the hind femora. These long-winged forms are known in New England only in *M. extremus*, and seem to be confined almost or quite exclusively to very high elevations. The long-winged form of *M. fasciatus* has been seen by me only from Michigan, but should be looked for in northern New England.

ON COLEOPTERA FOUND WITH ANTS. THIRD PAPER.

BY H. F. WICKHAM, IOWA CITY, IOWA.

To the earlier contributions of mine on this subject, published in some of the preceding numbers of *Psyche*. I wish to add the following observations, made at Iowa City during the years 1894 and 1895. A number of the records are new, both as regards host and locality, while a few are inserted simply as information touching upon dates or as furnishing additional proof regarding the true status of certain species. I have adopted the plan of taking up each species of ant separately and enumerating its guests; as in this way it would seem easier for the reader to form an idea of what is likely to be found in a given nest. For identification of all the hosts I am under obligations to Mr.

Theo. Pergande, while most of the Pselaphidae and Staphylinidae were named by Captain Casey, who, as we all know, has for years made careful studies among them. Several undescribed Aleocharini and some Scydmaenidae are also in my collections from ants' nests, but these are not included in the present paper.

1. *Formica subsericea* Say. A strong colony of this species, having its nest in a little rocky mound, was examined on April 14 and the following beetles obtained: *Ptomaphagus parasitus* Lec., eight specimens, chiefly at a distance of several inches from the surface. They are lively little fellows and run about actively in their efforts

to escape. Mr. Blanchard writes that these are true *parasitus* and not either of the new species which have been confounded with it in some collections. *Batriscus scabriceps* Lec., one specimen, from near the top of the nest. *Oxytelus suspectus* Casey, one specimen at about the same depth as the *Batriscus*. The exact status of this *Oxytelus* in relation to the ants is rather in doubt—but it seems quite likely that it may find the neighborhood of colonies agreeable in some way, since I get nearly all my specimens from the nests of *Formica subsericea*. The colony above mentioned yielded, in addition to the things already enumerated, three specimens of *Hetaerius brunnipectus* Rand.; these differ from many other myrmecophiles in the habit they have of feigning death at the earliest alarm, but they soon recover and make off at a good rate. They are to be found nearly throughout the nest. Another colony of *F. subsericea*, examined about a month later, furnished a single specimen of *Batriscus scabriceps*.

II. *Formica fusco-gigantes* Forel. Specimens of *Oxytelus suspectus* were taken from a nest of this ant.

III. *Formica obscuripes* Forel. A colony of this species has constructed a large nest in the vicinity, covered by a hillock of rubbish, chiefly small bits of vegetable matter. The first exploration of this nest was made on April 14, 1894, at which time a considerable number of the Staphylinid beetle, *Platymedon laticolle* Casey, were obtained.

It is an active insect and on being exposed by the removal of shelter, immediately burrows again in the loose bits of rubbish of which the ant-hill is composed. No hostility was seen to be manifested towards it by the numerous ants. In the following year another visit was made to the same nest, with the result of finding, on April 26, about twenty-five more of the *Platymedon*, though by May 19 it had become rather scarce—possibly because so many had been taken on the previous visit. The eastward extension of the range of this beetle is of interest, the previous records having come from Arizona, Colorado and Nebraska. The ant with which it lives must be highly desirable company, if we may judge from the number of other guests taken on April 26—two specimens of a small undescribed Aleocharinid, three *Tachyporus*, three *Limulodes paradoxus* Matth., one *Anomala binotata* Gyll. (this deep down in the nest), three *Monotoma fulvipes* Melsh., and two *Anthicus melancholicus* Laf.

IV. *Camponotus pictus* Forel. It is well known that this ant is the host of *Lomechusa cava* Lec., and it seems that the beetle may be found with it through most of the warmer months of the year. I have myself taken it at Iowa City as early as April and as late as September. This past summer I took three in a nest on August 11, and have some records from Mr. A. B. Wolcott showing it to occur in Illinois March 18, and July 9, 12, and 26. It may perhaps be double brooded.

V. *Lasius aphidicola* var. (?) Mr. Pergande expresses a doubt as to the specific identification of this ant. The nest was found in an old log, April 13, and one specimen of *Batrissus foveicornis* Casey occurred as a guest.

VI. *Aphaenogaster fulva* Rog. A

strong colony of this ant was investigated on August 4. The nest was made on the lower surface of a prostrate log, between the bark and the wood. The guests were numerous *Limulodes paradoxus* and four *Thiasophila latifollis* Casey.

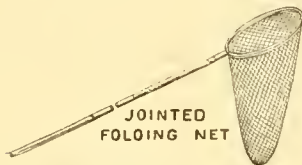
INSECT-VISION.

It has always been assumed that flowers attracted insects, in large measure at least, by the splendor of their inflorescence. Some recent experiments by Plateau, recorded in the Bulletin of the Belgian Academy, throw doubt upon this assumption. In a considerable bed of showy dahlias, Plateau concealed from sight the highly colored rays of some of the flowers exposing only the disk, and in a second series of experiments the disk also but independently, either by means of colored papers or by green leaves secured in place by pins. Butterflies and bees sought these flowers with the same avidity and apparently the same frequency as the fully exposed flowers in the same patch, the bees particularly pushing their way beneath the obstacles to reach them, though not always with suc-

cess. Plateau concludes that they are guided far more by their perception of odors than by their vision of bright and contrasted colors.

In a second communication to the same Academy, Plateau gives the details of another set of experiments to determine whether a wide-meshed net presents any obstacle to the passage of a flying insect which, as far as room was concerned, could easily pass in flight through the interstices. He finds that while such nets do not absolutely prevent passage on the wing, insects almost invariably act before one they wish to pass as if they could not distinguish the aperture, ending by alighting on the mesh and crawling through. He reasons that through the lack of distinct and sharp vision the threads of the net produce the illusion of a continuous surface, as for us the hatchures of an engraving, seen at a distance.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,
Klaeger and Carlsbad Insect Pins, Setting
Boards, Folding Nets, Locality and
Special Labels, Forceps, Sheet Cork, Etc.
Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.
78 Ashland Place,

BROOKLYN, N. Y.

fifths of the width between the eyes. Pronotum twice wider than long, length once and four-fifths that of the vertex, curvature one-half of the length, in front with the usual arcuate line. Hind margin of the last ventral segment with a broad deep emargination, the sides of which are strongly sinuate. Pygofers nearly equalling valves, outer apical margins slightly concave, and clothed with long slender hairs.

Color pale sordid yellowish, brightest on the head, darkest on the pronotum. Elytra very slightly infuscated. Abdomen above, except margins of segments, yellowish, margins of some of the basal ventral segments black. Legs with dark dots at bases of tibial spines.

Described from a single female taken at Las Cruces on *Sisymbrium* (Ckll., 2711). This is the species mentioned on page 100 of the Prelim. List. Hemip. Colo. It appears to be a *Mss.* name of Dr. Uhler's which was never published. It is a quite common insect in various parts of Colorado, and will undoubtedly be found widely distributed in the west. This species could hardly be confused with *T. caricis*, which is larger, of a much brighter yellow, and has a much more produced vertex. It also differs in the form of the last ventral segment. Although a good *Thamnotettix* otherwise, yet this species possesses but one antepical cell in the elytra. Had this character been correlated with the weak form in the definition of *Limo-*
tettix, I should consider that genus founded on reasonable grounds, and this species a good representative of it.

Athysanus acuminatus, n. sp.—Rather slender, general color pale fulvous; elytra exceeding abdomen. Length male 4.75 mm.

Male: Face little less than one-seventh wider than long. Clypeus once and two-thirds longer than wide, gradually broadening to the apex, where it is truncate; sides slightly concave near the base, basal suture curved. Lorae very large, a third longer,

and as wide as the clypeus at base, superiorly acute. Cheeks broadly, evenly emarginate below the eyes, sides below the emargination slightly sinuate, moderately broad below the lorae, attaining the tip of the clypeus. Antennae with the six joints following the two basal very unusually robust and distinct (thread-like portion of the flagellum wanting in this specimen). Front one-ninth longer than wide, edges slightly incurved at the antennae, below this straight to the clypeus. Vertex slightly convex, length at eyes five-sevenths of length at middle, the latter three-fourths of the width between the eyes. Pronotum two and one-third times wider than long, length a fourth greater than that of the vertex, curvature about three-sevenths of the length, hind margin straight. Elytra exceeding abdomen by about one millimeter, the outer antepical cell connected with the costal margin by two supernumerary cross-veins. Genitalia: Plate subangular posteriorly, somewhat produced at the apex. Valves long triangular, outer edges sinuate and furnished with long fine hair; apices produced into long, slender acuminate processes which form nearly one-third of the total length. Pygofers a third longer than valves, obtusely but narrowly rounded at tips, furnished on apical half of discs with numerous strong bristles in two or three rows.

Color pale fulvous throughout; slight indications of lighter concentric arcs on the front; indistinct mottlings on anterior borders of pronotum and vertex, the latter with a fine dark median line on posterior one-half. Elytra with one or two small circular or oval white spots on the discs of each cell, these spots surrounded and connected by darker clouding most conspicuous in the apical cells; veins brown, dark towards the apex.

Described from one male taken at Las Cruces in September 1894 (Ckll., 2383). This species differs widely from any other North American species of the genus. It appears to be most nearly related to *A.*

relativus, but is very distinct from that species in size and other characters.

Agallia bigeloviae, n. sp.—Form and color, nearly, of a small, pale *A. sanguinolenta*. The female differs only as follows.

More robust. Sculpturing on posterior three-fourths of pronotum not nearly so coarse. Veins in elytra more prominently brown. Two medial brown dashes on pronotum and vertex. Black spots on vertex larger. Elytra barely equalling abdomen. Hind margin of last ventral segment thrice strongly notched. the middle notch very deep

and much more obtuse at apex than the lateral, the two lobes thus formed obtusely rounded at tips and much shorter than the hind angles of the segment. Length little more than 2 mm.

Described from a single female taken on Bigelovia at Albuquerque (Ckll., 4616). This species is very nearly related to *A. sanguinolenta*, but easily separated by the above mentioned characters, especially the form of the last ventral segment. A larger series of this insect is much needed for study.

XIII. NEW SPECIES OF PROSAPIS.

BY T. D. A. COCKERELL.

The name *Prosopis* is preoccupied for a genus of plants, on the flowers of which the bees of the genus *Prosopis* are sometimes found. I have therefore ventured to write the bee-genus *Prosapis* (πρῶσ-απίς), a name which accords with the assumed fact that it is one of the most primitive among bees.

Prosapis bakeri, n. sp.—♂, length 5 mm., black, with creamy markings, punctures of head and thorax fine and close. Head rather broad; face not much narrowed below, white below level of antennae, the white extending as a pointed projection upwards in median line, and on each side as a club-shaped process, curved over the antennal socket, and remote from the orbital margin. The two sides of the median pointed process meet at an angle of almost 45°. Flagellum very dark brown, paler beneath. Scape swollen, truncate, its anterior side white and posterior side black. Prothorax all dark, except the usual creamy-white spot on tubercles, which presents no dark dot. Tegulae with a yellow spot. Pubescence all pale. Pleura rather hairy, closely and rather coarsely but not very deeply punctured. Dorsal wrinkles of metathorax rather feeble. Wings grayish-

hyaline, nervures and stigma piceous. Second submarginal narrowed one-half to marginal. Femora black; tarsi yellowish-white with the ends darkened; anterior tibiae yellowish-white in front; middle tibiae with the basal fourth, and hind tibiae with the basal two-fifths yellowish-white. Abdomen moderately shining, very minutely punctured, slightly pubescent at sides, but without any conspicuous hair-bands or patches.

Hab.—Colorado; seven miles W. of Livermore, Larimer Co., July 1, 1894, 7000 feet (C. F. Baker).

Allied to *rudbeckiae*, but differs by the white face, the half white scape, and the white frontal process curving over the antennae, etc.

Prosapis wootoni, n. sp.—♂ about 5½ mm. long, black with pale dull yellow markings, head and thorax closely punctured. Pubescence pale, including that of dorsum of mesothorax. Head rather large and broad, face moderately narrowed below. Antennae entirely piceous, scape only moderately swollen. Face below antennae pale yellow, the yellow forming only a rounded projection in the median line, but at the sides produced upwards

along the orbital margins more than half as far as the length of the scape, gradually narrowing from the base to a rounded termination which recedes a little from the orbit. Clypeus with a small black spot on each lateral margin. Prothorax with the usual yellow on tubercles, not showing any dark dot; and on the hind margin two very small and narrow, hardly noticeable, yellow lines. Tegulae wholly dark. Pleura densely and subconfluently punctured; base of metathorax rugose, with very large shining punctures. Wings hyaline, second submarginal cell not narrowed one-half to marginal. Femora black; tibiae black, anterior tibiae yellow in front, middle tibiae yellow at extreme base, hind tibiae with the basal two-fifths yellow. Tarsi with the first joint yellowish-white, the rest dark brown, except the anterior tarsi which are wholly dark brown. Abdomen shining, first segment finely punctured.

Hab.—New Mexico; Ruidoso Creek, 7500 feet on *Scrophularia*, July 6, 1895 (E. O. Wooton, 78).

Differs from *affinis* by the clear wings, more produced lateral face-marks, etc.; from *rugosulus* by the lateral face-marks terminating more narrowly, and not notched within; from *citrinifrons* also by the shape of the face-marks.

Prosapis citrinifrons, n. sp.—♂ about 5 mm. long, shiny, black with bright lemon yellow markings, head and thorax densely punctured. Pubescence of pleura pale, that of dorsum of mesothorax blackish. Head of ordinary size, face very little narrowed below, antennae black, scape little dilated; face below antennae bright yellow, the yellow in the median line forming a short broad narrowly truncate prominence, that at the sides extending upwards along the orbital margin rather more than half the length of the scape, broadly rounded-excavated within by the antennal socket, terminating narrowly and obtusely, at the tip slightly receding from the orbital margin.

Prothorax dark, except the yellow on tubercles, which shows a hyaline spot. Tegulae entirely dark. Base of metathorax strongly rugose. Wings smoky. Femora black; tibiae black, anterior tibiae orange in front, middle tibiae yellow at extreme base, hind tibiae with the basal two-fifths yellow. Tarsi dark brown, first joint of mid and hind tarsi yellowish-white. Abdomen shining, with sparse pubescence; first segment with minute scattered punctures.

Hab.—Colorado: Forrester's Ranch on Laramie River, Larimer Co., July 19, 1895, at 8500 feet (C. F. Baker).

Differs from *affinis* by the dark hind border of prothorax, and the shape of the face-marks; from *rugosulus* by the shape of the face-marks, etc.

Prosapis tridentulus, n. sp.—♂ about 5 mm. long, black with orange markings, head and thorax closely punctured, scutellum with the punctures deep but sparse. Head of ordinary size, face tolerably narrowed below, vertex closely but hardly confluent punctured, antennae wholly dark, scape stout. Face below antennae reddish-orange (perhaps yellow, altered by cyanide). Supra-clypeal pale patch conical, elongated, truncate, about two-thirds as long as the clypeus; lateral upward pale extensions narrow, rapidly receding from orbital margins, so as to be convex outwardly and concave inwardly, extending upwards very little further than the median mark.

Prothorax wholly black except the usual light patch on tubercles, which presents a black dot. Tegulae with a light spot. Punctures on pleura rather sparse. Base of metathorax rugose-tuberculate. Wings clear with a slight smoky tinge; second submarginal cell very broad, little narrowed above. Femora black with a light spot at extreme tip; tibiae black, anterior tibiae orange in front, middle tibiae orange at apex and base, hind tibiae with basal two-fifths and extreme tip orange.

Abdomen distinctly punctured, but first segment shining, with the punctures sparse, lateral hind margin of first segment with a narrow hair-band.

Hab.—Colorado; Chamber's Lake, Larimer Co., July 18, 1895, 9500 feet (C. F. Baker). Also from New Mexico; Ruidoso Creek, 7500 feet, July 6, 1895, on *Scrophularia* (E. O. Wooton, 75). Differs from *tridens* by its smaller size, clearer wings, second submarginal cell broader in proportion to its length, tubercles with a black dot, and less deeply punctured first segment of abdomen; from *verticalis* by the first recurrent nervure entering the second submarginal cell, and the shorter antennae; from *mesillae* by its larger size, longer and narrowed lateral face-marks, etc.; from *pygmaea* by its larger size, the face-marks, etc.; from *digitatus* by the clearer wings, and the curved, instead of straight, lateral face-marks.

Prosapis rugosulus, n. sp.—♂ about 6 mm. long, black with orange markings, head and thorax strongly punctured, scutellum with the punctures larger and sparser than those of the mesothorax. Head of ordinary size, face only moderately narrowed below, vertex confluent punctured, antennae wholly dark, scape stout. Face below antennae reddish-orange (perhaps yellow, altered by cyanide), median projection short, broad, truncate; lateral extensions of the pale color rather broad, somewhat excavated by the antennal sockets, ending, about on a level with the middle of the scape in a broad truncation.

Prothorax with a couple of small orange spots on hind border; tubercles largely orange, with no black spot. Tegulae with a small light spot. Pleura rather closely punctured. Base of metathorax rugose. Wings grayish hyaline. Femora black. Tibiae black, anterior tibiae orange in front, middle tibiae with a little orange at apex and base, hind tibiae with the basal two-fifths orange. First segment of abdomen

distinctly and rather closely punctured, first three segments with narrow lateral apical hair bands.

Hab.—Colorado; Chamber's Lake, Larimer Co., July 18, 1895, 9500 feet (C. F. Baker).

Var. *fallax*, v. nov. ♂. Tegulae with no light spot; no light spots on hind border of prothorax; lateral face-marks at ends curved inwards, receding a little from the orbital margin.

Hab.—Colorado; same locality and date as type (Baker). Another form, perhaps a distinct species, differs by the pale markings being yellow, the puncturing of mesothorax finer, and the scutellum more closely punctured. It is from Steamboat Springs, Colo., 6000 feet (Baker).

Prosapis tridens, n. sp.—♂ 6 mm. long, black with reddish-yellow markings. Head, thorax and abdomen strongly punctured. Head of ordinary size, face only moderately narrowed below. Face below antennal sockets reddish-yellow, the clypeal sutures dark; the light color extends upwards in the median line as a conical projection, truncate about the level of the upper margin of the antennal sockets; at the sides it extends upwards as a narrow curved projection reaching the same level, receding from the orbital margin rather slowly, with its concave side following the margin of the antennal socket. Vertex closely and roughly punctured. Antennae wholly dark, their tips reaching only a little beyond the tegulae; scape moderately swollen. Prothorax all dark except the usual light spot on tubercles, which exhibits no dark dot. Tegulae with a light spot. Mesothorax moderately shining, very closely punctured, scutellum not so closely. Enclosed portion of metathorax coarsely rugose. Pleura closely punctured. Wings strongly tinged with fuliginous, nervures and stigma piceous. Second submarginal cell not narrowed one-half to marginal. Femora black, with a small yellow spot at extreme end; anterior tibiae light in front, middle tibiae

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 241.

MAY, 1896.

CONTENTS:

THE MALLOPHAGA.— <i>Vernon L. Kellogg</i>	375
NOTES ON THE WINTER INSECT FAUNA OF VIGO COUNTY, INDIANA.—V.— <i>W. S. Blatchly</i>	379
NOTES ON THE ACRIDIDAE OF NEW ENGLAND.—II.—TRYXALINAE.—III.— <i>Albert P. Morse</i>	382
NOTES ON THE TYPES OF PAPIRIUS TEXENSIS PACK. AND DESCRIPTION OF A NEW SMYNTHURUS.— <i>Fustus Watson Folsom</i>	384
THE LARVA OF CAUTETHIA GROTEI HY. EDW.— <i>Harrison G. Dyar</i>	385
THE NEW CATALOGUE OF BEES.— <i>T. D. A. Cockerell</i>	386
CHRYSOBOTHRIIS FEMORATA AND CLERUS 4 GUTTATUS.— <i>P. C. Boveclitch</i>	387
TUTT'S BRITISH MOTHS	388
NOTES (The nest of Vespa; Moore's Lepidoptera Indica; Lake Superior Coleoptera; the death of Juan Gundlach)	388

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

710573

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5 00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, Danaid archippus. Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichnology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, Retinia frustrana, col. pl. Boston, 1883.	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS,
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

THE MALLOPHAGA.

BY VERNON L. KELLOGG, STANFORD UNIVERSITY, CAL.

A small and interesting group of insects, the Mallophaga, seems to have been pretty methodically and consistently overlooked by American insect-students. In Germany, Nitzsch of the University of Halle, and following him and profiting by the collections and notes made by him, Giebel and Taschenberg, at Leyden Piaget, and in England Denny, have undertaken to collect and describe Mallophaga, with the result that some 1000 species have been named, and several very portly volumes filled with descriptions and figures of these small parasitic insects have been printed. The Mallophaga are interesting because of their parasitic habits, their strangely specialized structure, and the still open question of their position among insects. Because they have been commonly associated with the Pediculidae in early entomological texts, and have been studied by Nitzsch, Giebel, Denny and Piaget with the true lice as external parasites of warm-blooded animals, and are called "lice," and are unknown things to most entomologists, they are commonly held as a group closely allied to the Pediculidae, which they most certainly are not.

They have an incomplete metamorphosis, biting mouth parts, are wingless, and feed on the scales, feathers and

hairs of mammals and birds. They have gradually ascended during the storm and stress of classificatory struggling from the position of a family blown with each changing wind from Hemiptera to Orthoptera to Pseudo-Neuroptera, to the position of an independent order untrammelled by near relations or affinities.

With some considerable difficulty I have made a small beginning in the study of the American forms, and have now in the course of printing the descriptions and figures of one new genus and 38 new species of Mallophaga collected by me from American water and shore birds, mostly maritime birds shot on the Bay of Monterey, California. On these water birds I have besides identified 23 species previously described from European birds. In addition I have noted on American land birds 16 previously described species and 24 new forms. No recognizable species of Mallophaga has been heretofore described from specimens taken from American birds. In this short study of the group, there are apparent many interesting problems in zoological and geographical distribution, in the relation of parasite to host, and in the peculiar opportunities for variation and species-forming.

Because of these interesting problems and of the need for a wider observation of the American forms of the group I present this table of the genera of the Mallophaga and a short paper to follow on their habits and distribution in the hope of calling the attention of American students to the group.

The Mallophaga were divided by Nitzsch into two families, the Philopteridae with filiform antennae and without maxillary (= labial) palpi, and the Liotheidae with capitate, 4-segmented antennae and maxillary (= labial) palpi. The family Philopteridae included two genera: *Trichodectes*, with 3-segmented antennae and 1-clawed tarsi, and *Philopterus* with 5-segmented antennae and 2-clawed tarsi. The latter genus was subdivided into the five sub-genera *Docophorus*, *Nirmus*, *Goniocotes*, *Goniodes*, and *Lipeurus*. The family Liotheidae similarly included two genera: *Gyropus* with 1-clawed tarsi and *Liotheum* with 2-clawed tarsi. The latter genus was subdivided into six sub-genera.—*Eureum*, *Laemobothrium*, *Physostomum*, *Trinoton*, *Colpocephalum* and *Menopon*. The two 1-clawed genera *Trichodectes* and *Gyropus* (one belonging to each family) were found by Nitzsch exclusively upon mammals; all the other genera exclusively upon birds. In essential identity the classification of to-day is that of Nitzsch; it differs in discarding the generic groups *Philopterus* and *Liotheum*, and in considering the Nitzschian sub-genera as genera, and in the addition

of several new genera based on species since discovered.

The change of classification by which the one-time sub-genera of *Philopterus* are now put on equality with the genus *Trichodectes* and similarly the sub-genera of *Liotheum* on equality with *Gyropus*, seems to me ill-advised. The two genera found on mammals differ in so many ways and so radically from their bird-infesting congeners (?) in each family that I believe their striking host and structural differences should be recognized in the classification. I propose, therefore, in the light of the present ranking of the Mallophaga as an independent order of insects, to rank the Nitzschian families as sub-orders, the Nitzschian genera as families, and the Nitzschian sub-genera, the genera of present-day writers, as genera. This will leave unchanged the present generic names and ranking, but will restore the expression, first indicated by Nitzsch in his generic groups, of the differences between the mammalian parasites and the avian parasites. This re-ranking, which is practically a return to the classification of Nitzsch, is adopted in the following synopsis and key which I have arranged to include all the genera so far established.

Synopsis of the Order Mallophaga.

Sub-order ISCHINOCERA.

Family *Trichodectidae*.

Genus *Trichodectes* Nitzsch.

Family *Philopteridae*.

Genera *Akidoproctus* Piaget, *Docophorus* Nitzsch, *Giebelia* Kellogg (MS.), *Nirmus* Nitzsch, *Eurymetopus* Taschenberg, *Goniodes* Nitzsch, *Goniocotes* Burmeister, *Ornithobius* Denny, *Bothriometopus* Taschenberg, *Lipeurus* Nitzsch, *Oncophorus* Rudow.

Sub-order AMBLYCERA.

Family *Gyropidae*.

Genus *Gyropus* Nitzsch.

Family *Liotheidae*.

Genera *Colpocephalum* Nitzsch, *Boopia* Piaget, *Trinoton* Nitzsch, *Laemobothrium* Nitzsch, *Physostomum* Nitzsch, *Eureum* Nitzsch, *Nitzschia* Denny, *Ancistrona* Westwood, *Menopon* Nitzsch.

Key to the Sub-orders.

- A With filiform 3- or 5-segmented antennae, and no labial palpi. Sub-order ISCHNOCERA.
- AA With clavate (or capitate) 4-segmented antennae, and 4-segmented labial palpi. Sub-order AMBLYCERA.

Key to the Genera of the Sub-order Ischnocera.

- A With 3-segmented antennae; tarsi with 1 claw; infesting mammals (family *Trichodectidae*). *Trichodectes* N.
- AA With 5-segmented antennae; tarsi with 2 claws; infesting birds (family *Philopteridae*).
- B Antennae similar in both sexes.
 - C Front deeply angularly notched. *Akidoproctus* P.
 - CC Front convex, truncate, or rarely with a curving emargination, but never angularly notched.
 - D Species broad and short; with large movable trabeculae (at the anterior angle of antennary fossa).
 - E Forehead with a broad transverse membranous flap projecting beyond lateral margin of the head in the male, barely projecting in female. *Giebelia* Kell.
 - EE Without such membranous flap. *Docophorus* N.
 - DD Species elongate, narrow; with very small or no trabeculae. *Nirmus* N.
- BB Antennae differing in the two sexes.
 - C Species wide, with the body elongate-ovate to sub-orbicular.
 - D Temporal margins rounded; last segment of abdomen roundly emarginated; antennae of male without appendage, third segment very long. *Eurymetopus* Tasch.

- DD Temporal margins usually angulated; last segment of abdomen convex, rarely angularly emarginated with two points.
- E First segment of antenna of male large, sometimes with an appendage; third segment always with an appendage. *Goniodes N.*
- EE First segment of antenna of male enlarged, but always without appendage; third segment without appendage; last segment of abdomen always rounded behind. *Goniocotes Burm.*
- CC Species elongate, narrow, sides sub-parallel.
- D Third segment of antenna of male without an appendage. *Ornithobius Denny.*
- DD Third segment of antenna of male with an appendage.
- E Front deeply angularly notched. *Bothriomctopus Tasch.*
- EE Front not angularly notched.
- F Antennae and legs long; a semi-circular oral fossa. *Lipeurus N.*
- FF Antennae and legs short; oral fossa narrow, elongate, extending as a furrow to the anterior margin of head. *Oncophorus Rudow.*

Key to the Genera of the Sub-order Amblycera.

- A Tarsi with one claw; infesting mammals (family Gyropidae) *Gyropus N.*
- AA Tarsi with two claws; infesting birds (except *Boopia*?) (family Liotheidae).
- B Ocular emargination distinct, more or less deep.
- C Forehead rounded without lateral swellings; antennae projecting beyond border of the head. *Colpecephalum N.*
- CC Forehead with strong lateral swellings.
- D Antennae projecting beyond border of the head; temporal angles projecting rectangularly; eye large and simple. *Boopia P.*
- DD Antennae concealed in groove or under side of head; temporal angles rounded or slightly angular; eye divided by an emargination and fleck.
- E Mesothorax separated from metathorax by a suture. *Trinoton N.*
- EE Meso- and metathorax fused, no suture. *Laemobothrium N.*
- BB Ocular emargination absent or very slight.
- C Sides of the head straight or slightly concave; forehead with two small laterally-projecting labral lobes. *Physostomum N.*
- CC Sides of the head sinuous; forehead without labral lobes.
- D Body very broad; metathorax shorter than prothorax. *Eureum N.*
- DD Body elongate; prothorax shorter than metathorax.

E Ocular emargination filled by a strong swelling; sternal markings forming a quadrilateral without median blotches.

Nitzschia Denny.

EE Ocular emargination without swelling, hardly apparent or entirely lacking; median blotches on sternum.

F Very large; with two 2-pointed appendages on ventral aspect of hind-head; anterior coxae with very long lobe-like appendages.

Ancistrona Westwood.

FF Small or median; without bi-partite appendages of hind-head.

Menopon N.

NOTES ON THE WINTER INSECT FAUNA OF VIGO COUNTY, INDIANA.—V.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

COLEOPTERA (CONT.).

A number of beetles belonging to the families Dytiscidae, Gyrinidae and Hydrophilidae, doubtless pass the winter as imagoes,* hibernating in the waters of the deeper pools of ponds and streams, or beneath the mud and driftwood near their margins. The opportunity did not occur to make a special investigation of such pools, and therefore but two species of water beetles were taken during the winter collecting.

HYDROPHILIDAE.

78, *Berosus striatus* Say. The only specimen taken in the county was found Feb. 26, deeply buried in damp sand, beneath a log on margin of old canal.

* Imagoes of the genera *Dytiscus* and *Hydrophilus* have been seen by the writer on numerous occasions in early April.

79, *Philhydrus cinctus* Say. On two occasions in February from beneath logs close to ponds. Common in summer.

SILPHIDAE.

80, *Silpha surinamensis* Fab. Dec. 18.

81, *S. inequalis* Fab. Jan. 16.

The above were taken on several occasions beneath logs close to carrion. *Surinamensis* is found only singly or in pairs. *Inequalis* is gregarious, winters in different stages, and in Indiana is the most abundantly represented species of the family.

82, *Choleva basillaris* Say. One specimen, Dec. 5, from beneath a rail in upland field.

83, *Agathidium* sp.? One Dec. 25. Beneath chunk.

Besides the four species mentioned, two others, *Necrophorus orbicollis*

Say and *Silpha noveboracensis* Forst., have been taken on or before April 1st. They doubtless hibernate.

SCYDMAENIDAE.

84, *Scydmaenus* sp.? One, Jan. 6, beneath log in upland clearing.

PSELAPHIDAE.

85, *Ceophyllus monilis* Lec. One, from a large cone-shaped ant's nest. Feb. 28.

86, *Tmesiphorus costalis* Lec. Our most common species of the family. On numerous occasions in winter from beneath logs, usually oak, in sandy upland woods. Gregarious.

87, *Ctenistes piccus* Lec. Dec. 23. Five were found piled up together, on the side of an overturned log, on sandy margin of old canal.

88, *Batrissus* sp.? Dec. 10. One. Beneath log in upland thicket.

STAPHYLINIDAE.

89, *Falagria venustula* Er. Jan. 7.

90, *Aleochara bimaculata* Grav. Jan. 1.

91, *Aleochara* sp.? Dec. 23.

One or two of each of the above were taken on the dates mentioned from beneath logs. *A. bimaculata* is common in fungi in summer; the others are rare at all seasons.

92, *Quedius fulgidus* Fab. Dec. 25. Beneath the bark of red oak (*Quercus rubra* L.) logs.

93, *Staphylinus maculosus* Grav. Dec. 18.

94, *S. tomentosus* Grav. Feb. 6.

95, *S. cinnamopterus* Grav.

Of eight species of this genus known to occur in the county the above three were the only ones taken in winter. *S. cinnamopterus* is the most common of all, and hibernates beneath beech and oak logs; the others, beneath logs and chunks near decaying animal matter. In summer all are found in fungi. *S. vulpinus* Nordm. has been taken on April 1st, and probably hibernates.

96, *Philonthus brunneus* Grav. Dec. 8.

97, *P. baltimorensis* Grav. Dec. 10.

98, *Xantholinus cephalus* Say. Dec. 25.

99, *X. emmesus* Grav. Jan. 6.

Of the above, *P. brunneus* is common, the others scarce. All hibernate beneath logs and rubbish in fence corners which are filled with dead leaves. The only specimen of *X. cephalus* taken was rolled up like a ribbon and did not move until after it had been in the cyanide bottle for some seconds.

100, *Stenus colonus* Er.

101, *S. annularis* Er.

But the two members of this large genus have been recognized in the county. *S. colonus* is very common in winter beneath and between the radical leaves of mullein; *S. annularis* much less common beneath logs and rubbish.

102, *Cryptobium badium* Grav. Feb. 10.

103, *C. bicolor* Grav.

104, *C. pallipes* Grav.

105, *C. latebricola* Nordm.

Of these *C. badium* has been taken but once in winter; the others on numerous occasions beneath bark, chunks and mullein leaves. *C. palipes* frequents damp, sandy places.

106, *Lathrobium armatum* Say.

107, *L. simplex* Lec. Dec. 10.

108, *L. longiusculum* Grav.

109, *L. collare* Er. Feb. 10.

110, *L. dimidiatum* Say.

These five species represent the genus, as far as known, in Vigo County. *L. armatum* is very common beneath logs in low, damp, sandy places; *L. simplex* rare in winter; and the others frequent beneath bark and logs in upland woods.

111, *Paederus littorarius* Grav.

This handsome little Staphylinid winters in numbers beneath and between the leaves of almost every mullein plant.

112, *Sunius longiusculus* Mann.

Common in winter beneath chunks. Upland.

113, *Pinophilus latipes* Grav.

Singly beneath logs in dry upland woods. Jan. 14.

114, *Tachyporus maculipennis* Lec.

Feb. 10.

115, *T. chrysomelinus* Linn.

116, *T. brunneus* Fab.

Of these *T. maculipennis* is scarce, the others common, beneath mullein leaves and rubbish.

117, *Erchomus ventriculus* Say.

Dec. 25. Common beneath the close fitting bark of red oak (*Q. rubra*) logs.

118, *Conosoma crassum* Grav. Jan.

21.

119, *Acidota subcarinata* Er. Feb. 23.

The last two species occur in moss and beneath chunks in dense upland woods.

Besides the above-named 31 species of Staphylinidae five additional ones were taken in winter which are as yet undetermined. Seventy-nine members of the family have been collected in the county, and doubtless many small ones occur which have been overlooked. A careful and systematic collecting carried on through several winters would probably show that the large majority of the species are represented in winter by the imago.

SCAPHIDIIDAE.

120, *Scaphidium quadriguttatum* Say. Feb. 23.

121, *S. piccum*. Dec. 25.

In winter *S. piccum* is rather frequent; the other very rare, beneath bark of old beech logs.

122, *Scaphisoma convexum* Say. Dec. 29.

Beneath bark of tulip (*Liriodendron*) stumps and logs.

PHALACRIDAE.

123, *Phalacrus* sp.? Jan. 7.

124, *Olibrus consimilis* Marsh. Dec. 10.

These two species are rare in winter beneath chunks and rails along upland fence rows.

NOTES ON THE ACRIDIDAE OF NEW ENGLAND.—II.—TRYXALINAE.—III.

BY ALBERT P. MORSE, WELLESLEY, MASS.

Pseudopomala brachyptera (cont.).

Habits, etc. This peculiar locust is not uncommon locally on the coarser grasses found in waste lands, especially upon a species of bunch-grass (*Andropogon scoparius*) everywhere abundant. I have taken it also on beach-grass at Provincetown, and upon timothy. Though a good leaper and fairly active it is not shy and seeks safety in attempting to escape observation by sidling around the grass-stems rather than by active retreat. I once saw a long-winged female fly several feet, proving that with the possession of the means came the power of flying. Its sluggish habits, however, in connection with its linear form, render it less likely to attract the attention of its enemies, and to the biologist it is perhaps the most interesting of our locusts on that account. It must be seen in the living state to have its full beauty appreciated. The singular, almost grotesque, yet graceful form interests even the casual observer, and its coloration of lilaceous drab, giving it almost the appearance of being clothed with a delicate bloom, pleases the most fastidious eye.

I have taken young specimens at various times in June and July and adults from July 10 to Sept. 3. It is likely to be met with, however, a week earlier and some time later in the

season. About 150 specimens, chiefly collected in person, are from Fryeburg, Me.; Florence (S. W. Denton), Provincetown, Sherborn, Sudbury, Wellesley, Winchendon, and West Chop, M. V., Mass.; Canaan, North Haven, and Thompson, Conn. It doubtless occurs in all of the New England States. The long-winged form, while not common, can scarcely be called rare. 2 ♂, 7 ♀, specimens were taken in each case in company with the usual form. I have also an additional ♂ captured by Mr. C. J. Maynard at Newtonville, Mass., and Mr. Scudder has one from Iowa.

TRYXALIS Fabr.

(= *Metaleptea* Brunner.)

Truxalis Fabricius 1775. S. Ent., p. 279.

According to priority, as stated by Brunner himself (Revision, p. 118), this name should be retained for this genus. The genus is out of place in Brunner's table since the apical angles of the hind femora are not produced.

Tryxalis brevicornis Linn. Figs. A, Aa. Ab.

Gryllus brevicornis. Linné, Cent. Ins. p. 15, 37,—1763.

Pyrgomorpha brevicornis. Thomas, 67.

Pyrgomorpha punctipennis. Thomas, 68 (?).

Truxalis brevicornis. Beutenmüller, 291.

This species has been taken on Long Island in the near vicinity of New York by Mr. Beutenmüller and will very likely be found in Conn. It will be readily determined by the characters given in the key. In coloration it is very similar to *Dichromorpha viridis*, the ♂ being either brown, or green above with dark brown sides, and the ♀ either brown or green with a dusky line along the dorsal part of the sides of the pronotum which is continued on the head to the eye. It is found locally in the tall grass of swamps.

The following measurements are from Indiana specimens received from Prof. Blatchley.

Antenna.	Hind fem.	Teg.	Teg.>Hind fem.	Body.	Total
♂ 10-11	14	20	3-4	18-20	20-28
♀ 10-11	20	31	6	32-35	33-44

6. DICHROMORPHA gen. nov.

Type: *Chlocaltis viridis* Scudd. The systematic position of this genus and its more important diagnostic characters have been indicated in Brunner's Revision under the name of *Chlocaltis* (to which the type species has erroneously been referred), and to some extent in the preceding key. The type species is well described in Thomas, p. 75.

7. *Dichromorpha viridis* Scudd.

Figs. 7, 7a, 7b.

Chlocaltis viridis. Scudder, 455, —1862.

Chlocaltis viridis. Smith, Orth. Conn., 374. Fernald, 36. Morse, 14, 104. Beutenmüller, 292.

Chrysochraon viridis. Thomas, 75.

Long-winged form, *punctulata*.

Chlocaltis punctulata. Scudder, 455.

Chlocaltis punctulata. Fernald, 36.

“ *viridis* var. *punctulata*. Morse, 14, 105.

Chlocaltis viridis var. *punctulata*. Beutenmüller, 292.

Chrysochraon punctulatum. Thomas, 77.

Is not this *Trux. angusticornis* Stål. from S. Car. (Rec. orth., 106)?

The chief points of interest to be noticed here concerning this species are those connected with its dimorphism in form and color. There is no doubt that the *punctulata* form is but a case of reversion not uncommon in the female. I have yet to see a male with tegmina and wings reaching the end of the hind femora, that is to say, a true *punctulata* male, though a variation of 50 per cent. occurs in the length of the tegmina, these measuring 6 to 9 mm. in length. The tegmina of the female are usually 8 to 10 mm. long, and of the reversional form 19 mm., but examples occur of intermediate length, one having them 12 mm. Contrary to what is usually stated *both* sexes are either green or brown above, but brown males are only about one-third as numerous as brown females. Of 330 N. E. adults in my collection 20 are *punctulata* ♀. 5 being

brown and 15 green; 56 are brown *viridis*, 13 ♂, 43 ♀; 107 are green *viridis* ♀, and the remaining 147 are green *viridis* ♂.

Antenna.	Hind fem.	Teg.	Teg. <H. fem.	Body
♂ 6.5-8.5	9.5-10.5	6-9	4-5.5	15-16
♀ 7-8	14-15	8-10	0-8	23-27
			(7-8 usually)	
Body vs. H. fem.			Total.	
♂ -2 - -3			11.5-15	
♀ -2 - +2			15.5-26.5	

This species is plentiful in southwestern New England in the latter half of the season, making its appearance late in July and continuing until late in autumn. The earliest date on which I have captured it is Aug. 4, at which time adults and young of both sexes were numerous. It is found in old pastures and mowing lands but prefers those of a damp and heavy character where the herbage is green throughout the season,—this is perhaps the rea-

son of its more generally prevalent green coloration. In such situations I have found it numerous in individuals wherever taken. It is well protected by its coloration and is a decidedly sluggish insect, rarely using its wings, even when fully developed, in escaping its pursuers. It is found throughout Conn., in R. I., and in central and southwestern Mass. It is said by Scudder (Distrib. Insects N. H.) to have been taken in southern N. H., but this seems doubtful unless it possibly occurs there in the Connecticut Valley. I have taken it at Palmer, Mass.; Wickford, R. I.; and in Conn. at Thompson, Montville, New Haven, Canaan, So. Kent, Stamford, and Greenwich, between the dates of Aug. 4 and 30. Judging from collections sent me by Prof. Fernald it is common at Amherst, Mass.

NOTES ON THE TYPES OF *PAPIRIUS TEXENSIS* PACK. AND DESCRIPTION OF A NEW *SMYNTHURUS*.

BY JUSTUS WATSON FOLSOM, CAMBRIDGE, MASS.

Upon examining Packard's types of *P. texensis* at the Museum of comparative zoölogy, the tube containing them was found to hold, not only fourteen specimens of a *Papirius*, but also ten examples of a *Smynthurus*, and the original description of *P. texensis* evidently combines the characters of both these species, which certainly do resemble each other superficially. It being necessary to separate the species in question, I have retained the original name for the *Papirius*, to which is applicable a large part of the original description, quoting this part below with a few supplement-

ary notes, and have characterized the other species as *S. packardii*, again quoting where possible. The type specimens, considering they are nearly twenty-five years old, are well preserved, even in color.

Papirius texensis Pack. Pale luteous marbled with brown and black, head paler; a few short bristles above the mouth and on posterior dorsum; long stout hairs on vertex, anterior dorsum and sides of dentes. Eyes black. Antennae shorter than body, pale reddish brown, growing darker towards the end; segments nearly as 1: 5: 5.5: 2; basal segment twice as long as broad, naked;

second subpetiolate, sparsely hairy; third petiolate, hairy, with ten distal subsegments, the penultimate one laterally dilated; terminal segment lanceolate, without subsegments. Legs long, slender; tibia with broad alternate light and dark bands. Superior claw long, slender, little curved, obscurely toothed; inner edge sinuate basally, toothed in the middle and obscurely beyond; two obscure teeth on either side near the outer edge, dividing it into thirds; inferior claw two-thirds as long, stout, tapering, with a short bristle inside upon a rounded basal dilation and with a subapical bristle exceeding the other claw; tenent hairs absent. Furcula nearly reaching the mouth; manubrium with a few ventral hairs; dentes tapering, with remarkably long and large lateral hairs barbellate basally, and four longer equidistant ventral hairs; mucrones one fourth dentes, laterally linear, little-tapering, serrulate beneath, apex with three rounded lobes bent downward.

Length, 1.3 mm. Waco, Texas (Belfrage).

Smynthurus packardii, n. sp. Body subtriangular, dilated broadly behind; pale luteous or brown, spotted with black dots, sometimes coalescing; a broad pale unspotted area on the anterior dorsum and another between the antennae and down the face; a light line along the middle of clypeus. Head, body and legs well covered with

long, curving, white hairs, which on the vertex arise from black dots. Eyes conspicuously black. Antennae long, nearly equalling body; segments not tapering or knotted; as 1: 2: 4: 8.5; basal segment stout cylindrical, twice as long as broad, almost naked; second and third with hairs of irregular length; terminal segment with at least twenty distinct, whorled, globular subsegments. Superior claw narrowly lanceolate with slender, well-curved tip and a single tooth on the middle of the inside. Inferior claw two-thirds as long, lanceolate, nearly straight, with a short bristle inside, one-third from the base, upon a gradual dilation, also a subapical bristle not exceeding the other claw; tenent hairs absent. Furcula stout, extending beyond ventral tube; manubrium exceeding anal tubercle; dentes with moderately long lateral hairs and a single, long, ventral, subapical hair; mucrones stout, one third dentes in length, with straight dorsal outline, ventral edges irregularly undulate, and apex obliquely truncate.

Length, 1.75 mm. Waco, Texas (Belfrage).

In having over twenty antennal subsegments, *S. packardii* is unapproached by any American *Smynthurus* as yet described, with the possible exception of *S. eisenii* Schött, from California,* the two species being closely allied.

THE LARVA OF CAUTETHIA GROTEI HY. EDW.

BY HARRISON G. DYAR, NEW YORK.

Larvae solitary, sitting on a small stem of the food plant, the feet on joints 7 and 8 not used in rest. Head retractile at apex; the body widens to joint 5, then gently tapers to tail; joints 12 and 13 are both small, the side angles of hind feet triangular projecting beyond anal plate. Horn long, slender, arising from an enlarged base. Annulets fine, distinct, with numerous secondary setae

which are situated in paler spots, scarcely at all elevated into granules. A continuous subdorsal line runs from the middle of joint 2 to the horn, white, shading below into the side color, more or less pale yellow at its

* Schött, Harald. Beit. z. Kent. Kalif. Collem. Bih. Kongl. Svensk. Vet. Akad. Handl. Bd. 17, Afd. iv. No. 8, p. 7, Taf. 1. fig. 1-6. 1891.

sharp upper border. Dorsal space light leaf green, an irregular, but distinct geminate, shaded greenish white dorsal band, broadening out and filling in all the dorsal space on joints 2 to 4, still obscurely darker centered. All the space below the subdorsal line likewise completely filled in with the same greenish white, with the paler secondary dots. Spiracles white with a median brick red band, except the one on joint 5 which is white with a black spot at its posterior side. The side color of the body is cut by darker green oblique shades which run from the posterior edge of each segment on the sub-stigmatal line upward and forward (in the reverse direction from what is usual in Sphingidae) each confined to a single segment, on joints 5 to 11. A substigmatal line is distinct from the anal feet forward to joint 11, white and yellow like the subdorsal line and also shaded with pink. Forward of joint 11 it becomes faint and is scarcely distinguishable in front of joint 8. Horn pointed, green, with black spinules, the apex pale. Head dark green with narrow, obscure, vertical, pale bands; antennae pinkish; width about 2.5 mm.; length of horn 4 mm.; of the larva 28 mm. The food plant of this tiny Sphinx is the "wax berry," *Chiococca racemosu*, determined for me by Mr. F. Kinzel. The imago appeared in six weeks. Larvae from Lake Worth, Florida.

THE NEW CATALOGUE OF BEES.

Catalogus Hymenopterorum, Vol. X, Apidae (Anthophila). By Dr. C. G. De Dalla Torre, 1896, pp. 643.

All students of bees must gratefully welcome this admirable catalogue, which gives not only the names of the species, but the localities and all the more important references. It is practically complete up to the end of 1893, but various species described in 1894 from America are omitted, though one would suppose that there might have been time to include them before print-

ing. Of course, as is inevitable in such a work, the details suggest much criticism and comment. Very strangely, Wm. Kirby is in many places called W. F. Kirby, although the latter name is rightly the property of a much more recent entomologist, still happily with us. *Andrena* is modified to *Anthrena*, and *Heriades* to *Eriades*, but it is questionable whether such changes can be accepted. *Anthophora* becomes *Podalirius*, apparently on good grounds of priority. Our *Colletes punctata* Rob. (nom. preocc.) becomes *C. robertsonii* D. T. Our *Halictus cephalicus* Rob. (nom. preocc.) becomes *H. cephalotes* D. T., although there was already a nomen nudum *H. cephalotes* Schill., 1839. *H. distinctus* Prov. (preocc.) becomes *distinguendus* D. T. *H. gracilis* Rob. (preocc.) is altered to *gracillimus*, but Mr. Robertson had already changed the name to *foxii*. *H. palustris* Rob. is also altered to *paludicola*, in ignorance of Mr. Robertson's substitution of *nymphacarium* last year. *H. constrictus* Prov. (preocc.) becomes *provancheri* D. T. It may here be observed that Mr. Robertson substituted *H. macoupiensis* for his *H. quadrimaculatus*, "nec Schenk"; but it appears that Schenk's species is a synonym of *H. interruptus*. Our *H. fulvipes* Sm. (preocc.) becomes *rhododactylus* D. T.

Our *Andrena fimbriata* Sm. (preocc.) becomes *americana* D. T. *A. simulata* Prov. is altered to *canadensis*. *A. clypeata* Sm. becomes *clypeolata* D. T. *A. laticeps* Prov. becomes *provancheri*. *A. scrotina* Rob. becomes *robertsonii*. *A. salicis* Rob. was preoccupied by *salicis* Verhoeff; but the latter name is a synonym of *albicans*. *A. scutellaris* Rob. becomes *scutellata* D. T. *Nomia punctata* Fox (preocc.) is altered to *N. foxii* D. T.

Eunomia is not held to be distinct from *Nomia*. *Cilissa* is made a synonym of *Mellitta*. *Eucera* is made to include, as subgenera, *Diadasia*, *Emphor*, *Melissodes*,

Synhalonia, Tetrilonia, Xenoglossa, etc., but it seems impossible to accept such wholesale lumping.

Melissodes tristis Ckll. is much later than *Eucera tristis* Mor., but I do not care to rename it until convinced that it is desirable to merge *Melissodes* in *Eucera*. *Eucera arctos* n. n. is founded on *ursina* Cr., not of Haliday, but the name is unnecessary, since *ursina* is a synonym of *enavata*. *M. brevicornis* Cr. becomes *E. cressonii*. *M. californica* Sm. becomes *E. smithii*.

Podalirius (Anthophora) is made to include as subgenera, *Clisodon*, *Entechnia*, *Habropoda*, etc. *Habropoda mucida* is changed to *P. cressonii*. *Anth. carbonaria* Cr. becomes *P. infernalis*. Our *Nomada rubra* Prov. becomes *N. erythraea* D. T. *N. integra* Rob. becomes *N. integerrima* D. T. *N. punctata* Cr. becomes *N. provancheri* D. T. *Chelostoma* is treated as a subgenus of *Eriades*. *Osmia quadridentata* Cr. becomes *cressonii* D. T., but this change is unnecessary, since it is a synonym of *O. conjuncta* Cr. *O. parva* Prov. becomes *O. parvula* D. T. *Megachile carbonaria* Cr. becomes *M. cressonii*. Mr. Fox's three Jamaican species of *Megachile* are wrongly said to be from Indiana. *M. simplex* Prov. becomes *M. simplicissima* D. T. *Anthidium venustum* Cr. becomes *cressonii*. *Coelioxys brevis* Cr. becomes *C. cressonii*, but the author overlooks the fact that *Cresson* himself long ago changed the name to *altilis*. *Phileremus* is changed to *Ammobates*, which has priority of place on the same page of Latreille. The name *Ammobates* has been very frequently used in Europe for many years. Although the papers of Robertson and Coville are duly quoted under *Psithyrus* (or *Apathus*) *elatus*, the author did not examine them sufficiently to learn that the insect in question was a ♂ *Bombus*. *Trigona* and *Tetragona* are given as subgenera of *Melipona*. *Trigona nigra* Cr. becomes *M. cressonii* D. T. *Apis mellifica* L., 1761, is to be called *A. mellifera* L., 1758.

It must be confessed that it is not entirely creditable to our knowledge of the literature of our subject, that the author of this new catalogue has been able to supersede so many names of American species on grounds of preoccupation. It is fair to state, however, that in some instances we were aware of the prior names, and changes would have been proposed on this side of the water sooner or later. In a few cases the changes had actually been made, and our author was not aware of it.

T. D. A. Cockerell,

New Mexico Agric. Exper. Station,

March 3, 1896.

CHRYSOBOTHRIS FEMORATA AND CLERUS 4-GUTTATUS.

Wood piles are always attractive collecting spots. *Chrysobothris femorata* Fab. is a frequent visitor, and runs about very briskly, especially on hickory and oak logs. Early in June, 1894, a specimen of *femorata* was seen and heard to produce a very distinct noise by striking rapidly with the end of its abdomen on the bark of an oak log. Tapping with the finger nail seemed to attract other *Chrysobothris* on the same log, but it may have been only a coincidence. Unfortunately the tapping specimen could not be caught to determine its sex, but it was probably a male, and the tapping a call or challenge. Last summer no opportunity occurred of observing *Chrysobothris*, but so common a species offers a good chance for all interested to make further observations on this interesting tapping habit.

On the 16th of June, 1895, on a fresh spruce log was noticed a specimen of *Clerus 4-guttatus* Oliv. It had in its grasp a good-sized Scolytid, either *Nyleborus* or *Tomicus*. It held the victim with its front and middle legs, and kept turning it round and round, biting at it all the time, and raising itself on its hind legs. Finally it seized the Scolytid firmly beneath where

the thorax joins the body, and dropping on its legs with its prey between them, ran rapidly under the log before it could be captured. The incident explains in a measure the constant presence of the *Clerus* on soft wood logs. They are looking for food. *F. C. Bowditch.*

TUTT'S BRITISH MOTHS.—In a volume on British Moths just published by Routledge (London) Mr. J. W. Tutt treats the principal members of that group in England in accordance with the latest views on their classification as outlined by him in a paper read last year to the Entomological Society of London. To some of the groups he appends a table of their time of appearance in the different stages, larval food plants, frequency, etc. A dozen colored plates and about fifty cuts, most of them rather rude but characteristic, help the beginner. There is a great deal of information packed into the 368 pp., but discriminating tables for the separation of the groups would have rendered the work more serviceable.

NOTES.—In the recent memoirs of the Zoological society of France (v. 8, p. 1-140, 1895), Charles Janet follows in minute detail

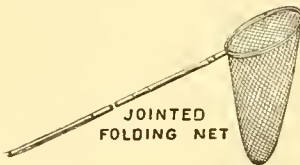
all the steps in the formation of a complete nest of *Vespa crabro*, with numerous figures. It will be found very valuable for comparison in studying our native wasps' nests.

With the issue of part xxiv, Moore's Lepidoptera Indica completes its second volume, in which the Satyrinae are concluded, the Elymniinae and Amathusiinae treated, and the Nymphalinae only begun. Apparently it will take nearly or quite another pair of volumes to complete this last subfamily. The present part contains illustrations of the early stages of *Charaxes* and *Eulepis*. Two figures are given of apparently full grown larvae of *E. athamas* but with totally different markings, to which no reference appears in the text.

H. F. Wickham prints a list of 700 Lake Superior Coleoptera, adding their extralimital distribution, in Vol. 6 of the Davenport Academy's Proceedings.

We regret to notice the death early in March, at the age of 85, of Dr. Juan Gundlach who has lived since 1839 in Cuba and devoted himself for more than half a century to the study of its natural history and especially its entomology and ornithology. His rich and unique collection was secured some years since by the Havana Institute.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,
Klaeger and Carlsbad Insect Pins, Setting
Boards, Folding Nets, Locality and
Special Labels, Forceps, Sheet Cork, Etc.
Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.



PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 242.

JUNE, 1896.

CONTENTS:

NEELUS MURINUS, REPRESENTING A NEW THYSANURAN FAMILY (Plate 8).—*Justus Watson Folsom*. 391

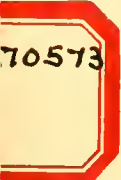
SUPPLEMENT TO PSYCHE, I.—CONTRIBUTIONS FROM THE NEW MEXICO AGRICULTURAL EXPERIMENT STATION (New species of *Prosapis*, cont., *T. D. A. Cockerell*; proposed biological station, *T. D. A. Cockerell*. 29

SUPPLEMENT TO PSYCHE, II.—LIST OF MT. WASHINGTON COLEOPTERA.—*F. C. Bowditch*. 1

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]



Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, . . . Free

Author's extras over twenty-five in number, under same conditions, each per page, . . . 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion, . . .	\$0.10	\$0.08
Eighth page, first insertion, . . .	.75	.60
Quarter " " " . . .	1.25	1.00
Half " " " . . .	2.25	1.75
One " " " . . .	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$20.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, Danais archippus. Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Technology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, Retinia frustrana. col. pl. Boston, 1833. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

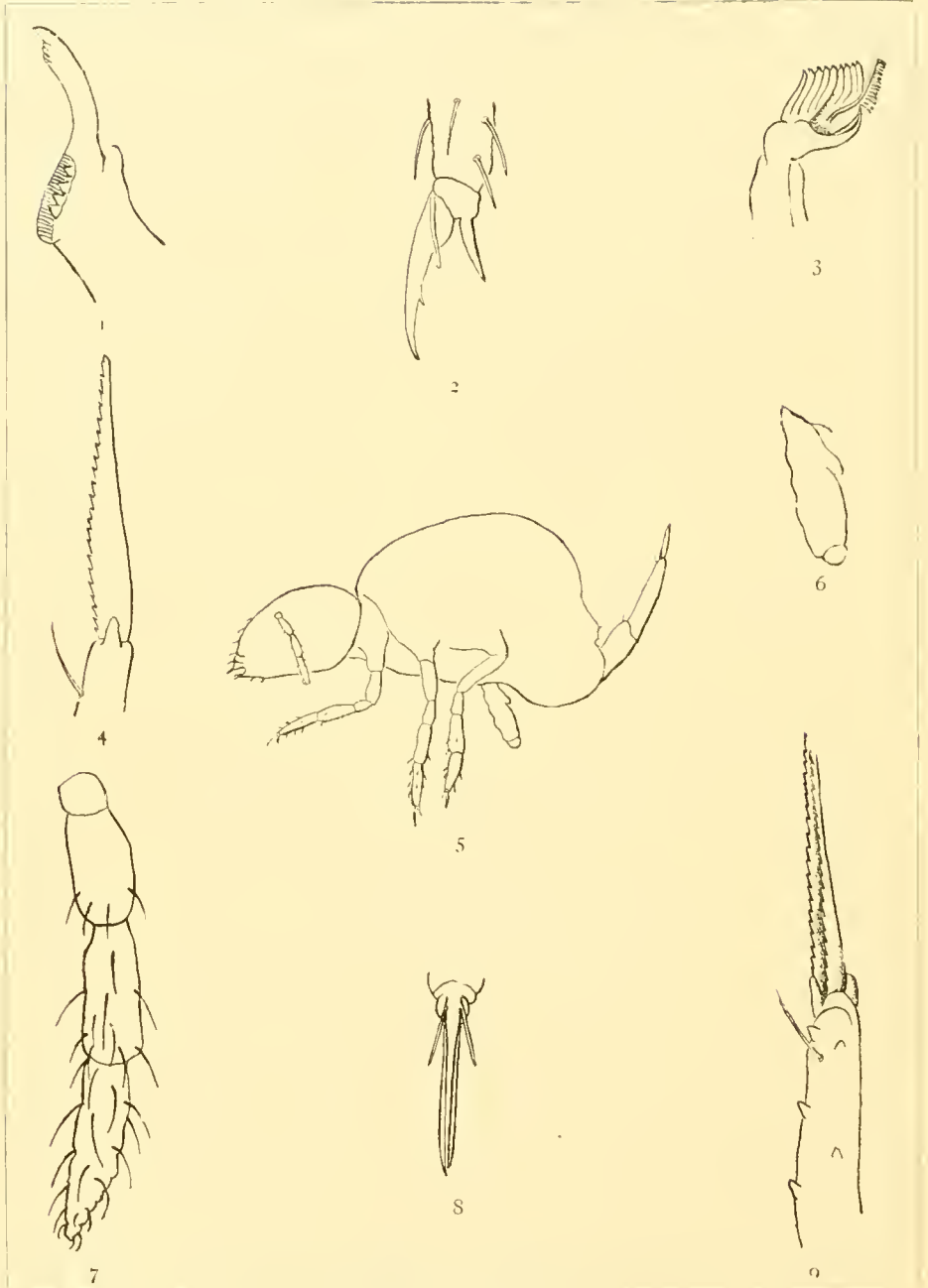
H. F. WICKHAM,
Iowa City, Iowa.

FIVE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.



J. W. Folsom, Del.

FOLSOM, NEELUS.

PSYCHE.

NEELUS MURINUS, REPRESENTING A NEW THYSANURAN FAMILY.*

BY JUSTUS WATSON FOLSOM, CAMBRIDGE, MASS.

This species was common in a greenhouse at Cambridge in February and March of this year. It occurred only on the under side of wet stones among "filmy ferns" (Hymenophyllaceae) from Jamaica, and therefore may not be indigenous.

Neelus murinus is evidently nearly related to the Papiriidae and Smynthuridae, especially the latter, but differs in important respects. The antennae closely resemble those of certain Smynthuri having an unringed terminal segment; the superior claw is unidentate, an apparently constant Smynthuran characteristic, as observed by Mr. MacGillivray; and an approach to a horizontal head is seen in *S. marginatus* Schött.† On the other hand, as I have not yet been able to find any tracheae, *Neelus* may, like *Papirius*, have none. The pseudonychia resemble those of *Tomocerus* and the tubercles of the ventral tube are similar to those of *Tomocerus*, *Orchesella* and other genera.

We may present as follows the generic characters of *Neelus* as contrasted with those of *Smynthurus* and *Papirius*.

‡ NEELUS, n. gen.

Head horizontal, broadly articulated. Thorax longer than abdomen. Anal tubercle inconspicuous. Ventral filaments represented by two rounded tubercles. Superior claw pseudonychiate. Dentes ventrally toothed, apically two lobed. Eyes absent. Tracheae apparently absent.

NEELIDÆ, n. fam.

The following characters may collectively be considered of family value as distinguished from those of *Smynthuridae* and *Papiriidae*. Head horizontal. Thorax exceeding abdomen. Processes of ventral tube tuberculate. Tracheae apparently wanting. Eyes absent.

I am glad to take this opportunity to thank Professor Mark, of Harvard University, for the valuable supervision he has given me while studying this species.

Neelus murinus n. sp. Plate 8.—General color ochraceous-buff, in alcoholic specimens ochraceous-orange; when young, white with a dorsal longitudinal median ill-defined

* Contributions from the Zoological Laboratory of the Museum of Comparative Zoölogy, under the direction of E. L. Mark, No. LX.

† Schött, Harald. Zur Systematik und Verbreitung Palæarctischer Collembola. Kong. Sven. Vet. Akad. Handl. Bd. 25, No. 11 p. 25, Pl. I. fig. 11. 1893.

‡ *νήelus*, stranger. The specific name, *murinus*, is based upon the fancied resemblance to a mouse

buff stripe; head paler; antennae, legs and furcula white. Head horizontal (fig. 5), in lateral view ovate, half as long as body, smooth, anteriorly with short setae. Eyes absent. Antennae (fig. 7) shorter than the width of the head, not geniculate, slender, segments four, their relative lengths as 1:3:4:5; basal segment globose, naked; second subcylindrical, sparsely hairy apically; third cylindrical, subpetiolate, more hairy; terminal segment long-conical, with hairs curving towards the notched apex. Labrum and labium projecting, with stout setae. Mandibles with long, falcate-oblong apex (fig. 1); terminal tooth long, sinuate within; lower incisive teeth small, three and four, compressed; below the base of the apex is a prominent rounded lobe directed forward; molar surface little convex, minutely denticulate, bounded on one side by a longitudinal row of four or three large, blunt teeth, respectively dorsal and ventral on the right and left mandibles; molar surface with a slight posterior lobe. Maxillae (fig. 3) with a conspicuous, dorso-external, curved, acuminate claw; ventral and internal to this, a wavy, linear process bearing on distal half an external comb of long teeth; remainder of maxilla composed of two large, oblong, concaved appendages, each with four or five ribs terminating in as many teeth on the anterior truncated margin. Body (fig. 5) seen from above oval, smooth; in profile with high-arched dorsal outline; smooth excepting a few bristles on the inconspicuous anal tubercle. Prothorax compressed, broadly articulated with the head. Ventral surface white, much swollen before the manubrium. Ventral tube (figs. 5 and 6) equal to denses in length, cylindrical, crenate anteriorly, one-lobed posteriorly near base, ending in two semi-globose papillate tubercles. Legs slender, about as long as furcula, scarcely bristly except on tibia. Superior claw (fig. 2) as long as third antennal segment, slender, internally sinuate with one sharp tooth one-third from apex; a linear pseudonychia, as long as the inferior

claw, arises from either side the base of the external margin of superior claw (fig. 8). Inferior claw less than half the other in length, uniformly tapering, scarcely curving with the superior claw, smooth, not toothed; tenent hairs absent. Furcula short, scarcely reaching mesothorax; segments ventrally as 1:1.5:1; manubrium stout, swollen, with a few ventral hairs and sinuate distal articulation; dentes laterally a little tapering, distally (fig. 9) with five large, lateral teeth at intervals, three being external, and two internal, also a long subapical ventral bristle and an evident, blunt-conical, apical lobe on either side the base of the mucro; mucrones laterally narrowly lanceolate (fig. 4), deeply concave ventrally with each edge distinctly serrate and with simple apex.

Maximum length, 0.7mm. Described from over fifty types, twenty-five of which have been given to the Museum of Comparative Zoölogy at Cambridge, Mass.

EXPLANATION OF PLATE 8.

Neelus murinus, n. sp.

Fig. 1. Extremity of right mandible, from above, x 530.

Fig. 2. Tarsus and claws of one foot, x 530.

Fig. 3. Extremity of right maxilla, from above, x 530.

Fig. 4. Side view of mucro and end of dens, x 440.

Fig. 5. Left side of insect, ventral tube turned backward, x 72.

Fig. 6. Ventral tube, x 116.

Fig. 7. Antenna, x 440.

Fig. 8. Outside of superior claw to show pseudonychia, x 530.

Fig. 9. Dorso-lateral view of right mucro and part of dens, x 440.

with basal two-fifths light, hind tibiae with basal half light. Tarsi with first joint light, the others fuscous. Abdomen shining, quite conspicuously punctured; the lateral hind margin of the first segment, and the following segments, with short pale pubescence. The punctures on the first segment, though rather sparse, are deep and conspicuous. Tip of abdomen with rather long brownish hairs.

Hab.—Colorado; Four-mile Hill, 8 miles S. of Steamboat Springs, July 19, 1894, 7000 feet (C. F. Baker).

Differs from *verticalis* by the punctured first abdominal segment and shorter antennae. It is a larger species than *mesillae*.

Prosapis divergens, n. sp.—♂ hardly 5 mm. long, black with creamy-white face, and lemon-yellow marks on body and legs. punctures of head and thorax moderately fine, but strong and close, first segment of abdomen rather sparsely but distinctly punctured. Head of ordinary size, face moderately narrowed below. Vertex and occiput roughly punctured; antennae all black, scape moderately swollen. Face below antennae creamy-white, the white color forming a rounded projection in the median line, hardly extending upwards, but at the sides extending along the orbital margin about two-thirds the length of the scape. From the broadest part at the base, this lateral white projection extends, nearly evenly narrowing, very little notched by the antennal socket, to the terminal very narrow truncation.

Prothorax with the usual yellow patch on tubercles, and two short yellow stripes on hind border. Yellow of tubercles without a dark spot. Tegulae with a yellow spot. Pleura with a moderate amount of white pubescence. Pubescence of mesothorax very short and sparse, dark in color. Base of metathorax strongly rugose.

Wings smoky hyaline, second submarginal cell not narrowed one-half to marginal. Femora black; tibiae black, anterior tibiae yellow in front, middle tibiae yellow at ex-

treme base, hind tibiae with the basal two-fifths yellow. Tarsi with the basal joint yellow, the others dark brown. First segment of abdomen rather sparsely but very distinctly punctured, remaining segments more finely punctured, more or less pubescent.

Hab.—Colorado; Four-mile Hill, 8 miles S. of Steamboat Springs, July 15, 1894, 7000 feet (C. F. Baker).

Differs from *vootoni* by its smaller size, white face, and spots of tegulae; from *rugosula* by the lateral face-marks very narrowly truncate and hardly notched within, the short median mark, etc.; from *citrinifrons* by the white face, spots on tegulae, partly yellow hind border of prothorax, etc.; from *affinis* by the smaller size, white face, spots on tegulae, etc.

Prosapis episcopalis, n. sp.—♂ slightly over 6 mm. long, black with creamy-white markings, head and thorax densely punctured. Head rather large, not very broad, face little narrowed below, the extreme base slightly widening. Vertex confluent punctured. Antennae entirely dark, scape stout but not dilated. Face below antennae yellowish-white, the upward extension in the median line rather short and pointed, the supraclypeal yellow piece as a whole resembling in shape a bishop's mitre; laterally the white extends along the orbital margins, not half the length of the scape, somewhat broadly, shallowly excavated inwardly by the antennal socket, ending obtusely.

Prothorax with a pair of short yellowish-white stripes on hind border; the tubercles also with the usual pale patch, lacking a dark spot, and extending inwards [upon the tubercles] further than usual. Tegulae with a large spot. Pleura strongly punctured. Scutellum less closely punctured than mesothorax. Base of metathorax rugose, with large, shining pits. Wings strongly tinged with fuliginous. Femora black; anterior tibiae yellowish-white in front, black behind; middle tibiae white at each end, black in

middle; hind tibiae with the basal half white, the terminal half black. Tarsi with the first joint yellowish-white, the others brown. First segment of abdomen sparsely but distinctly punctured, and with a narrow white hair band on hind margin at sides.

Hab.—Colorado (C. F. Baker, No. 1411) on Elk River, 10 miles north of Steamboat Springs, July 16, 1894.

Resembles a species from Florida of which I have only the ♀, but that differs at once by the smooth first segment of abdomen, immaculate tegulae, dark middle tibiae, etc.

Differs from *modesta* by the white face, the narrower and more pointed supraclypeal pale area, the darker wings, etc.; from *affinis* at once by the shape of the face-marks, spot on tegulae, etc.; from *rugosula* by the greater size, darker wings, and pointed supraclypeal area; from *coloradensis* by the darker wings, narrower lateral face-marks, etc.

Prosapis coloradensis, n. sp.—♂ about 5½ mm. long, stoutly built, head and thorax closely punctured, scutellum as closely as mesothorax, black with cream-colored markings. Head large, rather long, face moderately narrowed below, vertex confluent punctured, antennae all dark, flagellum brown, scape broad, dilated, with a conspicuous terminal hump on outer side. Face below antennae cream-color, supraclypeal projection short and truncate, lateral upward extensions of pale color very broad, slightly excavated inwardly at base by antennal sockets, terminating in a broad oblique truncation, a little higher up than the middle of the scape.

Hind border of prothorax with two very narrow yellow lines; tubercles with the usual pale yellow patch, convex and shining, without a dark spot. Tegulae with a light spot. Pleura closely punctured. Enclosed area of metathorax rugose, without the large shining pits of some species. Pubescence of dorsulum gray. Wings hyaline. Femora black; tibiae black, anterior tibiae white in front, middle tibiae with the basal and apical fifths

white, hind tibiae with the basal two-fifths white and a white dot at tip. Tarsi brown, first joint and spot on second joint of four hind tarsi white. First segment of abdomen minutely but distinctly and rather closely punctured, with no lateral hair band.

Hab.—Colorado; Chamber's Lake, Larimer Co., July 18, 1895, 9500 feet (C. F. Baker).

Prosapis digitatus, n. sp.—♂ about 4½ mm. long, black with very pale yellow markings, head and thorax closely punctured. Head of ordinary size, face moderately narrowed below, antennae dark brown, scape not dilated. Face below antennae very pale yellow, the yellow extending upwards in the median line as a rather narrow, conical, truncate projection; at the sides it extends in the form of narrow, straight, finger-like projections, pointing somewhat inwards, well away from the orbital margin. Prothorax, including the tubercles, wholly dark. Tegulae without a light spot. Punctuation of mesothorax hardly so close as in some species, that of scutellum slightly more sparse. Pleura with close, shallow punctures. Base of metathorax more or less radiately wrinkled. Wings smoky. Femora black, except a light spot at the extreme tip of the first four. Tibiae black, anterior tibiae yellowish in front, middle of extreme base, and hind tibiae for basal two-fifths. Tarsi brownish, more or less yellow basally. First abdominal segment shining, with very sparse, small punctures. Pubescence of abdomen very sparse.

Hab.—Colorado; Steamboat Springs, July 13, 1894 (C. F. Baker, No. 1329).

Easily known by the dark tubercles, and lateral face-marks, which free from the orbital margin, are straight and not enlarged at their ends.

Prosapis asinina Ckll. and Csd.—♂ Tr. Am. Ent. Soc., 1895, p. 299; n. syn. *P. bifpes*, Ckll. and Csd. ♀, t. c., p. 300.

Prosapis rudbeckiae, race *ruidosensis*, n. race, ♂.—Larger, about 6 mm. long; up-

ward lateral extensions of pale color on face more conspicuously bulbous at ends, the base from which they arise oblique, being lower on the orbital margin than mesad; scape with only a small pale spot (this may be the case also in true *rudbeckiae*), flagellum below brownish. Tubercles with a yellow patch bearing a dark spot, tegulae wholly dark. Wings strongly tinged with brownish, decidedly larger. Enclosed space of metathorax distinctly longitudinally subreticulately wrinkled, one might perhaps say cancellate. Mesothorax pubescent.

Hab.—New Mexico; Ruidoso Creek, 7500 feet. July 6, 1895, on *Scrophularia* (E. O. Wooton, no. 74).

Prosapis rudbeckiae, race *subdigitata*, n. race, ♂.—Slightly smaller, about $4\frac{1}{2}$ mm. long; pale markings apricot-color (probably reddened by cyanide), upward lateral extensions of pale color on face little swollen and rather short, the base from which they arise oblique, but higher on the orbital margin than mesad. Scape wholly dark. Tubercles and tegulae wholly dark. Wings dusky-hyaline, not yellowish or brownish. Mesothorax with greyish pubescence. Enclosed area of metathorax strongly rugoso-punctate.

Hab.—Colorado; C. F. Baker, 1658. Foothills west of Fort Collins, June 15, 1895.

The two above forms are probably valid species, but for the present it will be a convenience to place them under *rudbeckiae*. The form named *subdigitata* present characters intermediate between *rudbeckiae* and *digitata*; it differs from the latter by its pubescent mesothorax (that of *digitata* being virtually bare), its greyish wings (those of *digitata* being distinctly tinged brownish) its somewhat shorter second submarginal cell. Yet, on the whole, it must be confessed that it is as near to *digitata* as to *rudbeckiae*. The following table will separate the allies of *rudbeckiae*.

A. Tubercles wholly dark.

1. Wings tinged greyish, mesothorax pubescent *subdigitata*.

2. Wings tinged brownish, mesothorax bare. *digitata*.

B. Tubercles partly yellow.

1. Comparatively large, face white, scape wholly white in front. *bakeri*.

2. Face pale yellow, scape with at most a yellow mark.

a. Larger, wings tinged brownish. *ruidosensis*,

b. Smaller, wings tinged greyish. *rudbeckiae*.

Prosapis triangularis, n. sp., ♂.—Length $5\frac{1}{2}$ mm., rather stout, black with deep yellow markings. Head fairly large, face little narrowed below; face-markings deep lemon-yellow, including clypeus, a large elongate-triangular or low-conical supraclypeal mark, the apex of which is obtuse, and the usual lateral marks, deeply notched by antennal sockets, extending thence narrowly upwards along orbital margin to a pointed termination. Scape wholly black, stout but not dilated; flagellum dark brown. Front and vertex very coarsely punctured. Mesothorax, scutellum and pleura with very large close punctures, anterior part of pleura becoming almost cancellate. Enclosed area of metathorax not well-defined, with large confluent pits. Hardly any pubescence on thorax, except a fringe of short white hairs at lateral ridges of metathorax. Hind border of prothorax interrupted in middle, a large patch on tubercles, and spot on tegulae, deep yellow. The dark (hyaline) spot on patch on tubercles is inconspicuous. Anterior femora beneath, middle and hind femora at extreme tips, anterior tibiae in front, basal third of middle tibiae, basal half of hind tibiae, and extreme tips of four hind tibiae, yellow more or less suffused with rufous. Tarsi pale rufescent, first joint of four hind tarsi pale yellow. Wings fuliginous, clear at base. Abdomen shiny, with no distinct hair-bands. Dorsum of first segment impunctate.

Hab.—Georgia, exact locality and collector unknown. Sent by Mr. Fox. In Coll.

Amer. Ent. Soc. It might be confounded with *affinis*, but it is larger, the supraclypeal mark is much longer, and the wings are darker.

Prosapis suffusa, n. sp., ♂.—Length about 6 mm., fairly stout, black with yellow markings. Face little narrowed below, dull lemon-yellow. Supraclypeal mark broad, rapidly narrowing to a bifid apex. Lateral marks roundly excavated by antennal sockets, produced only a short way along orbital margin to a blunt but narrow tip. Scape stout but not dilated, wholly dark; flagellum dark brown, last joint with a longitudinal groove or excavation. Front and vertex with rather small but very close punctures. Mesothorax, scutellum and pleura with very close distinct punctures. Enclosed space of metathorax deeply pitted. Prothorax wholly black except a narrow and inconspicuous yellow line on hind border of tubercles. Tegulae with a very small yellow spot. A spot at apex of anterior femora in front, anterior tibiae in front, a spot at base and one at apex of middle tibiae, and the basal third of hind tibiae in front, yellow. Tarsi brown, the first joint of the four hindmost whitish. Wings pale fuliginous; 2nd submarginal cell narrowing about one-half to marginal. Abdomen without distinct hair-bands; a sericeous pile on dorsum of first segment. First segment very distinctly punctured.

Hab.—Nevada, exact locality and collector unknown. Sent by Mr. Fox. In Coll. Amer. Ent. Soc. Distinguished from *citrinifrons* by its larger size, brown wings, etc.

Prosapis nevadensis, n. sp., ♂.—About 4½ mm long, black with whitish markings. Head of ordinary size, face moderately narrowed below, clypeus and lateral marks brownish-white (very pale café-au-lait), the lateral marks broad, triangular, notched by the antennal sockets, terminating above at an angle of about 45° on the orbital margin: the inferior inner side of the triangle is about one-third longer than the superior. Supraclypeal area wholly dark. Scape hardly at all dilated, wholly dark; flagellum dark brown. Front and vertex coarsely punctured, punctures on front running into grooves. Mesothorax, scutellum and pleura strongly punctured. Enclosed area of metathorax strongly wrinkled. Pubescence on head and thorax excessively sparse and inconspicuous, metathorax not hoary. An interrupted band on prothorax, patch on tubercles (in which is a dark spot) and spot on tegulae pale yellow. Anterior tibiae in front, spot at base of middle tibiae, and basal third of hind tibiae, yellowish-white. Basal joint of four hind tarsi mostly yellowish-white, the tarsi otherwise dark brown. Wings uniformly tinged with fuliginous; second submarginal cell as high as long, not narrowed nearly one-half to marginal. First abdominal segment minutely but very closely and distinctly punctured. No distinct hair-patches or bands on abdomen, but a sericeous pile on basal half of first segment.

Hab.—Nevada, exact locality and collector unknown. Sent by Mr. Fox. In Coll. Amer. Ent. Soc. Easily known by the wholly dark supraclypeal area.

PROPOSED BIOLOGICAL STATION. The undersigned has it in view to establish in New Mexico a Biological Station, and health and holiday resort for scientific and literary persons, teachers and kindred spirits. (No loafers, no fools, no absolute invalids.)

It will be necessary to commence in a small way, as hardly any funds are available, but

it is hoped that by strict economy the running expenses may be met. I shall be very glad to hear at once from anyone interested in the matter, so as to see if anything can be done this year.

T. D. A. COCKERELL,
Las Cruces, N. M.

SUPPLEMENT TO PSYCHE.—II.

LIST OF MT. WASHINGTON COLEOPTERA.

BY F. C. BOWDITCH, BROOKLINE, MASS.

A number of lists of Coleoptera from this region have been published from time to time, and rather than add another, it seemed best to make a consolidation, complete through 1895; a few species mentioned in former lists with a query, (probably included herein under other names) and one or two species believed to have been incorrectly determined, have been omitted.

Mr. Frederick Blanchard has added many species, and given much time, and Mr. Samuel Henshaw has very kindly done the same, and the size of the list is largely due to their efforts. *Cryptobium latebricola* Nord. and *Microclytus gazellula* Hald., are inserted as species at the suggestion of Mr. Blanchard.

Borne by the wind, species from the adjacent country are carried over the mountain, and are collected in great numbers on the Summit, so that a general list of Summit captures includes not only the strictly Arctic fauna, but very many chance visitors.

A warm day with a south wind, produces a wonderful crop of beetles on the Summit; the air is filled with them;

the white painted hotel is a great attraction for many, and the collector is kept busy merely looking over the walls of the buildings; these flights seem worthy of close study, i. e., direction, duration, times, etc., as indicating what goes on all over the country in a greater or less degree; here the mountain enables us to be in the midst of the flight and get an idea of the extent of the migration or moving about of species.

Early in the season is much the best time for collecting, as the cold weather comes very early, and towards the end of July many species have disappeared; one of the most interesting large species listed last summer was the brown variety of *Agabus tristis* Aubé, taken ordinarily in Alaska and high Colorado. Future collecting will doubtless add many small alpine species, and the "Lakes of the Clouds" need careful dredging early in the season, to show their best array of water beetles.

It is hoped the list will serve as a basis for future collectors to attempt a list of the whole White Mountain region, as well as a convenience to collectors on Mt. Washington itself.

CICINDELIDAE.

- Cicindela longilabris* Say, July, summit.
6-guttata Fab., July, summit.
purpurea Oliv., July, summit.
ancosciconensis Harr., July, summit.
vulgaris Say, July, summit.
repanda var. *12-guttata* Dej.

CARABIDAE.

- Cychrus nitidicollis* var. *Brevoorti* Lec.,
 upper woods.
canadensis Chd., upper woods.
Nomaretus bilobus Say, upper woods.
Carabus chamissonis Fisch., June, July, al-
 pine.
serratus Say.
Calosoma frigidum Kby., July, summit.
Elaphrus olivaceus Lec., Lake of Clouds.
fuliginosus Say, July, summit.
riparius Linn., Hermit Lake.
Blethisa Julii Lec., Crawford bridle path.
Notiophilus sylvaticus Esch., upper woods.
Hardyi Putz., July, summit.
Nebria saturalis Lec., June, July, very com-
 mon, alpine.
Sahlbergi Fisch., July, alpine.
pallipes Say, July, common, summit.
Dyschirius globulosus Say, summit.
Bembidum simplex Lec.
scopulinum Kby.
Grapii Gyll.
versicolor Lec., July, summit.
cantum Lec., alpine.
mutatum G. & H., July, summit.
4-maculatum Linn., July, summit.
oblongulum Mann., alpine.
Tachys nanus Gyll., July, summit.
incurvus Say, summit.
Patrobus septentrionis Dej., summit.
rugicollis Rand., July, summit.
Trechus rubens Fab., July, summit.
Pterostichus adoxus Say, July, summit.
rostratus Newm., woods.
honestus Say.
coracinus Newm., July, summit.
punctatissimus Rand., June, Halfway
 House.
lucublandus Say, June; July, very common,
 summit.
mutus Say, near Halfway House.
vitreus Dej., July, summit.
Luczotii Dej., July, common, summit.
vindicatus Mann., July, alpine.
hudsonicus Lec., July, common alpine.
mandibularis Kby., July, common alpine.
Amara arenaria Lec., July, summit.
haematopus Dej., July, not rare, alpine.
hyperborea Dej., July, very common, sum-
 mit, alpine.
laticollis Kby., July, summit.
pallipes Kby., July, summit.
cupreolata Putz.
erratica Duft., summit.
Calathus ingratus Dej., July, carriage road.
advena Lec.
impunctatus Say.
Platynus angustatus Dej., Halfway House.
maurus Mots., Alpine.
sinuatus Dej.
bicolor Dej.
atratus Lec.
affinis Kby., July, summit.
cupripennis Say, July, common, summit.
carbo Lec., July, Hermit Lake (also
 from Gunnison, Col.)
Bogemanni Gyll., July, common, summit-
 down.
quadripunctatus DeG., July, summit.
ruficornis Lec.
retractus Lec.
Lebia pumila Dej., July, summit.
furcata Lec., July, summit.
Metabletus americanus Dej., July, summit.
Cymindis cribricollis Dej.
unicolor Kby.
Chlaenius niger Rand., July, one specimen,
 summit.
Brachylobus lithophilus Say.
Agonoderus pallipes Fab., July, summit.
pauperculus Dej.
Harpalus viridiaeneus Beauv., July, com-
 mon, summit.
pennsylvanicus DeG.
spadiceus Dej., Alpine.
pleuriticus Kby., July, common, summit.

- herbivagus* Say, July, common, summit.
laticeps Lec., summit.
varicornis Lec., summit.
Stenolophus fuliginosus Dej., summit.
conjunctus Say, July, common, summit.
Bradycellus cognatus Gyll., summit.
neglectus Lec., Willis Seat, Lake of Clouds.
cordicollis Lec.
Tachycellus nigrinus Dej., July, summit, Willis Seat.
Anisodactylus piceus Lec.
rusticus Say, July, common, summit.
Harrisii Lec, summit.
baltimorensis Say, July, summit.
- HALIPLIDÆ.
- Haliplus cribrarius* Lec., July, common, Lakes of Clouds.
ruficollis DeG. July, common, Lakes, of Clouds.
- DYTISCIDÆ.
- Laccophilus maculosus* Germ., July, common, summit.
Bidessus affinis Say, July, common, summit.
lacustris Say.
Coelambus dissimilis G. & H., July, Lakes of Clouds, 4 specimens.
impressopunctatus Sch., July, Lakes of Clouds, 4 specimens.
Deronectes catascopium Say, July, common, Lakes of Clouds.
Hydroporus caliginosus Lec., Hermit Lake.
signatus Mann., July, Lakes of Clouds.
morio Sharp, July, Lakes of Clouds.
vitulus Er, July, common, Lakes of Clouds.
americanus Aubé.
niger Say, July, Lakes of Clouds.
modestus Aubé, July, Lakes of Clouds.
Hybius ater De G., Hermit Lakes.
angustior Gyll., July, Lakes of Clouds, 1 specimen.
Coptotomus interrogatus Fab., Hermit Lakes.
Agabus seriatus Say, July, common, summit Hermit Lake.
- semipunctatus* Kby.
punctulatus Aubé, July, not rare, Lakes of Clouds.
ambiguus Say, July, Lakes of Clouds.
anthracinus Mann., July, not rare, Lakes of Clouds, alpine.
infuscatus Aubé, July, Lakes of Clouds.
reticulatus Kby. Hermit Lake.
tristis Aubé, July, *brown variety* very common, Hermit Lake, Lake of Clouds, alpine.
leptapsis Lec., July, Lake of Clouds.
Rhantus binotatus Harr., July, common, Lake of Clouds.
bistriatus Bergst., July, rare, Lakes of Clouds.
Colymbetes longulus Lec., July, rare, Lake of Clouds
sculptilis Harr., July, rare, Lakes of Clouds.
Hydaticus stagnalis Fab., July, Lakes of Clouds, 1 specimen.
Dytiscus Harrisii Kby., Lakes of Clouds.
Acilius semisulcatus Aubé, July, very common, Lakes of Clouds, Hermit Lake.
fraternus Harr.
mediatus Say, July, not rare, Lakes of Clouds.
- GYRINIDÆ.
- Gyrinus ventralis* Kby.
affinis Aubé.
Dineutes assimilis Aubé.
nigrior Rob., Hermit Lake.
- HYDROPHILIDÆ.
- Helophorus linearis* Lec.
lineatus Say, Lakes of Clouds.
inquinatus Mann., summit.
Tropisternus mixtus Lec., July, summit.
glaber Hbst., Lakes of Clouds.
sublaevis Lec., Hermit Lake.
Hydrocharis obtusatus Say, July, Lakes of Clouds.
Berosus striatus Say, July, Lakes of Clouds.
Laccobius agilis Rand, Lakes of Clouds.
Philhydrus perplexus Lec., Lakes of Clouds.
consors Lec., Lakes of Clouds.

- Cymbiodyta fimbriata* Mels., July, Lakes of Clouds.
lacustris Lec., July, Lakes of Clouds.
Helocombus bifidus Lec., summit.
Hydrobius fuscipes Linn., summit.
Creniphilus monticola Horn, Hermit Lake.
Peabody river.
subcupreus Say, July, summit.
Cercyon sp.
- SILPHIDAE.
- Necrophorus americanus* Oliv., Half-way House.
orbicollis Say, Half-way House.
vespilloides Hbst.
Silpha surinamensis Fab., July, summit.
noveboracensis Forst.
Choleva basillaris Say.
Colon bidentatum Sahlb, subalpine.
dentatum Lec., sub-Alpine.
magnicolle Mäkl, July, subalpine.
Hydnobius substriatus Lec.
Anisotoma valida Horn.
assimilis Lec., summit.
Liodes globosa Lec., near Lake of Clouds.
obsoleta Horn.
geminata Horn.
Agathidium exiguum Mels.
repentinum Horn, woods.
politum Lec., woods.
pulchrum Lec.
difforme Lec., woods.
- SCYDMAENIDAE.
- Scydmaenus subpunctatus* Lec.
Brathinus nitidus Lec., in drift wood along streams.
varicornis Lec., in drift wood along streams.
- PSELAPHIDAE.
- Decarthron abnorme* Lec.
- STAPHYLINIDAE.
- Falagria dissecta* Er., July, summit.
 sp? July, summit.
- Homalota picipennis* Mann.
Tachyusa sp?
Acylophorus pronus Er.
Quedius peregrinus Grav.
laevigatus Gyll., July, summit.
molochinus Grav., July, summit.
fulvicollis Steph.
brunnipennis Mann., woods.
prostans Horn.
Listrotrochus cingulatus Grav., Willis Seat.
Staphylinus badipes Lec., July, summit.
vulpinus Nord., summit.
cinnamopterus Grav., July, summit.
Tympanophorus puncticollis Er., summit.
Philonthus palliatus Grav., July, summit.
debilis Grav. July, summit.
varians Payk., July, summit.
fulvipes Fab., July, summit.
Pettiti Horn.
lonatus Er., July.
aequalis Horn. July, summit.
brunneus Grav., July.
cyanipennis Fab.
brevipennis Horn, woods.
microphthalmus Horn
Xantholinus obscurus Er., July.
hamatus Say, July, summit.
Baptolinus macrocephalus Nord.
longiceps Fauv., woods.
Dianous nitidulus Lec.
Stenus bipunctatus Er.
Juno Fab.
Austini Casey.
rugifer Casey, Hermit Lake.
montanus Casey.
alpicola Er.
egenus Er.
noctivagus Casey.
monticola Casey.
Cryptobium pallipes Grav.
pallipes var. *latebricola* Nord. Willis Seat.
Lathrobium concolor Lec.
pedale Lec.
Paederus littorarius Grav., July, summit.
Sunius longiusculus Mann., July, summit.
Tachinus parallelus Horn.
pallipes Grav.

Tachyporus jocosus Say, July, summit.
 chrysomelinus Linn., July, summit.
 scitulus Er. Alpine, sub-alpine.
 Erchomus ventriculus Say, July, summit.
 Conosoma Knoxii Lec., July, summit.
 Boletobius cingulatus Mann.
 intrusus Horn, July, summit.
 anticus Horn.
 obsoletus Say.
 Bryoporus rufescens Lec., July, summit.
 Mycetoporus humidus Say, July, summit,
 Willis Seat.
 splendidus Grav.
 Oxyporus 5-maculatus Lec.
 Oxytelus pennsylvanicus Er.
 Ancyrophorus planus Lec., common, along
 streams.
 Geodromicus nigrita Müll.
 Lesteva pallipes Lec. In moss along streams.
 Acidota crenata Fab., July, summit.
 quadrata Zett.
 Arpedium cribratum Fauv.
 Gyllenhalli Zett.
 Olophrum rotundicolle Say.
 Anthobium pothos Mann.
 Micraedus austiniensis Lec. In moss along
 streams.
 Protinus limbatus Mäkl.

SCAPHIDIIDAE.

Scaphidium 4-guttatum var. 4-pustulatum
 Say, summit.
 Scaphium castanipes Kby., woods.
 Scaphisoma terminatum Mels.
 rubens Casey.

COCCINELLIDAE.

Hippodamia 13-punctata Linn.
 parenthesis Say, July, summit.
 Coccinella trifasciata Linn., July, summit.
 transversoguttata Fald., July, summit.
 monticola Muls.
 tricuspis Kby. summit, Willis Seat.
 Adalia frigida Schn.
 Harmonia picta Rand., July, summit.
 14-guttata Linn.
 var. similis Rand., July, summit.
 12-maculata Gebl., July, summit.

Mysia pullata Say.
 Anatis ocellata Linn., summit.
 Psyllobora 20-maculata Say, July, summit.
 Chilocorus bivulnerus Muls., July, summit.
 Brachyacantha ursina Fab., July, summit.
 Hyperaspis undulata Say, alpine.
 signata Oliv.
 proba Say.
 bigeminata Rand., summit.
 lugubris Rand., July, summit.
 Sycmus puncticollis Lec., summit.
 tenebrosus Muls., July, summit.

ENDOMYCHIDAE.

Phymaphora pulchella Newm.
 Lycoperdina ferruginea Lec., Willis Seat.
 Mycetina perpulchra Newm.

EROTYLIDAE.

Mycotretus pulchra var. dimidiata Lac.

COLYDIIDAE.

Lasconotus borealis Horn, July, summit.
 Cerylon castaneum Say.

CUCUJIDAE.

Cucujus clavipes Fab., summit.
 Laemophlaeus biguttatus Say, summit.

CRYPTOPHAGIDAE.

Antherophagus ochraceus Mels.
 Henoticus serratus Gyll., summit.
 Cryptophagus sp.
 Atomaria ephippiata Zimm., July, summit.

DERMESTIDAE.

Byturus unicolor Say, summit.
 Dermestes lardarius Linn.
 Anthrenus castaneae Mels.
 Orphilus glabratus Fab.

HISTERIDAE.

Hister planipes Lec., July, summit.
 interruptus Beauv., July, summit.

NITIDULIDAE.

- Cercus pennatus* Murr.
Epuraea immunda Sturm.
 truncatella Mann., summit.
 planulata Er.
 ovata Horn, July, summit.
 peltooides Horn.
 labilis Er., summit.
Omosita colon Linn., July, summit.
Ips fasciatus Oliv., July, summit.
 sanguinolentus Oliv., July, summit.
 confluentus Say, sub-alpine.
Rhizophagus dimidiatus Mann.
 remotus Lec., Glen.

LATHRIDIIDAE.

- Melanophthalmus distinguenda* Com.

TROGOSITIDAE.

- Peltis ferruginea* Linn.
Grynocharis 4-lineata Mels.
Thymalus fulgidus Er.

BYRRHIDAE.

- Pedilophorus subcanus* Lec., sub-alpine.
Cytillus sericeus Forst., July, summit.
 trivittatus Mels., July, summit.
Byrrhus americanus Lec., July, summit.
 cyphophorus Lec., July, summit.
 geminatus Lec., July, summit.
 Pettitii Horn, July, summit.
 Kirbyi Lec., July, summit.
Syncalypta sp., July, summit.

DASYLLIDAE.

- Macropogon rufipes* Horn.
Eucinetus oviformis Lec., Glen.
 testaceus Lec., Glen.
Prionocyphon discoideus Say, alpine.
Cyphon obscurus Guér.
 variabilis Thun., summit.

ELATERIDAE.

- Deltometopus amoenicornis* Say.
Epiphanius cornutus Esch.

- Adelocera aurorata* Say, July, 2 specimens, summit.
 brevicornis Lec., July, summit.
Cardiophorus convexulus Lec., July, 1 specimen, summit.
Cryptohypnus Sanborni Horn, July, very plenty, summit, sub-alpine.
 abbreviatus Say, June; July, very common, summit.
 nocturnus Esch., summit.
 var. *bicolor* Esch., sub-alpine.
 planatus Lec.
Hypnoidus tumescens Lec.
 restrictulus Mann., July, summit.
Elater carbonicolor Esch., alpine
 pedalis Germ.
 mixtus Hbst., July, summit.
 pullus Germ., July, summit.
 nigricollis Hbst., alpine.
 linteus Say, alpine.
 socer Lec., July, summit.
 semicinctus Rand., July, rather rare, summit.
 luctuosus Lec.
 nigricans Germ.
 rubricus Say, July, common, summit.
 apicatus Say, July, common, summit.
Megapenthes stigmaticus Lec.
Agriotes mancus Say, July, common, summit.
 stabilis Lec., July, common, summit.
 fucosus Lec., Willis Seat.
 limosus Lec., July, common, summit.
Dolopius lateralis Esch. July, common, summit.
Melanotus scrobicollis Lec., July, 1 specimen, summit, Willis Seat.
Limonius confusus Lec., Willis Seat.
 aeger Lec.
 pectoralis Lec.
Campylus productus Rand.
 denticornis Kby. July, summit, Willis Seat.
Athous scapularis Say.
 rufifrons Rand.
Oestodes tenuicollis Rand., July, summit.
Paranomus costalis Payk., July, summit.
 estriatus Lec., Willis Seat.

Sericosomus honestus Ramb., woods.
incongruus Lec.
Corymbites virens Sch., July, Aug., very
 common, one specimen with entirely
 green elytra, summit.
resplendens Esch., July, common, summit.
cylindriformis Hbst.
fulvipes Bland.
spinus Lec., July, very common, summit.
tarsalis Mels.
carcinus Germ., Willis Seat.
falsificus Lec., July, summit.
insidiosus Lec.
fallax Say.
medianus Germ., July, very common,
 summit.
triundulatus Ramb., July, summit.
hamatus Say.
propola Lec., July, summit.
hieroglyphicus Say, July, very plenty,
 summit.
cruciatus Linn., July, summit.
aeripennis Kby., July, not rare, summit.
aratus Lec., summit.
metallicus Payk., July, summit.
Oxygonus obsesus Say, summit.
 n. sp.
Asaphes decoloratus Say, July, summit.

THROSCIDÆ.

Aulonothroscus constrictus Say.

BUPRESTIDÆ.

Dicerca divaricata Say, July, summit.
obscura var. *lurida* Fab.
tenebrosa Kirby.
Buprestis maculiventris Say, July, summit.
 Willis Seat.
fasciata Fab.
Melanophila longipes Say, July, summit.
Drummondi Kby., July, summit.
fulvoguttata Harr., July, summit.
Anthaxia aeneogaster Lap., July, summit.
Chrysobothris femorata Oliv., July, summit.
dentipes Germ., July, summit.
scabripennis Lap., July, summit.
trinervia Kby., July, summit.

Agrilus anxius Gory, July, summit.
obsoleto-guttatus Gory, July, summit.
Brachys ovata Web.

LAMPYRIDÆ.

Colopteron reticulatum Fab., Lake of
 Clouds.
Celetes basalis Lec.
Caenia dimidiata Fab., July, summit.
Eros thoracicus Ramb.
aurora Hbst., July, summit and Fabyan
 Bridle Path.
sculptilis Say.
crenatus Germ.
Plateros modestus Say, Lake of Cloud.
Lucidota atra Oliv., summit.
Elychnia corrusca Linn., July, summit and
 Fabyan Bridle Path.
Pyropyga nigricans Say.
decipiens Harr., July, summit.
Pyractomena lucifera Mels., sub-alpine.
Photuris pennsylvanicus DeG., Willis Seat.
Podabrus rugulosus Lec., Willis Seat.
diadema Fab., July, summit. Alpine and
 sub-alpine.
modestus Say.
limbellus Lec.
punctatus Lec.
puncticollis Kby.
piniphilus Esch., sub-alpine.
simplex Coup.
laevicollis Kby., alpine and sub-alpine.
Telephorus traxini Say.
carolinus Fab., July, summit.
nigritulus Lec.
rectus Mels.
scitulus Say.
rotundicollis Say, July, summit. Willis
 Seat.
Curtisii Kby., summit.
tuberculatus Lec.
Malthodes fuliginosus Lec.
niger Lec.
 sp., woods.

MALACHIDÆ.

Attalus terminalis Say, July, summit.

CLERIDÆ.

- Thanasimus dubius* Fab.
undulatus Say, July, summit.
 var. *nubilus* Kl., alpine.
Hydnocera subaenea Spin.
verticalis Say, summit.

PTINIDÆ.

- Hadrobregmus foveatus* Kby.
Xyletinus fucatus Lec.
Dorcatoma pallicorne Lec., Halfway House.
Ptilinus ruficornis Say, July, summit.
Dinoderus substriatus Payk., July, summit.

LUCANIDÆ.

- Platycerus depressus* Lec., July, summit.

SCARABÆIDÆ.

- Aphodius fossor* Lec.
validus Horn, July, summit.
hamatus Say, July, summit.
finetarius Linn., July, common, summit.
granarius Linn., July, common, summit.
prodromus Brahm., July, summit.
Geotrupes splendidus Fab.
Balyi Jek., near Willis Seat.
Dichelonycha elongata Fab., summit.
subvittata Lec., summit.
Serica tristis Lec
Macroductylus subspinosus Fab.
Lachnosterna fusca Fröh.
Aphonus tridentatus Say, near Willis Seat.
Allorhina nitida Linn., July, summit.
Euphoria fulgida Fab., July, summit.
Trichius affinis Gory.

CERAMBYCIDÆ.

- Asemum moestum* Hald., July, summit.
Criocephalus asperatus Lec., July, summit.
Tetropium cinnamopterum Kby., July, not rare, summit.
Gonocallus collaris Kby.
Rhopalopus sanguinicollis Horn, July, Aug., summit.
Hylotrupes ligneus Fab.

- Phymatodes maculicollis* Lec.
dimidiatus Kby., summit.
Merium proteus Kby.
Callidium jaanthinum Lec., summit.
Molorechus bimaculatus Say.
Calloides nobilis Harr.
Clytus marginicollis Lap.
Xylotrechus colonus Fab., July, not uncommon, summit.
4-maculatus Hald., July, summit.
undulatus Say.
Neoclytus muricatus Kby.
Clytanthus ruficola Oliv., summit.
Microclytus gazellula Hald.
Cyrtophorus verrucosus Oliv.
Desmocerus palliatus Forst., Willis Seat.
Rhagium lineatum Oliv., July, summit.
Pachyta monticola Rand., July, common, summit.
Anthophilax malachiticus Hald.
attenuatus Hald., July, summit.
Acmaeops bivittata Say, July, summit.
proteus Kby., July, summit.
pratensis Laich., summit.
Gaurotes cyanipennis Say, summit.
abdominalis Bland.
Bellamira scalaris Say, July, summit.
Leptura plebeja Rand.
subargentata Kby.
capitata Newm.
instabilis Hald.
6-maculata Linn., July, Aug., summit.
nigrella Say.
canadensis Oliv., July, summit.
vagans Oliv.
sanguinea Lec., Willis Seat.
hirtella Lec.
proxima Say, July, summit.
tibialis Lec.
pedalis Lec.
vittata Oliv.
pubera Say, July, summit.
ruficollis Say, July, summit.
 var. *sphaericollis* Say.
vibex Newm.
mutabilis Newm., July, summit.
aspera Lec.

Monohammus scutellatus Say, July, very common, summit.
confusor Kby., July, summit.
marmorator Kby.
Hyperplatys maculatus Hald., summit.
Graphisurus pusillus Kby.
Acanthocinus obsoletus Oliv., alpine.
obliquus Lec., July, summit.
Pogonocherus penicellatus Lec., July, summit.
mixtus Hald.

CHRYSOMELIDÆ.

Donacia subtilis Kunze, summit.
pusilla Say.
emarginata Kby., July, summit.
metallica Ahr.
rufa Say, summit.
Orsodachna atra Ahr., July, summit, Willis Seat.
Syneta ferruginea Germ.
Pachybrachys sp. Willis Seat.
Diachus auratus Fab., July, summit.
catarius Suff.
Adoxus obscurus Linn., July, Aug., summit.
Graphops pubescens Mels., July, summit.
nebulosus Lec.
Typophorus canellus Fab., July, summit.
Nodonota tristis Oliv., July, Lake of Clouds.
Prasocuris vittata Oliv., July, summit.
Doryphora 10-lineata Say, July, summit.
Chrysomela elegans Oliv., July, summit.
scalaris Lec., summit.
multipunctata Say, Willis Seat.
 var. *bigsbiana* Kby., summit.
Gastroidea polygoni Linn., July, summit.
Lina lapponica Linn., Willis Seat,
tremulæ Fab., July, summit.
Gonioctena pallida Linn., June, July, summit.
Phyllodecta vulgatissima Linn., July, summit.
Luperodes meraca Say, July, summit.
cyanellus Lec., July, summit.
 var. *varipes* Lec., July, summit.
Trirhabda canadensis Kby., July, summit.
Galerucella cavicollis Lec., July, summit,
 Willis Seat.

nymphaea Linn., Willis Seat.
decora Say, July, summit.
Disonycha pennsylvanica Ill. July, summit.
triangularis Say.
xanthomelaena Dalm., July, summit.
Haltica bimarginata Say, July, summit.
ignita Ill.
evicta Lec.
Crepidodera helixenes Linn., July, summit.
robusta Lec., July, alpine, summit, in moss.
Epitrix cucumeris Harf, July, summit.
Phyllotreta vittata Fab., sub-alpine.

TENEBRIONIDÆ.

Phellopsis obcordata Kby.
Iphthimus opacus Lec., July, summit.
Upis ceramboides Linn., July, summit.
Scotobates calcaratus Fab.
Tenebrio molitor Linn., Willis Seat.
tenebrioides Beauv., Willis Seat.
Paratenetus punctatus Sol., summit.
Boletotherus bifurcus Fab.
Boletophagus depressus Rand.

CISTELIDÆ.

Hymenorus niger Mels.
Isomira 4-striata Coup., July, summit.

LAGRIIDÆ.

Arthromacra aenea Say, Willis Seat.

MELANDRYIDÆ.

Tetratoma tessellata Mels.
Prothalia undata Lec.
Melandrya striata Say, July, summit.
Emmesa connectens Newm., July, summit.
Xylita laevigata Hellen, near summit.
Zilora hispida Lec.
Scotochroa atra Lec.
Serropalpus barbatus Schall.
Mystaxis simulator Newm.
Eustrophus confinis Lec., July, summit.
Orchesia castanea Mels.
Canifa pallipes Mels.
Scotodes americana Horn, July, summit.

PYTHIDAE.

- Crymodes discicollis* Lec., July, summit.
Pytho niger Kby.
 strictus Lec.
Priognathus monilicornis Rand., S. W. slope
 of mountain.
Salpingus virescens Lec., July, summit.

OEDEMERIDAE.

- Ditylus caeruleus* Rand.
Asclera ruficollis Say, summit.

CEPHALOIDAE.

- Cephaloon lepturides* Newm., July, summit.
 ungulare Lec., July, summit.

MORDELLIDAE.

- Anaspis nigra* Hald.
 flavipennis Hald.
 rufa Say, summit.
Pomoxia lineella Lec., July, summit.
Mordella scutellaris Fab., summit.
 serval Say, summit.
Mordellistena scapularis Say.

ANTHICIDAE.

- Nematoplus collaris* Lec.
Corphyra fulvipes Newm.
 Newmani Lec.
 cyanipennis Bland., summit.
 lugubris Say, July, summit, Willis Seat.
Xylophilus piceus Lec.
Notoxus anchora Horn.
Anthicus coracinus Lec.

PYROCHROIDAE.

- Ischalia costata* Lec.
Schizotus cervicalis Newm., July, summit.
Dendroides concolor Newm.

MELOIDAE.

- Macrobasis unicolor* Kby., July, summit.
Epicauta cinerea Forst.

ATTELABIDAE.

- Attelabus bipustulatus* Fab.
 rhois Boh.

OTIORHYNCHIDAE.

- Hormorus undulatus* Uhler.
Cercopeus chrysorrhoeus Say, Lake of
 Clouds.

CURCULIONIDAE.

- Pythonomus nigrirostris* Fab.
Lepyrops palustris Scop., July, summit,
 alpine.
Macrops sparsus Say.
Pissodes strobi Peck, June, summit.
 affinis Rand., July, summit.
 dubius Rand., June.
 rotundatus Lec.
Pachylobius picivorus Germ.
Hyllobius pales Hbst., July, summit.
 confusus Kby.
Hypomolyx piceus De Geer.
Dorytomus laticollis Lec., summit.
 brevicollis Lec., Willis Seat.
Magdalis Lecontei Horn.
 nov. sp. near hispidoides Lec.
 alutacea Lec., (also from high Mts. of
 Colo.
Anthonomus scutellatus Gyll., July, summit.
 suturalis Lec.
 musculus Say.
 xanthocnemis Dtz., summit.
Elleschus scanicus Payk.
Orchestes salicis Linn.
 niger Horn.
 pallicornis Say.
Conotrachelus nenuphar Hbst. summit.
Idiostethus ellipsoideus Casey, summit.
Cryptorhynchus bisignatus Say, July,
 summit.
Balaninus obtusus Blanch., summit.
 uniformis Lec., July, summit.

CALANDRIDAE.

- Cossonus subareatus* Boh.
Rhyncholus brunneus Mann.

SCOLYTIDÆ.

- Xyloterus lineatus* Oliv., July, Summit.
Xyleborus tachygraphus Zimm.
caelatus Eich.
Dryocoetes autographus Ratz., July, summit.
Tomicus pini Say, summit.

- Polygraphus rufipennis* Kby., July, summit,
 Lake of Clouds.
Hylurgops glabratus Zett.

ANTHRIBIDÆ.

- Eurymycter fasciatus* Oliv., Willis Seat.
Allandrus bifasciatus Lec., summit.

Just Published, by Henry Holt & Co., New York.

Scudder's Brief Guide to the Commoner Butterflies.

By SAMUEL H. SCUDDER. xi + 206 pp. 12mo. \$1.25.

An introduction, for the young student, to the names and something of the relationship and lives of our commoner butterflies. The author has selected for treatment the butterflies, less than one hundred in number, which would be almost surely met with by an industrious collector in a course of a year's or two year's work in our Northern States east of the Great Plains, and in Canada. While all the apparatus necessary to identify these butterflies, in their earlier as well as perfect stage, is supplied, it is far from the author's purpose to treat them as if they were so many mere postage-stamps to be classified and arranged in a cabinet. He has accordingly added to the descriptions of the different species, their most obvious stages, some of the curious facts concerning their periodicity and their habits of life.

Scudder's The Life of a Butterfly. A Chapter in Natural History for the General Reader.

By SAMUEL H. SCUDDER. 186 pp. 16mo. \$1.00.

In this book the author has tried to present in untechnical language the story of the life of one of our most conspicuous American butterflies. At the same time, by introducing into the account of its anatomy, development, distribution, enemies, and seasonal changes some comparisons with the more or less dissimilar structure and life of other butterflies, and particularly of our native forms, he has endeavored to give, in some fashion and in brief space, a general account of the lives of the whole tribe. By using a single butterfly as a special text, one may discourse at pleasure of many; and in the limited field which our native butterflies cover, this method has a certain advantage from its simplicity and directness.

THE SEVENTH VOLUME OF PSYCHE

Began in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

Vols. 1-6, Complete, Unbound, - Now sold for \$29.00.
 Vols. 1-6, and Subscription to Volume 7, - - \$33.00.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

Vol. 1. Introduction; Nymphalidae.

Vol. 2. Remaining Families of Butterflies.

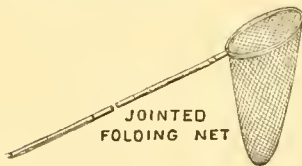
Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo, half levant, \$75.00 net.

HOUGHTON, MIFFLIN & CO.,

4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

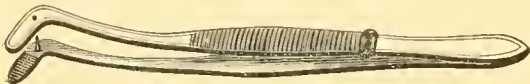
MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.
 78 Ashland Place.

BROOKLYN, N. Y.



PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 243.

JULY, 1896.

CONTENTS:

A NEW STRUCTURAL CHARACTER IN INSECTS (Plate 9).— <i>R. A. Cooley.</i>	395
NOTES ON BUTTERFLIES.— <i>Caroline G. Soule.</i>	398
NOTES ON THE WINTER INSECT FAUNA OF VIGO Co., IND.—VI.— <i>W. S. Blatchley.</i>	399
NOTES ON THE ACRIDIDAE OF NEW ENGLAND.—II.—TRYNALINAE.—IV.— <i>Albert P. Morse.</i>	402
NOTES ON THE OVIPOSITION OF <i>THANAOS ICELUS</i> (?)— <i>Justus Watson Folsom.</i>	403
<i>CALEPHIELIS BOREALIS</i> .— <i>Ellison A. Smythe, Jr.</i>	403

PUBLISHED BY THE
 CAMBRIDGE ENTOMOLOGICAL CLUB,
 CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

70513

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5.00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.38
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danaus archippus</i> . Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichthyology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> . col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

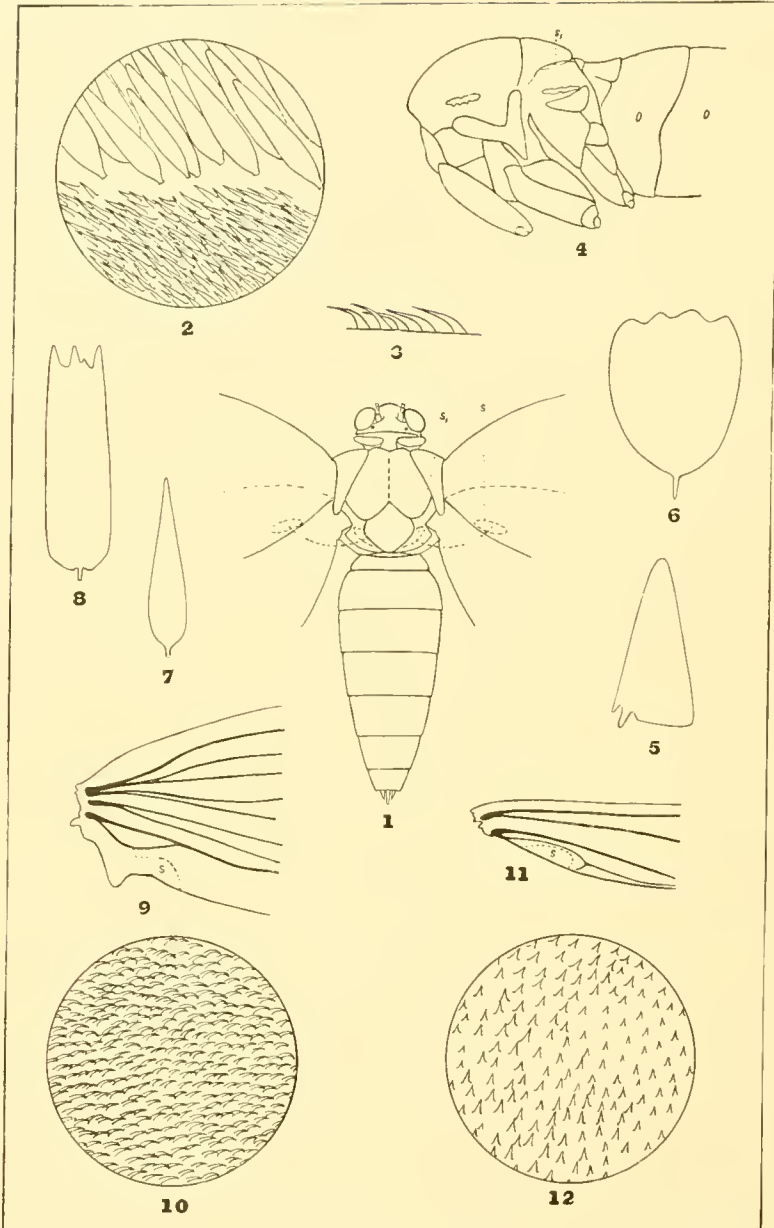
H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Paris 23-30.



COOLEY,—A NEW STRUCTURAL CHARACTER.

PSYCHE.

A NEW STRUCTURAL CHARACTER IN INSECTS.

BY R. A. COOLEY B. S., AMHERST, MASS.

While studying the wings of the Gypsy Moth for androconia I observed a peculiar structure which I have never seen definitely described. This structure is a small oval patch of short, sharp spines on the under side of the fore wing, near the base of the hind margin. A short notice of this, with illustrations, appears in Part II of Prof. C. H. Fernald's Report on the Gypsy Moth, just published. The spiny area was also found in *Crambus laqueatellus* Clem., and is described in Prof. Fernald's Monograph of the Crambidae, recently published in the Thirty-third Annual Report of the Massachusetts Agricultural College. Further investigation has revealed the fact that the structure is not confined to *Porthetria dispar* (Linn.) and *Crambus laqueatellus* Clem., but is present in very many of the Heterocera, and that whenever this occurs, there is always a corresponding patch on the thorax, at the place where the spines rest when the wings are in repose.

The only previous mention of anything of the kind, so far as known to me, is by Dr. W. Donitz, who in an article entitled "A Singing Lepidopteron," published in 1887 in the Berliner entomologische Zeitschrift, Vol. 31,

states that while holding a male of *Dionychopus niveus* Men. between his fingers it made a chirping noise. *D. niveus* is found in Japan and Siberia and is related to our *Spilosoma*. He states that the sound is produced by the rubbing together of brushes of sharp chitinized spines, one on the under side of the fore wings near the base, and one on the upper side of the hind wing. He expressed the opinion that the sound is produced for sexual attraction, but he was hardly justified in this conclusion since he had only males for examination. Though I have studied many species I have never found anything like what Dr. Donitz describes on the hind wing, but as previously stated, the second area is always found on the thorax. May it not be that he was mistaken in his observations?

The following descriptions were made from *Catocala concumbens* Walk., an insect which shows the structures distinctly, and which may be considered as typical. Figs. 1, 2, 3, and 4 of Plate 9, were drawn from this insect. On the fore wing the area Fig. 1, s, is more or less oval in form with its longest axis nearly parallel to the hind margin of the wing and it is without scales. It has a definite boundary at which the

spines disappear and the scales begin. The points of the spines are raised at an angle of about 45° and directed obliquely away from the edge of the wing. Fig. 2, is taken from the edge of the patch on the left wing of Fig. 1, and shows both the spines and bordering scales in their relative size and position in relation to the wing. Fig. 3 is a lateral view of the spines as seen from the edge of a fold through the spiny area.

On the thorax the area is of similar form and size, with clearly defined boundaries and is located on the metascutum at the base of the abruptly raised meso-scutellum. See Fig. 1, S_1 , and Fig. 4, S_1 . The area on the thorax is slightly raised and flattened and has no scales. The spines which cover this area are precisely like those on the wing and are so directed as to point opposite or nearly opposite to them when the wings are closed. The spiny area when present occurs in both sexes, even on the thorax of the apterous females of the species of *Orgyia*. In the microlepidoptera, so far as has been observed, the spines both on the wing and thorax are much farther apart than in the Macros.

So far as is known the Rhopalocera do not possess these structures. There is, however, on the fore wings of butterflies a patch of modified scales which are pointed and elevated, but the patch is of irregular shape and has no definite boundary. In some it is very apparent (*Anosia plexippus* Linn.) while in others it is obscure (*Pieris rapae*

Linn.). The scales are often smaller than the general type of scales of the wing, but they are much larger than the spines of the Heterocera. There is no corresponding area on the thorax but on the hind wing the scales near the base of the costa are similarly modified. Fig. 5 shows one of the modified scales from *A. plexippus* and Fig. 6 a normal scale from the same wing. Figs. 7 and 8 are respectively the same from *Heodes hypophlaeas* (Bdv.)

In *A. plexippus* the modified scales are so directed that those on one wing cross those on the other at an angle. If the two detached wings be held in their natural relative positions the scales of the two areas perceptibly interlock. It is possible that these scales assist the wings in making a uniform movement.

It is an interesting fact that some, at least, of the Trichoptera possess similar spiny structures. They are not, however, so well marked as in the Heterocera and in some cases (*Leptocerus* sp.) they are very indistinct or absent. *Neuronia stygipes* Hag. and *Neuronia semifasciata* Say have them well developed, both on the wings and thorax. The most important difference is that in the Trichoptera the spines gradually change to the ordinary slender spines, which cover the whole remaining surface of the wings and body. Fig. 8, shows the location of the patch on the wing of *Neuronia* and Fig. 10, shows the spines enlarged. Owing to a lack of duplicate material in this order, only a few species have been examined.

In the Hymenoptera, I have found

the spiny areas in two species, *Tromex columba* (Linn.), and *Urocerus cressoni* Norton, both of which have them very well developed both on the wings and thorax. The patch on the wings bears a close resemblance to that of the Heterocera except that the spines are more blunt. The patch on the thorax can be seen with the naked eye. See Fig. 11, s. and Fig. 12.

The question at once arises for what use are these organs? The theory of Donitz that they are for sexual attraction seems hardly tenable. In this case they must necessarily produce a sound, for they could attract in no other way. This seems scarcely possible, however, when we consider the relative directions in which the spines of the two areas point when they are in contact. In all cases the spines of the two areas point in opposite, or nearly opposite directions, and an attempt to rasp one surface over the other would result in an interlocking of the two as of the teeth of two hostler's grooming cards, whose handles are pointed in opposite directions. The fact that the structures are found in both sexes would also seriously weaken the theory that they are for sexual attraction. The most feasible theory in my opinion is, that they serve to hold the wings in place when at rest, thus allowing a relaxation of the muscles of the wings. We can conceive how this might be a great convenience to moths which close the wings over the back. Of course, the organs would be of no use to moths which do not close their wings in this way, as the Geometrina and Pteroporidae, and these do not have them.

It should be stated, however, that they are not found in all moths which do close the wings; the Sphingidae lack them.

The following is the result of an extended search through the Heterocera for these organs. The families are mentioned in the order in which they occur in Smith's List. It will be found that while the majority of moths have the spiny area, some groups, some parts of groups and some individuals lack them. Families not mentioned have not been examined. As previously stated they are not found in the Sphingidae, although they were discovered in every species which was examined of the Sesiidae. The Agaristidae, Syntomidae, Pyromorphidae, Ctenuchidae, Nycteolidae and Lithosiidae all possess them. *Euphancassa mendica* Walk., formerly classed with the Lithosiidae lacks them; but this species is now considered by some, at least, to belong to the Geometrina. The Arctiidae, Liparidae, Limacodidae have them and the Notodontidae also with the exception of *Apatelodes torrefacta* S. & A. The Platypterygidae and Saturniidae lack them. Of the Ceratocampidae, *Eacles imperialis* (Drn.) and *Dryocampa rubicunda* (Fabr.) lack them, while *Anisota senatoria* S. & A. has them. The Bombycidae, Cossidae, Hepialidae and all the families of the Noctuidae, except the Brepidae have them. As already stated they are not found in the Geometrina.* They

* The fact that the spiny area does not occur in *Brepfos infans* Moesch., one of the Brepidae, tends to confirm the statement of Meyrick that "Brepfos is a true member of this group," Geometrina.

occur in the Pyraustidae, Pyralididae, Phycitidae and Crambidae. The Pterophoridae do not have them. They are found in the Tortricidae, Grapholithidae, Tineidae, Plutellidae, Gelechiidae, Coleophoridae, Lithocolletidae, Lyonetiidae, Nepticulidae and Micropterygidae.

While it is possible that these spiny areas will not prove of great value in classification, it is somewhat suggestive when a species as *Apatelodes torrefacta* S. & A. lacks them; while they are present in genera placed on each side. In such cases they may perhaps aid the systematist.

The following lists contain an enumeration of the insects which I have examined for the spiny area, referred to their families. Numerals indicate the number of species examined.

Species in which the spiny areas are found.

Sesiidae 2	Thyatiridae 3
Agaristidae 5	Noctuidae 329
Syntomidae 1	Pyraustidae 11
Pyromorphidae 2	Pyralidae 5
Ctenuchidae 3	Phycitidae 5
Nycteolidae 1	Crambidae 1
Lithosiidae 10	Tortricidae 17
Arctiidae 22	Grapholithidae 17
Liparidae 3	Tineidae 1
Limacodidae 7	Plutellidae 1
Notodontidae 23	Gelechiidae 1
Ceratocampidae 1	Coleophoridae 2
Bombycidae 4	Lithocolletidae 1
Cossidae 1	Micropterygidae 1
Hepialidae 2	

Species in which the spiny areas are absent.

Sphingidae 21	Saturniidae 5
Lithosiidae 1	Ceratocampidae 2
Notodontidae 1	Bephiidae 1
Platypterygidae 4	Geometridae 79

EXPLANATION OF PLATE 9.

Fig. 1. Dorsal view of denuded body of *Catocala concumbens* Walk., showing the spiny area on the wing at s, and the corresponding area on the thorax at S₁.

Fig. 2. Portion enlarged from edge of the spiny area on wing of *C. concumbens*.

Fig. 3. Side view of the spines as seen from the edge of a fold through the spiny area on fore wing of *C. concumbens*.

Fig. 4. Lateral view of denuded body of *C. concumbens* showing the spiny area at S₁.

Fig. 5. Modified scale from the under side of the humeral angle of the fore wing of *Anosia plexippus* (Linn.)

Fig. 6. Normal scale from near the middle of the under surface of the fore wing of *A. plexippus*.

Fig. 7. Modified scale from the under side of the humeral angle of the fore wing of *Heodes hypophlaeas* (Bdv.)

Fig. 8. Normal scale from near the middle of the under side of the fore wing of *H. hypophlaeas*.

Fig. 9. Basal portion of the fore wing of *Neuronia semifasciata* Say, showing the spiny area at s.

Fig. 10. Spines from fore wing of *N. semifasciata* enlarged.

Fig. 11. Basal portion of fore wing of *Tremex columba* (Linn.), showing spiny area at s.

Fig. 12. Spines from fore wing of *T. columba* enlarged.

NOTES ON BUTTERFLIES.—I have seen *V. antiopa* lay eggs on white birch and "canoe" birch this year, and as far as I know this is a new food plant for the species.

Papilio turnus is unusually abundant in Brookline, Mass., this year, as well as at Jaffrey, N. H., especially around ash-trees, where I have seen many eggs laid in the past few days, and almost without exception on the higher branches of young trees.

Cavoline G. Soule.

NOTES ON THE WINTER INSECT FAUNA OF VIGO COUNTY,
INDIANA.—VI.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

COLEOPTERA (*Cont.*).

COCCINELLIDÆ.

Twenty-one species of these interesting and beneficial beetles were taken in the county. Thirteen of these were found to hibernate as imagoes, while one other, *Hippodamia glacialis* Fab., was taken on two occasions in the latter part of March, so that it probably also winters in the mature stage.

125, *Megilla maculata* DeG. By far the most abundant member of the family in Indiana. During October it congregates beneath rubbish and logs. On several occasions I have found them in midwinter by thousands, huddled together beneath piles of the stems of the larger ragweed (*Ambrosia trifida* L.) in the low bottom lands of the Wabash River. It also hibernates singly beneath mullein leaves.

126, *Hippodamia convergens* Guer.

127, *H. 13-punctata* Linn.

128, *H. parenthesis* Say.

129, *Coccinella 9-notata* Hbst.

The above four are frequent in winter beneath mullein leaves and chunks along the borders of sandy upland cultivated fields.

130, *Coccinella sanguinea* Linn. Once, Feb. 23, beneath mullein.

131, *Adalia bipunctata* Linn. Once, Jan. 1, beneath the bark of an ash snag.

132, *Chilocorus bivulnerus* Muls. Several times, singly, beneath chunks in upland sandy woods. Flies on the first warm days of spring, and is then frequently found resting on the sunny side of rails or posts of fences.

133, *Hyperaspis dissoluta* Cr. Dec. 10.

134, *H. undulata* Say. Jan. 7.

135, *Scymnus sp?* Jan. 21.

136, *Scymnus sp?* Jan. 6.

137, *S. haemorrhous* Lec. Dec. 23.

Each of the above, once each in winter, date given, from beneath mullein or chunks in upland fields.

ENDOMYCHIDÆ.

Five of the eight species known to occur in the county have been taken in winter, as follows:

138, *Lycoperdina ferruginea* Lec. Dec. 28.

139, *Aphorista vittata* Fab. Jan. 30.

140, *Mycetina perpulchra* Newm. Dec. 24.

141, *M. testacea* Ziegl. Feb. 3.
Dec. 24.

142, *Endomychus biguttatus* Say.

With the exception of No. 141 these are frequently found beneath chunks covered with dead leaves in fence corners along the margins of upland woods. One or two specimens of *M. testacea* have been taken on a dozen or more occasions at different seasons of the year from beneath a partly burned oak log in a sandy woods where the river-terrace and upland meet. It is a small, rounded, uniform light brown beetle, which feigns death when disturbed. In all my collecting I have never happened upon it elsewhere than beneath the one log.

EROTYLIDAE.

Six of the sixteen species taken in the county are known to hibernate as imagoes.

143, *Languria mozardi* Lat. Feb. 28. One from beneath a rail. In copulation, June 11.

144, *Megalodacne fasciata* Fab. Feb. 14.

145, *M. heros* Say. Dec. 10.

These two pass the winter, sparingly, in the dry rotten wood beneath the loose bark of oak, elm, and tulip logs. *Fasciata* is much the more common and gregarious.

146, *Ischyryus 4-punctatus* Oliv. Twice, Jan. 21; Feb. 21, beneath logs. Gregarious.

147, *Tritoma biguttata* Say. Once, Dec. 25, beneath chunk in low, damp ground.

148, *T. festiva* Lac. Once, Dec. 10, in dry cow dung.

COLYDIDAE.

Four of the six species found in the county have been taken in winter.

149, *Coxelus guttulatus* Lec. Feb. 10. One beneath the close bark of a sugar maple tree.

150, *Bothrideres geminatus* Say. Once, Feb. 25. Several beneath the loose bark of a hickory tree.

151, *Cerylon castaneum* Say. Jan. 7.

152, *Philothermus glabriculus* Lec. Dec. 25. The last two, once each, beneath chunks.

RHYSSODIDAE.

153, *Rhyssodes exaratus* Ill. Dec. 18.

154, *Clinidium sculptile* Newm. Feb. 21. Both scarce and hibernating singly or in pairs beneath the bark of beech and oak logs.

CUCUJIDAE.

Nine species have been taken in the county. Seven are known to hibernate in the mature stage.

155, *Silvanus surinamensis* Linn. Frequent, singly or in pairs, beneath bark and logs.

156, *Catogenus rufus* Fab. But twice in my collecting; both times in February from beneath the close bark of the sugar maple. Gregarious.

157, *Cucujus clavipes* Fab. On divers occasions beneath the bark of recently felled ash and tulip (*Liriodendron*) logs.

158, *Laemophlaeus biguttatus* Say. Once, Dec. 18., beneath bark of black walnut stump.

159, *L. testaceus* Fab. But one in my collection. Feb. 28, beneath chunk on sandy hillside.

160, *Brontes dubius* Fab. Frequent, beneath bark.

161, *Telephanus velox* Hald. Scarce in winter beneath bark. Also once, Feb. 27, in cup fungus (*Peziza coccinea* Jacq.).

DERMESTIDAE.

162, *Dermestes caninus* Germ.

163, *D. lardarius* Linn. Feb. 7.

164, *D. vulpinus* Fab.

Of these, *lardarius* is scarce in winter, the others frequent, gregarious, beneath chunks and mullein leaves in upland, sandy fields.

165, *Anthrenus varius* Fab. A common museum pest, emerging from pupal stage in three successive winters between Feb. 10th and 15th. Has been taken only in heated buildings. In open air would probably not emerge till spring.

HISTERIDAE.

166, *Hister americanus* Payk. Jan. 6.

167, *H. subrotundus* Say. Dec. 10.

168, *H. vernus* Say. Jan. 21.

169, *H. carolinus* Payk.

170, *H. lecontei* Mars.

The above five, of the sixteen species of the genus taken in the county, were found in winter. The first three were scarce, the last two common, all hibernating beneath bark and logs.

171, *Epierus pulicarius* Er. Once, Feb. 23; gregarious, beneath log, low ground.

172, *Pezomachus estriatus* Lec.

173, *P. bistriatus* Er.

Both hibernate in numbers beneath the bark of walnut, poplar, and elm logs.

174, *Saprinus manicus* Say. Once, Dec. 10; mullein leaves.

NITIDULIDAE.

175, *Prometopia 6-maculata* Say.

176, *Phenolia grossa* Fab.

These two, frequent in winter, adhering closely to the underside of logs. Remain motionless when log is upturned.

177, *Soronía undulata* Say. Once, Feb. 25, beneath log.

178, *Ips fasciatus* Oliv. Common in winter. Variable in color. Beneath logs.

LATRIDIIDAE.

179, *Corticaria* sp.? One, Dec. 23.

180, *Corticaria* sp.? One, Jan. 6. Both beneath chunks.

TROGOSITIDAE.

181, *Tenebrioides castanea* Melsh.

182, *T. laticollis* Horn.

Both common, gregarious, beneath bark of elm logs.

DERODONTIDAE.

183, *Derodontus maculatus* Melsh. Dec. 10.

Winters in fungi on poplar and elm logs.

NOTES ON THE ACRIDIDÆ OF NEW ENGLAND.—II.—TRYX-
ALINÆ.—IV.

BY ALBERT P. MORSE, WELLESLEY, MASS.

CLINOCEPHALUS gen. nov.

This genus occupies an intermediate position between *Dichromorpha* and *Orphula* and is closely related to the former from which it differs especially in having the sides of the pronotum convex below the lateral carinae, which, in addition, are slightly divergent on the metazona. The type species, described below, has been referred to *Stenobothrus occidentalis* Sauss. by Prof. Bruner, but it does not agree with the description of that species in some important particulars and is probably new, an opinion concurred in by Prof. McNeill to whom I have sent an example.

Clinocephalus elegans sp. nov.

Figs. B, B a.

[*Stenobothrus occidentalis* Saussure, Rev. et Mag. Zool., xiii, 317 (1861); also Thomas, 92, 105.]

Antennae filiform, slender, in ♂ longer than head plus pronotum, in ♀ equal to head plus prozona. Eyes large, of ♂ twice, of ♀ one and a half times the length of the sub-ocular suture, and two-thirds as wide as long. Vertex in side view nearly horizontal; seen from above as wide (♂) or wider (♀) between the eyes as the greatest width of an eye; the anterior margin distinctly elevated, in the ♂ right-angled or slightly acute and rather sharp at the apex, in ♀ more blunt and rounded; projecting in front of the eyes but little less than the width of an eye. Foveolæ absent but the ♀ shows a row of

small punctures on the front of the anterior margin. The top of the head shows a slight elongate medial depression in the convex part of the fastigium opposite the anterior end of the eyes, and also a pair of very shallow arcuate grooves, concave laterally, running from the end of the elevated margin of the vertex opposite the anterior part of the eyes back to the front margin of the pronotum, striking it about two-thirds of the way from the median to the lateral carinae. Face strongly retreating; costa rather deeply sulcate, in profile slightly curved (♂) or nearly straight (♀) slightly rounded above to meet vertex.

Pronotum elongate, longer than the anterior femora; the disk twice (♀) or twice and a half (♂) as long as wide. Carinae distinct, equally developed, the lateral parallel on the prozona, slightly divergent on the metazona. Metazona on midline two-thirds (♂) or three-fourths (♀) as long as prozona. Hind margin very obtusely angulate or nearly truncate. Sides of the pronotum with the dorsal third convex, the ventral two-thirds vertical, very similar in outline to *D. viridis* (Fig. 7b), longer than high, the front and hind margins of nearly equal length, converging downward, the hind margin becoming nearly vertical in its ventral fourth; lower margin obtuse-angulate just behind its middle, the two portions straight and nearly equiangular with the lateral carina in direction.

Tegmina nearly or quite reaching the tip of the abdomen, extending one-half to two-thirds down the hind femora, the marginal area dilated, tapering from that to tip; ♂ with the ulnar area enlarged, coarsely, — even scalariform-reticulated, except at base; ♀ similar but less enlarged, and less regularly reticulate.

Wings with opaque streak at distal third of costal margin, the ulnar area much expanded to the entire exclusion of the distal part of the discoidal. Anterior and middle femora of the ♀ slender, of the ♂ stout.

Genital segment of ♂ very like that of *D. viridis*; ovipositor of ♀ with the inferior tooth of the lower valves smaller than in *viridis*.

In color varying from light olivaceous green to dark greenish brown, with a dark brown stripe from hind margin of eyes along the sides of the pronotum, sometimes continued upon the humeral field of the tegmen. On the pronotum and head this stripe is usually about one-fourth the width of the side of the pronotum but sometimes becomes barely perceptible; it sometimes appears upon the disk as a narrow line just within the lateral carinae of the metazona.

Antenna	H. fem.	Teg.	Teg.<	H. fem.	Body.	Total length.
♂ 7.5-8	10	10.5	2.5	17	16	
♀ 5	12.3	12	4	20.5-23	19	

Described from 5♂, 2♀ 1: ♀, Anglesea, N. J., labelled by Prof. L. Bruner, received from Prof. J. B. Smith. 1♂, 1♀, Ravenswood, L. I., Benteinmüller; 1♂, Ga.; 1♂, Md.; 2♂ without locality;—all these latter from Mr. Scudder's collection.

This species agrees with the description of *occidentalis* in the form of the pronotum and disposition of the lateral carinae, but the median carina is not sufficiently elevated to be properly called subcristiform, and the vertex of the head is distinctly depressed behind the front margin, a character in which it differs markedly from the description of *mystecus* which *occidentalis* is stated to closely resemble. In superficial appearance the female recalls the short-winged form of *Sten. curtipennis*, from which it is readily distinguished by the absence of foveolae.

NOTES ON THE OVIPOSITION OF *THANAOS ICELUS* (?).

May 27, 1894, at Turkey Hill, Arlington, Mass., I noticed a species of *Thanaos* fluttering around a plant of *Baptisia tinctoria* as if to lay eggs, returning to the same plant several times and finally laying a single egg, in two seconds, upon the upper side of a young and tender leaf near the base. This occurred at one o'clock on a warm, sunny day. Three more eggs were found upon the same plant. By searching, a dozen more such eggs were found, one or two on each plant, nine on one plant, always single and on the upper surface of the leaf. Numerous eggs were found similarly on May 30, also nests of a young *Thanaos* on *Baptisia*. June 3, a long and careful search revealed abundant nests, but only a single egg, and the imagos had become rare. The eggs were pure white when laid, turning pink or orange within four hours; base flattened, sides little-rounded, summit depressed; longitudinal ribs ten, transverse ridges wide, prominent, quite concave; at micropyle a saucer-like depression with hexagonal margin; breadth of egg, 0.76 mm. *Justus W. Folsom.*

CALEPHELIS BOREALIS.—Looking over some miscellaneous entomological material the other day, which material had been captured by some of the students for the Station collection during the past summer, in this (Montgomery) County, I came across two unidentified specimens of *Calephelis borealis*. I closely questioned the student, but he could remember nothing as to date or immediate locality, or in fact anything, save that they had been caught near Blacksburg last summer. I note this, for while the butterfly has been taken in West Virginia by Mr. W. H. Edwards, I believe this is the first Virginia record, and any information concerning this species is desirable.

Ellison A. Smyth, Jr.
Blacksburg, Va., March 27, 1896.

THE SEVENTH VOLUME OF PSYCHE

Began in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

Vols. 1-6, Complete, Unbound, - Now sold for \$29.00.
 Vols. 1-6, and Subscription to Volume 7, - - \$33.00.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

Vol. 1. Introduction; Nymphalidae.

Vol. 2. Remaining Families of Butterflies.

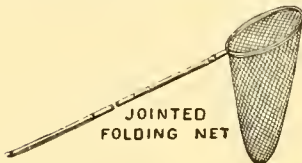
Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo, half levant. \$75.00 net.

HOUGHTON, MIFFLIN & CO.,

4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 244.

AUGUST, 1896.

CONTENTS:

NOTES ON THE ACRIDIDAE OF NEW ENGLAND.—II.—TRYXALINAE.—V.— <i>Albert P. Morse</i>	407
THE CONDITION OF APATELA.— <i>A. Radcliffe Grote</i>	411
PREPARATORY STAGES OF COSMOSOMA AUGÆ LINN.— <i>Harrison G. Dyar</i>	414
NOTE ON DIONYCHOPUS.— <i>Harrison G. Dyar</i>	415
RECENT PUBLICATIONS (Packard's Notodontidae; Reuter on palpi of butterflies; the Gypsy Moth report; Fernald's Crambidae; Felt's scorpion flies; Cockerell on <i>Perdita</i> ; Kellogg on Mallophaga).	416

PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

570573

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

PS Subscriptions not discontinued are considered renewed.

PS Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

PS Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U. S. A.

Subscriptions also received in Europe by
R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danais archippus</i> . Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Technology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate .50	
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> , col. pl. Boston, 1883. .25	
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

FINE EXOTIC LEPIDOPTERA.

In great variety. List on application. Sample box of 18 Indian and African butterflies, post free, \$1.50.

DR. REID, JUN.,
Ryhope, near Sunderland, England.

DULAU & CO., FOREIGN BOOKSELLERS
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

NOTES ON THE ACRIDIDAE OF NEW ENGLAND.—II.—TRYXALINAE.—V.

BY ALBERT P. MORSE, WELLESLEY, MASS.

7. ORPHULA Stal.

Orphula Stal. 1873. Recensio orthopterorum, i, p. 105.

According to Brunner's Revision the three following species belong to *Orphula*. Giglio-Tos, however, has separated from *Orphula* (Boll. Mus. Zool. ed. Anat. comp. R. Univ. Torino, Sept. '94) a group to which he applies the name *Orphulella*, giving it generic rank, and restricting the former to a single species. To *Orphulella* apparently belongs our *maculipennis*, but our other two species present characters intermediate between the two genera as characterized by Giglio-Tos. In consequence of this fact and the very great similarity of our species I am disposed to regard *Orphulella* as worthy of sub-generic rank only, and have retained the older name in its wider sense for our species.

The species of this genus are among the most difficult to discriminate of any of our locusts. It has been only by a large amount of collecting and observation in the field that I am enabled to present any positive statements regarding the forms described,

so variable are individuals of the same species in color, markings and structure. The characteristic differences of each form are given very fully in the key, but individuals vary so much that no specimen can be determined with entire confidence from a single character; yet by taking into consideration all the differences indicated I have had very little difficulty in identifying nearly 2500 specimens, less than half-a-dozen causing even temporary doubt.

We have in New England three distinct species of the genus, and I have no reason to think that there are more, though I have not been able to collect in the extreme north and north-east. These conclusions are practically the same as were published at the time of the description of *olivaceus* (*Psyche*, June, '93). Our species are best known under the names of *Stenobothrus maculipennis*, *aequalis*, and *olivaceus*. *Olivaceus*, the last species to be described, seems not to have been previously noticed, but the other two are more or less affected by several names applied to representatives of this genus from this region; these are: *pelidnus* Burm.,

speciosus, *bilineatus*, and *propinquans* Scudd. *Pelidnus* has priority over all; it was described from Penn. and the description agrees most closely with *maculipennis*, which would in this case become a synonym. *Speciosus*, *maculipennis*, *aequalis*, *bilineatus*, and *propinquans* were described next, in the same publication, in the order given, all the descriptions appearing at the same time, *speciosus* from a single specimen from Minn., the others from several, chiefly from New England. Of these the descriptions of *maculipennis* and *aequalis* best characterized the species to which they were applied and in consequence have been most widely used; *bilineatus* was applied to the brown form of *aequalis* and has properly been reduced to a synonym or retained in varietal rank merely, to denote this color-form. The type of *speciosus* also may prove to belong to *aequalis* in which case this name also will become a synonym. *Propinquans* was described from Minn. and Conn. and a word concerning it is necessary. In my Preliminary List I have given it as a synonym of *pelidnus* on Mr. Scudder's authority, based on inspection of the types some years ago. I also stated that from an examination of the types of *propinquans* I suspected them to be long-winged examples of *aequalis*. These types have unfortunately been inaccessible to me in the preparation of this paper with the exception of a single specimen from New England which was

probably such and which is undoubtedly *aequalis*. It may be, however, that individuals of both *maculipennis* and *aequalis* were included in the types of *propinquans*. So closely do the species of this genus resemble each other that it would be impossible without an examination of the types of *pelidnus* and a thorough collection and study of the species from Penn. and Minn. to say which, if any, of these names should be abandoned. Since the species are now well-characterized under their present names, it seems the wisest course to retain them rather than change the nomenclature on an uncertainty.

8. *Orphula maculipennis* Scudd.
Figs, 8, 8a, 8b, 8c, 8d, 8e.

Stenobothrus maculipennis. Scudder, 458. 1862. Thomas, 87. Ferriald in part, 37. Beutenmüller, 293. Morse, 14, 105; Psyche, '93, p. 478.

I have taken nearly 600 examples of this species but have yet to see one with tegmina failing to reach the end of the hind femora. Brown specimens are more plentiful than green, the relative proportion seeming to be affected by the environment, as in *aequalis*; green ♀ vary from one-eighth to one-third as common as brown; bright green ♂ are very scarce, and discolor somewhat in drying, becoming brownish, so that they appear less plentiful in the collection than in the field. Individuals are sometimes rose-red on the costal and anal parts of the tegmina with the pronotum and head either brown or green, the occiput being

striped lengthwise or not, and the sides of the pronotum banded or not, exactly as in *aequalis*; but there seem to be few individuals showing intermediate shades of coloring.

Antenna	Hind fem.	Teg.	Teg > Hind fem.
♂ 4.7-6.5	8.5-9.8	12.5-16.5	1-4.5
5.5-7	10.5-12.5	13.5-20	.5-3
	Body.	Total.	
	14.5-15.5-	1.68-20.5	
	16.5-23.5	19-26	

In the ♂ the hind femora usually extend 2mm. beyond the end of the abdomen, in the ♀ a little less.

This species begins to appear about the middle of July, being a week or two later than *aequalis*, and may be found during the remainder of the season. The earliest date on which I have taken it is July 18 and the latest Sept. 8. It is an active and alert species, leaping well and also flying freely and well, sometimes for two or three rods. I have found it common along the seashore of the three southern New England States, and in the northeastern part of Conn. It is found on the drier portions of the land adjoining salt-marshes, on the more densely grassed portions of ground just inshore of the sandy beaches, and on sandy or loamy soil further inland.

In Conn. I have taken it at Greenwich, Stamford, North Haven, Deep River, Niantic, Montville, Thompson; in R. I. at Kingston, Wickford, and on Block Id.; in Mass. on Cuttyhunk and Penikese Ids., at West Chop, M. V., Wood's Holl, Provincetown, Revere, and a single ♂ and ♀ at Welles-

ley. The specimens referred to this species in Smith's Orth. of Maine are longwinged examples of *aequalis*, as probably are also those spoken of by Scudder in Distribution of insects in N. H. where this species is said to occur in the White Mt. valleys and elsewhere.

9. *Orphula aequalis* Scudd. Figs. 9, 9a, 9b, 9c.

Stenobothrus aequalis. Scudder, 459, 1862. Thomas, 89. Beutenmüller 294. Morse, 14, 104; Psyche, '93, p. 478.

Stenobothrus bilineatus. Scudder, 460. Thomas, 90.

Stenobothrus maculipennis, in part. Fernald, 37. Comstock, Introd., 102. Smith, Orth. Me., 148; Orth. Conn., 376.

This species is one of our most variable locusts in color and markings, and to a scarcely less extent in structure. The tegmina and wings, while usually about reaching the end of the hind femora, are often considerably shorter, and occasionally extend beyond them. The long-winged specimens occur everywhere but seem to vary in numbers locally, being common in the hilly, elevated districts of Norway, Me., and Adams, Mass., but very scarce in the vicinity of Wellesley. Long-winged females are rather more common than males.

In color the discoidal field of the tegmina is tolerably uniform, being brownish, pellucid distally, more or less maculate with fuscous spots, or even unspotted. The costal (margi-

nal) and anal areas are very variable and may agree or differ in color with each other or with the top of the head and pronotum. These variations are endless but the more striking ones are the following:

	Head.	Pronotum.	Tegmina.
1	Green.	Green.	Green.
2	"	"	Rose-red.
3	Brown	Brown	"
4	"	"	Brown.

The occiput may or may not have a pair of longitudinal fuscous stripes, and the lower half of the side of the pronotum may or may not be crossed by an irregular fuscous band. These variations in color of particular parts occur independently of each other and of wing-length and vary extremely in tint. For instance, the general color of the insect being brown or green the dorsum of the pronotum may be pale gray or dark fuscous. The color of a large series of specimens, however, seems to agree to some extent with that of the environment, whether damp and the vegetation largely greenish, or dry and chiefly brown. Brown females are most plentiful and green males least so, though not uncommon.

Antenna.	Hind fem.	Teg.	Teg. vs. H. fem.
♂ 4.5-6.5	8.5-10	10-13.3	-1.5-+2.
5-6.5	9.5-12	9-16	-3. -+3.
	Body.	Total.	
	13-14	13-18.5	
	16-21.5	15.5-21	

This species makes its appearance the first week in July and probably may be found during the remainder

of the season, though becoming scarce in October. It is plentiful by July 15 and still common at the middle of September. It is one of the most plentiful and widespread of all our locusts but owing to its small size and non-migratory habits does not attract the attention given to the larger and consequently more destructive species. While somewhat local it is found nearly everywhere on dry, sandy or loamy soils, sometimes in company with *maculipennis* near the coast, and abundantly inland. It moves chiefly by leaping, but readily takes wing on occasion, flying, however, but a few feet. Active and alert in the hot, sunny weather of mid-summer, it can best be secured by sweeping the net rapidly over the ground, a dozen or two of specimens being the result of a few minutes work.

Of this species I have about 1500 specimens mostly of my own collecting, from many localities, among them the following: Deering, Fryeburg, Norway, and Speckled Mt., Me.; Hanover (Prof. C. M. Weed), No. Conway, Kearsarge Mt. (2000 ft.), and Kingston (S. W. Denton), N. H.; Brattleboro' (Mrs. J. B. Powers), Vt.; Canaan, Stamford, New Haven, Niantic, and Thompson, Conn.; Kingston and Wickford, R. I.; Cuttyhunk and Penikese Ids., West Chop, M. V., Wood's Holl, Mt. Hermon and Easthampton (S. W. Denton), Adams, Palmer, Worcester, Belmont (C. J. Maynard), Revere, Blue Hill, and the vicinity of Wellesley.

The specimens from Speckled Mt., Me. four in number, are all long-winged and perhaps flew there in the adult stage.

10. *Orphula olivacea* Morse. Figs. 10, 10a.

Stenobothrus olivaceus. Morse,—Psyche, '93, 477; '94, 104. Beutenmüller, 294.

This species I have described in full elsewhere (loc. cit.) and there is very little new to add here. The ♂, while often presenting a greenish hue at

capture, dries to a dull brown. The green form of ♀ is about one-fourth to one-third as numerous as the brown.

In New England it is known only from Greenwich and Stamford, Conn. Beutenmüller reports it from Sandy Hook, N. J., and I have received it from Prof. J. B. Smith, from Anglesea, N. J., where it seems to be common. One female from the latter place is extremely large, measuring as follows: hind fem. 14.5; teg. 22; total length 30 mm.

THE CONDITION OF APATELA.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

It is a matter for regret that in 1867 we had no larger series of the American species with us, when the late Mr. C. T. Robinson was my companion in a visit to Guenée at Chateaudun. I had *hamamelis* and a paler species, besides a few others, and this paler species is what I subsequently named *clarescens* in American collections. Guenée had his types in little glass boxes, and, after a long study, thought that the pale species might be *clarescens*, but it differed from his type somewhat. Guenée said that some of his types were sent back to the British Museum, and some named specimens, but many of his types he had with him. Of some of these he furnished me drawings (which I can no longer find) at a later period. There were no *Apatelas* among these. One was *Oligia exesa*, which I recog-

nized in my collection and which, with the other American species, we may have to refer to *Monodes*, as they are probably not congeneric with the type of *Oligia*, the European *O. strigilis*.

From what M. Guenée told me, it is clear that positive certainty as to the species of *Apatela* cannot be obtained until the types are examined which are now with M. Oberthür. These types must be compared with the named examples or types in the British Museum, and, above all, with Guenée's probably sufficient, yet somewhat scanty descriptions in this genus. The decision as to these species cannot rest alone on Mr. Butler's comparisons of the named examples in coll. Brit. Mus. From these named examples Butler and Smith refer *clarescens* as a synonym of *hamamelis*, leaving my *clarescens* without a

name, or rather free for Harris' *pruni*, a name based on a larva which is said to be that of my *clarescens*.

And against this latter course there seems no possible objection, for Guenée was uncertain that my species was his, and especially drew my attention to certain features which made the identification uncertain. But whatever Guenée's type of *clarescens* was, it was not identical with *hamamelis*. So good an entomologist as Guenée could not have redescribed his species from a specimen absolutely the same with his type. And yet this is what Prof. Smith would have us believe. This is the result of referring varieties as synonyms; for I admit the possibility of *clarescens* being based on a pale, perhaps large *hamamelis*. The same thing is repeated in *Heliophila* (*Leucania*). Here we are asked to believe that Guenée's *extincta*, *linita*, and *scirpicola* are, without any question, one species only. Now *Apatela* and *Heliophila* have this in common, that certain species are separable on very indistinct characters, but, especially in *Heliophila*, the characters are constant and readily seized upon by an expert. Neither in *Heliophila* nor in *Apatela* have I ever described a species under two names, whereas this has happened to me in genera where the species are usually more broadly distinguished and are perhaps more prone to vary. But, in my case, the mistake has usually happened owing to my having been obliged to return my type; consequently I could not compare the second specimen, which,

varying a little from my first type, seemed to be a distinct species from the picture in my memory. To suppose that Guenée, with all the specimens before him, could redescribe species of *Heliophila* and *Apatela* seems difficult. Guenée is not Walker.

Clarescens Grt. is therefore *pruni* Harris; but about *clarescens* Gn. there hangs a doubt, which the future monographer may solve. My memory of Guenée's type is not strong enough to risk any further opinion, while my deference to Guenée, and my relative unacquaintance with the species in 1867, led me to form no opinion of my own upon the specimen. The impression I took with me was that Guenée was disposed to make the identification on the whole, so that I adopted the name.

Now as to *brumosa*. I did not have this with me in 1867. After I had described *verrillii*, Mr. Morrison identified this species as *brumosa*. I thought this identification probable and adopted it. The species apparently belongs to the subgenus *Pharetra*, and I may here say that I have wrongly used the subgenus *Apatela*, the type of which is of course *aceris* for this group, in my papers in *Papilio* and the Canadian entomologist upon our Dagger Moths. The type of *Pharetra* Hübn. Verz., is, therefore, *auricoma*. Now, Butler and Smith identify *brumosa* with *persuasa*. The latter is a Texan species, and it seems to me doubtful that Guenée should have had this species before him, since his material came mostly from the

northern Atlantic district, although he had Florida material from Doubleday, and Georgia material probably originally from Norwich or even Abbot. *Persuasa* must be compared with Guenée's description to check this reference. But extremely doubtful seems to me Butler's identification of *longa* with *brumosa*, and it is doubtful to its author. Again we are asked to believe that Guenée redescribed his own species. Did Guenée write his three volumes with one collection before him, or did he merely edit descriptions made at different times, returning his types in the meanwhile so that the possibility of such mistakes becomes credible? My belief is that the former is the fact, hence these mistakes become incredible to me. The impression I have is that we ought to refer *zerrillii* to *brumosa*, and Walker's two names as shown by me in the Illustrated Essay as further synonyms, restoring *persuasa* to its author. But in my lists, I have felt bound to follow Mr. Butler.

The synonymy given in the Catalogue of Prof. Smith of *americana* is unintelligible to me, since *hastulifera* A. & S. and *acericola* A. & S. are cited also as distinct, while I have shown that Guenée's *hastulifera* is *americana*! Different localities are given to the three, whereas I know of but one species, viz., *americana*, which Harris considered to be *aceris* A. & S. (= *acericola* Guen.). Guenée, who did not know Harris' work, described *americana* as Abbot's *hastulifera* and proposed the name *acericola* instead of

Abbot's *aceris*, which he did not identify. Hence the synonymy (I leave Walker out of the question) runs thus: *americana* Harris = *hastulifera* Guen. nec A. & S., leaving Abbot's two species unidentified. As Abbot's *aceris* is certainly not the European species, this must be called *acericola* Guen., if identified as distinct from *americana* and *hastulifera*. Whether there is really more than one species is doubtful: but, in any case, Abbot's two species must be identified from Georgia larvæ (since the moths are badly drawn, or rather too difficult to distinguish from plates made under the circumstances). Harris thought the larva of *aceris* agreed with the larva of his *americana*, hence his reference of Abbot's species as identical with his own. Guenée, who had no larva (of *americana*), thought that the figure of the moth of *hastulifera* represented our northern species already described as *americana* by Harris, and made the identification. As regards the two plates of Abbot, Guenée and Harris are at cross purposes, but in any event have only one species in nature before them, viz., *americana*. The references in Prof. Smith's catalogue give the impression as if three distinct species had been identified and my speculation that the larvæ had perhaps been transposed by Abbot, to account for the opposite identifications of Harris and Guenée, is adopted. I repeat, until Abbot's species are made out beyond peradventure from Georgia material, all speculation is futile.

From the foregoing I believe that the *status quo* of *Apatela* remains virtually unchanged since my paper in *Papilio*, iii, 116, 1883. The list there given by me of unidentified names can only be safely changed to-day by the elimination of two of Harris' posthumous names based on larvae: *Ulni* Harris, being based on larvae belonging to *morula*, as Prof. Smith tells us, and is therefore a synonym; while *pruni* Harris may be used for the species called by me *clarescens*, since the evidence is that Guenée's *clarescens* is not mine, although exactly what it is is not made out unquestionably. As before, the "future monographer" whom we are all expecting (I wish I had the naming of him) must busy himself with the question of what Guenée really described under the names: *spinigera*, *telum*, *interrupta*, and *longa*, and he will do well to reject *interrupta* altogether, as founded on a figure which, in this difficult genus, will hardly be admitted as a proper basis for a description and name. It will shorten his labors by so

much. He will have also to decide what Abbot intends by his plates of *aceris* and *hastulifera*, and he will have an easier task to make out Harris' remaining name *salicis*. I shall be glad if the other names in the catalogue, which are mainly based on my identifications, receive his confirmation. But he must conscientiously compare Guenée's text with the material, inasmuch as names derive their authority from literature, not from labelled specimens, however convenient these may be as a substitute for the somewhat arduous labor of making a specimen "function" to a description.

Note.—Since finishing this article I have received a letter from Mr. Harrison G. Dyar, who kindly informs me that the larva figured in Harris' Correspondence under the name *salicis*, belongs to *oblinita*. If there is any difference between our northern species and *oblinita* as figured by Abbot, we have a name in *salicis* for the northern form. Dr. Thaxter called my attention to material collected by him in Florida, but I was not able to find any points of specific distinction as compared with northern *oblinita*.

PREPARATORY STAGES OF COSMOSOMA AUGE LINN.

BY HARRISON G. DYAR, NEW YORK.

A full fed larva was found at Lake Worth, Florida, late in December and eggs were obtained from several female moths found flying over the flowers of some vines of *Mikania scandens* growing in the swamp. I am much indebted to Mr. F. Kinzel of Palm Beach, who has kindly sent me leaves of the food plant every few days, and thus enabled me to raise the larvae and observe their stages.

Eggs. Rather low conoidal with flat base; smooth, shining, translucent, waxy white, faintly tinged with yellow; no marks under a hand lens. Under a half-inch objective the reticulations are linear, rounded, hexagonal, irregular, even four-sided, scarcely raised. Diameter 0.8 mm., height 0.6 mm. Usually laid singly on the young leaves of the food plant. Duration of this stage eight days.

Stage I. Head colorless, eyes black,

mouth brown; width .3 mm. Body entirely colorless, the hairs single, rather long, white; anal feet rather large, divergent; length 2.5 mm. Later certain of the dorsal hairs (of tubercle ii) and all the warts become blackish. After feeding the body is greenish from the food showing by transparency, the head, thoracic feet and joint 13 slightly yellowish. Warts normal, single haired, iv behind the spiracle, vi absent, an oval dusky leg-plate with several hairs; on joints 3 and 4 tubercles ia, ib and ia from a single area, iib weak, remote, iii and v absent, vi with two hairs. On joint 13 i, ii and iii from a single area, iv and v from a single area, the anal plate with 10 hairs.

Stage II. Head yellow, shining, ocelli black; width .4 mm. Body whitish, yellow at the ends as in the mature larva; warts all black, neatly defined, several, haired, arranged as in the mature larva, the subprimaries present, normal. Hair black and white mixed, the white the most numerous, spinulated; warts iv and v on joints 5 and 11 a little larger than elsewhere, the hairs, however, all alike. Leg-plates pale.

Stage III. Head .6 mm., whitish, the ends of the body yellow; warts black, all much as before, the hairs quite dense, but not at all obscuring the body, variously curved, from six to ten arising from each wart.

Stage IV. Head .8 mm. The same, the warts distinct, neatly defined; hair a little thicker laterally on joints 5 and 11, indicating the tufts, but no plumed hairs present.

Stage V. Head 1.2 mm. There is no change; length about 14 mm.

Stage VI. Head 1.7 mm. Similar to the mature larva except for the absence of the side tufts, though warts iv and v on joints 5 and 11 bear an unusual number of black hairs, thus serving to suggest the tufts. The hairs are all alike, black and white, of even length, abundant, but fine, not obscuring the body. A distinct orange mark on joint 12 before the spiracle. A few long hairs anteriorly.

Stage VII. Mature larva. Head yellow, ocelli black, mouth brown; width 2.4 mm. Body yellowish on joints 3, 4, 12 and 13, joint 12 most distinctly so, as also the feet; warts and spiracles black; i to iii normal, iv small but distinct, behind the spiracles, v and vi normal, none large. Hair dense, fine, of even length, black, and white mixed, the white predominating, the appearance consequently pale gray, sparsely dashed with black. On joints 5 and 11 dense concolorous tufts laterally, the same length as the other hairs and also white and black, but heavily feathered, the black ones plumed; these tufts arise from warts iii and iv. On the thorax there is one large wart above the stigmatal wart, but it is not elongated nor of unusual size; a few long hairs from it overhang the head. On joint 2 the cervical shield has two tiny warts on each side, a wart at the edge, a stigmatal and a subventral wart. Skin translucent, without marks.

Cocoon. Large, elliptical, attached only by one side to the supporting object as in *Halisidota caryae*, composed of silk and the larval hairs, transparent, regular, light yellow, intermixed with black plumed hairs; size 17 x 9 mm.

Pupa. Rounded, shaped as in *Halisidota*, the incisures not movable. All pale yellow, spiracles, eyes and a row of dorsal marks black. The pupa skin is very thin, but all the essential points indicate an Arctian affinity, not Lymantriid as stated in Ent. Amer. (vol. i, p. 86) where the editor was evidently misled by the transparent skin of the empty pupa. His statement should be reversed. Imago in 21 days.

NOTE ON *DIONYCHOPUS*.—In Psyche for July Mr. R. A. Cooley questions the accuracy of the results of Dr. W. Donitz in respect to the structures in *Dionychopus niveus* Men. which could be capable of producing a sound heard by Dr. Donitz. This has led me to examine the species, and I believe that Mr. Cooley is entirely correct. The spiny patch is present on the under side of the fore wing

and there is a very distinct one on the thorax, all just as figured on Mr. Cooley's plate. I entirely fail to find any corresponding patch on the upper side of the hind wings. There is a small space devoid of scales just below the frenulum, it is true, but the microscope shows nothing on it more than the simple wing membrane.

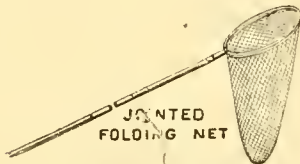
As to the sound this insect is said to produce, it may more plausibly be attributed to another organ. There is, on the side, on the anterior edge of the metathorax, a semi-circular, bladder-like structure, about 3mm. long, with a series of fine curved teeth along its straight front edge; the teeth are rather long and curve dorsally. The structure is situated directly below the hind wing, on which near the base of cubital vein, is a round pointed, chitinized knob, which may serve for rasping on these teeth.—*H. G. Dyar.*

RECENT PUBLICATIONS.—The brief space left in the present number may be utilized in calling attention to some recent publications. First, Packard's Monograph of the N. A. Notodontidae, a quarto volume with 49 plates, mostly colored, besides maps; special attention is given to the different stages of the caterpillar and a vast profusion of remarkably fine figures are given; it is of the utmost importance for the study of phylogeny. Another quarto volume by Reuter on the Palpi of Rhopalocera (600 pp., 6 pl.), draws attention to an overlooked structure on the inner side of the basal joint

which he describes in a multitude of forms, and at the same time essays a classification of butterflies, which is well worthy of close attention. The Gypsy Moth Report of the Mass. Board of Agriculture by Messrs. Fernald and Forbush is a notable work of over 500 pages 8vo with 67 plates, scattered through the volume (but without summary explanation) which reflects the utmost credit on the ingenuity of resource, industry and skill of the authors; whether or not we agree with their conclusions or approve the State's vast expenditure, we can but thank them for this admirable piece of work; only two or three insects have had as much attention given them, and they are mostly American.

Space only allows the briefest mention of some other American publications: The Crambidae of North America by C. H. Fernald with its six most exquisite chromolithographs and three other plates of structure; 10 genera and over 80 species are described, with synopses of genera and species. E. B. Felt gives an excellent essay on the scorpion flies with a couple of plates and interesting accounts of their larval habits, etc. T. D. A. Cockerell publishes an account of 70 N. A. bees of the genus *Perdita*, mostly new, with much very interesting introductory matter and many biological notes. V. L. Kellogg issues an octavo volume with 14 plates on Mallophaga, mostly Californian, a much needed work for America.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,
Klaeger and Carlsbad Insect Pins, Setting
Boards, Folding Nets, Locality and
Special Labels, Forceps, Sheet Cork, Etc.
Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 245.

SEPTEMBER, 1896.

CONTENTS:

NOTES ON THE ACRIDIDAE OF NEW ENGLAND.—II.—TRYXALINAE.—VI.— <i>Albert P. Morse</i>	419
A THYSANURAN OF THE GENUS ANOURA (Illustrated).— <i>F. L. Harvey</i>	422
LIFE HISTORY OF <i>ICHTHYURA STRIGOSA</i> GROTE.— <i>Harrison G. Dyar</i>	424
BIBLIOGRAPHICAL NOTES.—VII.— <i>Samuel Henshaw</i>	435
PROCEEDINGS OF THE CAMBRIDGE ENTOMOLOGICAL CLUB (Pigment of the scales of Lepidoptera; a Japanese journal of entomology; Bermuda insects; eggs of <i>Neophasia</i>).	426

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

5.10573

PSYCHE.

NOTES ON THE ACRIDIDAE OF NEW ENGLAND.—II.—TRYXALINAE.—VI.

BY ALBERT P. MORSE, WELLESLEY, MASS.

8. CHLOEALTIS HARR.

Chloealtis Harris 1841. Report p. 148. 3rd ed., 1862, p. 184.

This genus was established by Harris on two species of which one (*curtipennis*) belongs to *Stenobothrus* (Fischer, 1853), the other (*conspersa*) must receive this name. *Chrysochraon* (Fischer, 1853) is closely related, especially *Ch. dispar* of Europe, but if but one name can be retained that must be *Chloealtis* which has twelve years priority. In Brunner's Revision this generic title is evidently applied to the species hitherto known as *Ch. viridis*; here treated under the title of *Dichromorpha*.

11. *Chloealtis conspersa* Harr.

Figs. 11, 11a.

Chloealtis conspersa. Harris 1841. Report. 149; ed. 1862, p. 184. Scudder, 455. Fernald, 36. Smith, Me., 145; Conn., 375. Morse, 13, 104. Beutenmüller, 293.

Chloealtis abortiva Harris, 149; ed. 1862, 184.

Chrysochraon conspersum. Thomas, 76. Comstock, 102.

Stenobothrus melanopleurus. Scudder, 456.

This species is readily recognized by the absence of foveolae, the shining black sides of the pronotum of the male, and the peculiar form of the ovipositor of the female. The male differs so much in size and appearance from the female that it was described as a *Stenobothrus (melanopleurus)* by Scudder. The ♂ varies from pale straw to dark brown, but is usually light brown above, and the tegmina immaculate, sometimes with very faint dusky spots; the hind tibiae are either red or yellowish. The ♀ varies from straw to very dark fuscous brown, and usually has the tegmina more or less spotted with dusky, though they are sometimes immaculate. The name *abortiva* Harris does not seem worthy of retention, far the larger number of specimens being intermediate in markings.

About 350 specimens, nearly one-half of which are females, give the following measurements:

Antenna.	Hind fem.	Teg.	Teg.<	Hind fem.	Body.
♂ 10-11	10.7-13	7.7-12	3-5.5	15-19	
♀ 10-12	11.6-16	7-10	8-11	20-28	

The wings in the male are usually one-third to one-half, in the female one-half to two-thirds, as long as the tegmina. In the female the abdomen

about reaches the tip of the hind femora, in the male it falls short by 2 to 4 mm.

McNeill was the first to announce the occurrence of long-winged individuals in this species in Illinois; Blatchley captured a female in Indiana, and last season I secured two in Sherborn, Mass. I have not seen a male with functional wings. This form may be distinguished as *prima*. These two females measure as follows :

Tegmina.		Wing.		Teg. > Hind fem.		Total length.
Long.	Wide.	Long.	Wide.			
19.5	4.7	18	8.5	2		27
20	4.8	18	8.5	3		28

While not abundant, this species is common locally in suitable situations. It seems to prefer bushy pastures or edges of pine woods but is found wherever old stumps or fragments of soft or decaying wood are accessible as a nidus for its eggs. I have several times found it associated in locality with *Ps. brachyptera* and *Mel. "rectus,"* with the one in bunch-grass, with the other in low bushes, etc., in both cases in close proximity to woodland. The females are rather sluggish and easily captured, moving of necessity by crawling and leaping, but the males are quite alert and active.

It may be found from the latter part of June throughout the season. I have taken the adult ♂ on June 24, and the ♀ on Oct. 7. I have collected specimens at Deering, Fryeburg, Norway, and Stoneham, Me. ; No. Conway, summit of Kearsarge Mt., and Jackson, N. H. ; Hyde Park, Jay, and St. Johns-

bury, Vt. ; Wellesley and several towns in its vicinity, Winchendon, Wood's Holl, and West Chop, M. V., Mass. ; Wickford, R. I. ; Canaan, Montville, New Haven, Niantic, and Stamford, Conn.

An interesting account of its oviposition is given in Smith's Orthoptera of Maine (also Orth. of Conn.) and, together with additional matter, in Scudder's Distribution of Insects in New Hampshire. The latter work contains a description and notation of its songs in sunshine and shadow, which may also be found in the 23rd annual report of the Entomological Society of Ontario.

9. STENOBOTHRUS FISCH.

Stenobothrus Fischer, 1853. Orth. europ., p. 313.

12. *Stenobothrus curtipennis* Harr. Fig. 12.

Locusta (Chloealtis) curtipennis. Harris, Rep't, 149, 1841 ; ed. 1862, 184.

Stenobothrus curtipennis. Scudder, 456. Thomas, 91. Smith, Orth. Me., 147. Fernald, 37. Morse, 14, 104. Beutenmüller, 294.

Long-winged form, *longipennis*.

Stenobothrus longipennis. Scudder, 457, 1862. = var. of *curtipennis*. Smith, Thomas, Morse, *cit. supra*.

This species is the only true *Stenobothrus* occurring in New England, and, while one of the most variable of our locusts in color, markings and wing-

development, is readily recognized by the presence of foveolae visible from above. The length of tegmina and wings is very variable and consequently of very slight importance, several marked color varieties being either long or short winged. The wings, while often very small, are probably always capable of being expanded sufficiently to serve as parachutes at least, being in nearly every case almost as long as the tegmina, not abortive as in *Chl. conspersa*. While the larger proportion of individuals captured fall into one of two series, being either long or short winged, no sharp line of demarcation exists between the series. In the short-winged the tegmina of the ♂ usually do not reach the end of the hind femora by 2 to 3 mm., in the ♀ by 3 to 5 mm.; in the long-winged they equal or exceed the femora 1 to 2 mm., but intermediate examples are not uncommon. Short-winged individuals are somewhat the more numerous. The three most striking color varieties are the following: (1) dorsal half of sides of pronotum and cheeks fuscous, darkest above; (2) sides of pronotum gray, crossed halfway down by a broad, irregular, fuscous band; cheeks somewhat infuscated above and below a pale band at level of lower margin of eye; (3) face, sides of head and body green. Each of these forms may be either long or short winged, light gray, yellowish, reddish, or fuscous above, or of intermediate shade.

Antenna	H fem.	Teg.	Teg. vs. H. fem.
♂ 8.5-10.5	10.5-11.8	8.5-15	-3-+3
♀ 6.5-8	11.5-14	7-16.5	-7-+2
	Body.	Total.	
	13.5-15.5	14-22	
	15-24.5	12.4-23	

This is a sprightly, wide-awake little "hopper" of no mean ability, which also freely makes use of its wings when needful; an artful dodger, and an adept in all descriptions of tumbling and vaulting. While common wherever there is a thick and succulent growth of herbage, it is especially plentiful in the long grass and sedge of meadows, by the side of ditches, etc., becoming even abundant locally.

The season during which it may be procured in the adult state is probably the longest of all of our locusts; I have captured specimens from June 24 to Nov. 17. Not only is its season a protracted one but it is one of the most thoroughly distributed of our species in area, and can probably be found in every township of New England wherever there is a grassy area of some extent. About 700 specimens in my collection are from the following localities: Deering, Portland, Fryeburg, Hudson, (F. P. Briggs), Norway, and Speckled Mt., Stoneham, Me.; No. Conway, Kingston (S. W. Denton), Hanover (Prof. C. M. Weed), summit of Mt. Washington, N. H.; Hyde Park, Stowe, Montgomery, Jay, Newport, Hartland (Prof. C. M. Weed), Brattleboro (Mrs. J. B. Powers), Vt.; Kingston, and Block Id., R. I.; all quarters

of Conn.; and various places in Mass., including Winchendon, Greylock Mt., Penikese, Cuttyhunk, and Martha's Vineyard Ids. The specimens from Greylock Mt. consist of both long and short winged adults and young, showing that the species undoubtedly breeds there; those from Speckled Mt. on the contrary are all long-winged adults and probably flew

there, having been observed by Mr. Scudder in the middle of Sebago Lake almost simultaneously. A notation and description by Mr. Scudder of its song and attitude during stridulation will be found in Distribution of Insects in New Hampshire and the 23rd report of the Entomological Society of Ontario.

A THYSANURAN OF THE GENUS ANOURA.

BY F. L. HARVEY, ORONO, ME.

Prof. A. S. Packard in his "Syn. Thys. of Essex Co. Mass." p. 27 describes a species of *Anoura* under the name *A. gibbosa*, which was collected at Brunswick, Me. The description is so meagre and differs so materially from a form found in similar situations about Orono, Me., that we submit the following account of specimens examined.

Description.—Lead colored or pale indigo bluish. Body short and broad with broad segment. Head long in proportion to the other segments, and divided above into two areas: a wide anterior flattened portion, bearing three rounded tubercles. The middle one much larger and marked by about twenty small irregular color patches. The posterior portion narrower, ridged, bearing five tubercles, the middle one rectangular larger and two lobed by a transverse depression. The others small and rounded.

The prothorax bears four tubercles, the two median ones small or obsolete, the location indicated by hairs. The segments from the third to the eighth inclusive six-tuberculate. Ninth segment four tuberculate

The body ending in two large tubercles. The tubercles armed with whitish hairs at the apex which become larger, longer and more numerous toward the posterior part of the body. The tubercles are colored like the body but surrounded at the base by a light colored ring which has light colored lines radiating from it to the apex of the tubercles breaking the color into six sub-triangular zones. The tubercles on the second segment are triangular at the base and the color broken by lighter lines into twelve irregular patches nine surrounding three. Body widest at 7th to 8th segments. The bucal cone acute, broad at the base, prominent and projecting beyond the head, as shown in Fig. 2. Antennae short, stout, hirsute, as long as half the width of the head. Basal joint broadest. Three basal joints about equal. Terminal joint longest, narrowest, conical, lighter colored.

Legs short and stout slightly longer than half width of body. Underside of body yellowish at the insertion of the legs.

Measurements.—Total 1.9 mm. to 1.6 mm. Greatest width .798 at 8th seg., head, .399 mm. long. Breadth .532 mm. behind but at base of antennae .319 mm. Antennae .213 mm.

Habitat. Common about Orono, Me., in decaying wood or under boards, stones, logs, etc., at all seasons.

Remarks. The illustrations were drawn by Mr. Emerton from live specimens furnished by the writer. Fig. 1 shows a full grown specimen somewhat too broad from pressure. Fig. 2 ventral view of some specimen. Fig. 3 represents a form found with the other

our specimens as the six tubercles are plainly on the tergal region and in plain view when the specimen is walking. We would suggest the name *Anoura 6-tuberculata* n. sp. should the form prove distinct from Packard's species when compared with his type. Our form when disturbed or killed in alcohol or balsam puts the antennae at right angles to the body as shown in

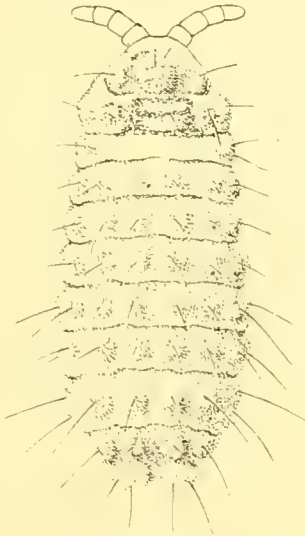


Fig. 1.

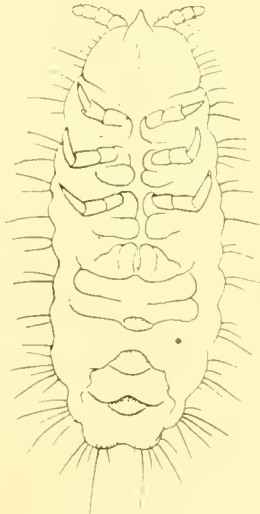


Fig. 2.

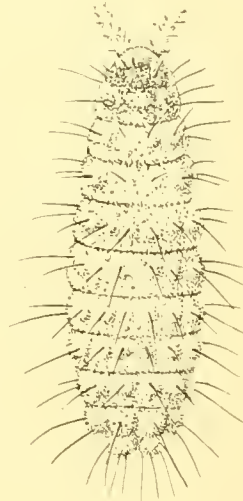


Fig. 3.

and may be the same species though smaller and the body much more slender and the antennae narrower.

Our specimens are larger than Packard's, and the tubercles on the head different and the number of tubercles on the segments greater. Packard's statement "*four large subacute tubercles across the upper side of each segment*" certainly does not apply to

Lubbock's figure of *A. muscorum* Temp. Mr. Macgillivray has proposed the name *Aphoromma* for *Anoura* which is preoccupied. Should this prove to be the same as Packard's species the more minute description and the figures will be interesting. We do not know that Packard's species has been figured.

LIFE HISTORY OF ICHTHYURA STRIGOSA GROTE.

BY HARRISON G. DYAR, NEW YORK CITY.

Larva. Closely like that of *I. apicalis*; much paler in the early stages, darker in the last stage, the head black, not brown, the body of a dark purplish color, but marked in exactly the same pattern as *I. apicalis*.

Eggs. Laid in patches of 25 to 50 on the under side of leaves of *Populus tremuloides* at Jefferson Highlands, N. H. in June. Somewhat conoidal, not exactly hemispherical, when fresh not shining bright emerald green, later of a purplish color, the heads of the enclosed larvæ showing as black spots at the vertices; shell milky white; reticulations evident, neat, but narrow, almost linear and rather small, hexagonal with rounded angles, a small, better marked area at the vertex. Diameter, 8 mm.; height, 5 mm.

On hatching the larvæ do not run off as *apicalis* does, but begin to form their houses without wandering. They are less solitary in habit than *apicalis*.

Stage I. Head rather cordate, mouth pointed; shining black; width about 4 mm. Body slightly flattened, grayish white, the slight elevation on joint 12 vinous brown and all of the sides thinly mottled with the same color; cervical shield black, anal plate vinous; thoracic feet black. The vinous on the sides is very obscure, being most pronounced in a narrow subdorsal line. Setæ single, long, dark at base, normal, vi absent, though represented by a slight tubercle without seta; leg plate distinct; on thorax no subprimary setæ, vi with two hairs; the two lower setæ of cervical shield detached. Skin covered with cuticular points.

Stage II. Tubercles converted into small warts with a few secondary hairs from the skin besides. On abdomen normal, vi present; on thorax the setæ of i and ii unite to form three warts, the upper one small. Head slightly bilobed, shining black; width

7 mm. Body pale yellow dorsally on joints 3 to 12 with three faint purplish lines: cervical shield and anal plate smoky; a central purple spot on joints 5 and 12, the latter joint a little enlarged. A sub-dorsal, purple-brown mottled line and faint mottlings on the sides; feet and leg plates dusky. Hairs pale, some of them long. Later the pale parts predominate so that the body appears multilinate with pale, the warts yellow.

Stage III. Width of head 1.1 mm.

Stage IV. Head bilobed, shining black with many soft white hairs; medium suture deep, clypeus small, triangular, sunken below the bulging lobes; width, 2 mm. The body appears as before—a whitish ground, traversed by faint triple dorsal, triple approximate lateral and double stigmatal broken, narrow, purplish brown bands, the dorsal ones fainter than the others. Central dorsal spots behind tubercle i on joints 5 and 12, brown, no humps; warts all yellow. Primary and secondary hairs soft, pale, not long.

Stage V. Head black, the broad, high clypeus pale, scarcely sunken; width 3.2 mm. Body as before, the dorsal patches on joints 5 and 12 much fainter; warts conspicuously yellow. The pale brown mottled lines are broader than the five intervening spaces on each side, mottled, pulverulent on a dirty whitish ground. A single example had the colors brighter, the lines red, "lake red," the three dorsal fainter than the lateral ones; tubercles yellow, the lateral ones giving the appearance of yellow lines alternating with the lateral red ones (as in Dr. Packard's description). Later as the larvæ mature the head becomes nearly entirely black, the lines dark dull purple, broad, mottled and freckled, reducing the ground color to narrow irregular pale lines. The

general color is very uniform, the warts yellow but small and inconspicuous. Some of the whitish lines of the ground color are broken into ring-spots and streaks; about six remain on each side nearly continuous; the body is therefore dull dark purple, mottled with the narrow pale lines and rings and the small yellow tubercles. Hair very inconspicuous, fine, short, about one from each wart; secondary hair very fine, pilose. Spins an imperfect cocoon between leaves, the moth emerging the following season. The larvæ have the habits of *I. apicalis* (*vau*) living in houses formed of leaves spun together.

BIBLIOGRAPHICAL NOTES. — VII.

BY SAMUEL HENSHAW.

MINOR ENTOMOLOGICAL PUBLICATIONS.—
GARDEN AND FOREST. Vol. 5 (1892) contains the following notes and articles:—

- Jack, J. G. The perforation of flowers [by bees]. p. 29-30, fig. 7.
S. The gypsy moth and its extermination. p. 81-82.
Smith, J. B. Insects in the soil of greenhouses. p. 117.
Nutter, F. H. Help against the gypsy moth. p. 119.
G., T. and Editor. Insects [*Myzus cerasi*] on cherry trees. p. 203-204.
Hoskins, T. H. Insecticides and fungicides in the orchard. p. 261.
L [odeman], E. G. The pear *Psylla*. p. 285.
Bailey, L. H. Is spraying overdone? p. 310.
Jack, J. G. Notes on two [*Cyllene robiniae*, *Aegeria rubi*, *Bembecia marginata*] troublesome borers. p. 426.
Editor. Legislation against injurious insects and plant diseases. p. 457-458.
Smith, J. B. Legislation against injurious insects. p. 490-491.
Smith, J. B. The oak pruners [*Elaphidion* sp.]. p. 557-558, fig. 94-95.
Editor. Co-operation against insect invasions. p. 601-602.

Slade, D. D. A campaign against the tent caterpillar. p. 604.

Vol. 6 (1893) contains the following:—

- Wright, Walter C. Legislation against insects. p. 69-70.
[Lintner, J. A.] A destructive elm tree bark borer [*Saperda tridentata*]. p. 75.
Anon. [Notice of Smith's Cranberry insects]. p. 84.
R[obbins,] M. C. War upon caterpillars. p. 318-319.
A., E. B. and Editor. The white grub [*Lachnosterna* sp.] in lawns. p. 357.
Smith, J. B. The white grub [*Lachnosterna* sp.] in lawns. p. 369.
Editor. Legislation against plant diseases and injurious insects. p. 401-402.
Smith, J. B. Notes on blister beetles [*Meloidae*]. p. 423-424.
[Rudd, W. N.] To kill grubs and seeds in greenhouse soil. p. 427.
Smith, J. B. Is the woodpecker useful? [as a destroyer of insect larvae]. p. 483-484.
Vol. 7 (1894) contains the following:—
Jack, J. G. The plum *Curculio* as an apple pest. p. 44-45.
Smith, J. B. The plum *Curculio* on apple. p. 104.
Anon. Review of Sempers's Injurious insects and the use of insecticides. p. 149.
Orpet, E. O. The onion maggot. p. 187-188.
Anon. Review of Adler's Alternating generations. p. 259-260.
Beach, S. A. A scale insect [*Lecanium cerasifex*] on plums. p. 284, fig. 47.
G., D. and Editor. Injuries by seventeen year locusts. p. 288.
Smith, J. B. The San José scale. p. 344, fig. 55.
Hopkins, A. D. The relations of insects and birds to present forest conditions. p. 348.
Smith, J. B. The flat-head pear borer [*Agrilus sinuatus*]. p. 373-374, fig. 60.
C., S. and Editor. Insects injurious to plants. p. 448.

- Smith, J. B. The pear-borer [*Agrilus sinuatus*] again. p. 448.
- Sirrine, F. A. The pernicious scale on Long Island. p. 449.
Vol. 8. (1895) contains the following:—
- S., R. A. and Editor. The chestnut weevil. [*Balaninus* sp.]. p. 8.
- Anon. [Notice of Smith's San Jose scale]. p. 60.
- [Slingerland, M. V.]. Insects injurious to fruits. p. 79.
- Wright, W. C. The gypsy moth in Massachusetts. p. 108.
- [Hubbard, H. G. Effects of cold weather on insects in Florida]. p. 140.
- Goff, E. S. The kerosene attachment for spraying pumps. p. 143, fig. 21-22.
- Weed, H. E. Kerosene attachment for knapsack spray pumps. p. 186-187, fig. 29.
- Orpet, E. O. Insect pests. p. 187.
- Christ, H. An enemy [*Steganoptycha pini-colana*] of the larch on the high Alps. p. 238-239.
- Cockerell, T. D. A. New facts about scale insects. I. p. 244.
- Anon. [Notice of Slingerland's Cigar-case bearer]. p. 270.
- Anon. [Ravages of *Orgyia leucostigma* in Boston]. p. 300.
- [Southwick, E. B.] The tussock moth, *Orgyia leucostigma*. p. 308.
- Lowe, V. H. The white-marked tussock moth, *Orgyia leucostigma*, in western New York. p. 314-315, fig. 43.
- Jack, J. G. Another herbarium pest (*Ephesia interpunctella*). p. 323-324, fig. 45.
- A., S. J. Fighting the elm-leaf beetle. p. 346-347.
- Smith, J. B. Why certain hickories died [Ravages of borers]. p. 352-253, fig. 49.
- Britton, W. E. The columbine leaf-miner. *Phytomyza aquilegiae*. p. 443-444, fig. 61.
- Anon. [Raupenleim]. p. 470.
- Cockerell, T. D. A. Scale insects liable to be introduced into the United States. p. 513.
- Anon. [The cabbage maggot, *Anthomyia brassicae*]. p. 520.

PROCEEDINGS OF THE CLUB.

14 February, 1896. The 190th meeting was held at 156 Brattle St., Mr. S. H. Scudder in the chair.

Prof. C. M. Weed read his presidential address for 1895 on the Hibernation of Aphides.

In continuation of his remarks at the last meeting, Mr. A. G. Meyer said the cells from the scales of Lepidoptera were modified hypodermic cells and homologous with hairs. The pigment of the scales is derived from the blood, a haemolymph, of the chrysalis, which fills the scales while the pigment is forming. The haemolymph is an albuminous fluid containing a strong acid; its mineral bases contain a large amount of iron and also potassium and sodium in small quantities. The following facts confirm the statement that the pigments of the mature wings are derived from the blood of the chrysalis. The red band on the hind wing of *Samia cecropia* becomes yellow by the addition of hydrochloric or nitric acid, but its red color is restored by ammonia. The blood of the pupa of that species when treated with warm nitric acid becomes yellow, and is changed to orange-red by ammonia; the application of hydrochloric or nitric acid again turns it yellow, the color being restored by ammonia, exactly as is the case with the red color of the mature wing. Also, if the blood of *Callosamia promethea* is treated with hydrochloric acid and a minute crystal of chlorate of potash at a gentle heat, it becomes purple, but is blackened to a drab color by nitric acid. The purple spots near the outer edge of the hind wing of the female moth are similarly bleached to a drab color upon application of nitric acid. Most of the colors of the wings are probably derived from the blood of the chrysalis by processes of oxydation.

In answer to questions, Mr. Meyer stated that it was in the last stages of the pupa that the pigment was developed; and that colors

other than those due to pigment were developed earlier.

Mr. S. H. Scudder called attention to an article in the Boll. Soc. Rom. Stud. zool. on the rearing of *Sarcophagus affinis* from the top of the head of a child.

He also read a paper by Mr. H. F. Wickham on myrmecophilous Coleoptera, and exhibited a collection of Satyrid larvae.

Mr. J. W. Folsom showed a copy of a new journal of entomology in Japanese, published at Tokio; and also read some notes on the oviposition of two species of Thanaos, exhibiting specimens, which led to a discussion on the food plants of our species of Thanaos.

Prof. C. M. Weed remarked briefly on the insects found by him in a recent trip to Bermuda. He found few Coleoptera. Hymenoptera and Diptera were most abundant, especially the smaller species. Hemiptera were rather numerous. Among the Lepidoptera, *Junonia coenia* and *Anosia plexippus*

were the only butterflies commonly abroad, and several sphingids were seen. Orthoptera were rather scarce, cockroaches excepted. A large West Indian centipede and some other myriapods were abundant and spiders were numerous.

April 9, 1896. The 191st meeting was held at 156 Brattle St., Mr. A. P. Morse in the chair. Mr. J. W. Folsom was chosen secretary pro tem.

The secretary was directed to send a vote of thanks to Dr. John Hamilton for his gift of two bound volumes of his papers on Coleoptera.

Mr. S. H. Scudder exhibited the eggs of *Neophasia menapia* laid in a row on a pine needle in July, 1895 and now about to hatch. They were obtained by Mr. James Fletcher in British Columbia.

Mr. J. W. Folsom made some extended remarks upon *Thysanura* he had recently found and which were to be published in *Psyche* and the *Canadian entomologist*.

Just Published, by Henry Holt & Co., New York.

Scudder's Brief Guide to the Commoner Butterflies.

By SAMUEL H. SCUDDER. xi + 206 pp. 12mo. \$1.25.

An introduction, for the young student, to the names and something of the relationship and lives of our commoner butterflies. The author has selected for treatment the butterflies, less than one hundred in number, which would be almost surely met with by an industrious collector in a course of a year's or two year's work in our Northern States east of the Great Plains, and in Canada. While all the apparatus necessary to identify these butterflies, in their earlier as well as perfect stage, is supplied, it is far from the author's purpose to treat them as if they were so many mere postage-stamps to be classified and arranged in a cabinet. He has accordingly added to the descriptions of the different species, their most obvious stages, some of the curious facts concerning their periodicity and their habits of life.

Scudder's The Life of a Butterfly. A Chapter in Natural History for the General Reader.

By SAMUEL H. SCUDDER. 186 pp. 16mo. \$1.00.

In this book the author has tried to present in untechnical language the story of the life of one of our most conspicuous American butterflies. At the same time, by introducing into the account of its anatomy, development, distribution, enemies, and seasonal changes some comparisons with the more or less dissimilar structure and life of other butterflies, and particularly of our native forms, he has endeavored to give, in some fashion and in brief space, a general account of the lives of the whole tribe. By using a single butterfly as a special text, one may discourse at pleasure of many; and in the limited field which our native butterflies cover, this method has a certain advantage from its simplicity and directness.

THE SEVENTH VOLUME OF PSYCHE

Began in January, 1894, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. The numbers will be issued, as in Vol. 6, on the first day of every month and will contain at least 12 pages each. No more than this was promised for the sixth volume but the numbers have actually averaged more than 16 pages, and in addition 21 plates have been given and more than 50 other illustrations. We prefer to let performance outrun promise, but when a larger subscription list warrants it, we shall definitely increase the number of pages.

Vols. 1-6, Complete, Unbound, - Now sold for \$29.00.

Vols. 1-6, and Subscription to Volume 7, - - \$33.00.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

Vol. 1. Introduction; Nymphalidae.

Vol. 2. Remaining Families of Butterflies.

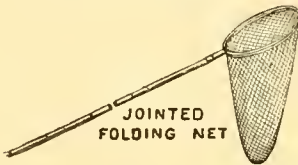
Vol. 3. Appendix. Plates and Index.

The set, 3 vols., royal 8vo, half levant, \$75.00 net.

HOUGHTON, MIFFLIN & CO.,

4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.

78 Ashland Place,

BROOKLYN, N. Y.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 246.

OCTOBER, 1896.

CONTENTS:

THE SPECIES OF NEMOBIUS FOUND IN NORTH AMERICA.— <i>S. H. Scudder.</i> . . .	431
NOTES ON THE WINTER INSECT FAUNA OF VIGO COUNTY, INDIANA.— VIII.— <i>W. S. Batchley.</i>	434
SOME ADDITIONAL SPECIES OF PROSAPIS.— <i>T. D. A. Cockerell.</i>	437
CAPTURES OF ORTHOPTERA.	439

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

5.70578

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

PS Subscriptions not discontinued are considered renewed.

PS Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5.00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, . . . Free

Author's extras over twenty-five in number, under same conditions, each per page, . . . 1c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

PS Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion, . . .	\$0.10	\$0.08
Eighth page, first insertion, . . .	.75	.60
Quarter " " " . . .	1.25	1.00
Half " " " . . .	2.25	1.75
One " " " . . .	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,

Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:
Burgess, E. Contributions to the anatomy of the milk-weed butterfly, *Danais archippus*. Boston, 1880. 16 p., 2 plates. . . . 1.00

Hitchcock, Edward. Ichtnology of New England. Boston, 1858 1.50

Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate .50

Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875. . . . 1.00

Scudder, S. H. The pine-moth of Nantucket, *Retinia frustrana*. col. pl. Boston, 1883. .25

Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889 1.00

Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894. . . . 2.00

Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883. . . . 2.00

U. S. Entomological Commission.—Fourth Report, Washington, 1885 2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

MANUAL OF N. A. DIPTERA.

Manual of the Families and Genera of North American Diptera, by S. W. Williston. Paper, \$2.00; Cloth, \$2.25.

J. T. HATHAWAY,
297 Crown St., New Haven, Conn.

DULAU & CO., FOREIGN BOOKSELLERS
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

THE SPECIES OF NEMOBIUS FOUND IN NORTH AMERICA.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

In the Journal of the New York Entomological Society for September, 1896 (Vol. iv, pp. 99-107), I published a paper on "The North American species of Nemobius," describing eight new species and giving a table for the separation of the fifteen known species. After the printing but before the publication of the paper, and, therefore, too late for insertion therein, I received from Professors Bruner and Cockerell

three additional new species, in describing which at this time I remodel the earlier part of the table, and publish it in a complete form, so as to include all the species. Professor Bruner also sends me an additional species, apparently new, from Vera Cruz, but as it is only represented by a male, I refrain from describing it until the female is found; it seems to be allied to *N. cubensis*.

Table to determine the N. A. Species of Nemobius.

- A¹. Ovipositor as long as or slightly (rarely as much as one-sixth) shorter than the hind femora, generally rigidly straight.
- b¹. Tip of ovipositor unarmed; last joint of maxillary palpi very obliquely excised at apex.
- e¹. Tegmina short; wings wanting; last joint of maxillary palpi bicolored, the oblique apical excision of lower margin beginning before the middle. **distinguendus.**
- e². Tegmina long; wings very long; the oblique apical excision of lower margin of maxillary palpi beginning at or beyond the middle.
- d¹. Smaller, darker form; last joint of maxillary palpi bicolored, the oblique apical excision of lower margin beginning at the middle; tegmina scarcely longer than head and pronotum together; blade of ovipositor relatively short, its lower margin straight **delicatus.**
- d². Larger, lighter forms; last joint of maxillary palpi unicolored, the oblique apical excision beginning beyond the middle; tegmina much longer than head and pronotum together; blade of ovipositor relatively long, its lower margin arcuate.
- e¹. Head and pronotum uniform fuscous. **ensifer.**
- e². Head and pronotum luteous, conspicuously variegated with fuscous. **pictus.**

b². Tip of ovipositor serrate or dentate; last joint of maxillary palpi almost transversely excised at apex.

- c¹. Ovipositor distinctly (at least a tenth) longer than hind femora.
 d¹. Blackish: dark and light colors of tegmina of ♀ feebly contrasted longitudinally above (Northern) . . . **fasciatus**.
 d². Grayish; dark and light colors of tegmina of ♀ strongly contrasted longitudinally above as on sides (Southern) . . . **canus**.
 c². Ovipositor barely as long as, or slightly shorter than, hind femora.
 d¹. Pronotum distinctly tapering, fully twice as broad posteriorly as long; teeth of ovipositor exceptionally fine. . . . **melleus**.
 d². Pronotum scarcely tapering, less than twice as broad posteriorly as long; teeth of ovipositor relatively coarse.
 e¹. Teeth of ovipositor blunt, little elevated; wings generally very long. . . . **socius**.
 e². Teeth of ovipositor sharp, well elevated, well separated; wings wanting.
 f¹. Tegmina of ♀ nearly or quite twice as long as pronotum; of ♂ strongly rounded apically, feebly margined with pallid at sides of dorsal field only, if at all **utahensis**.
 f². Tegmina of ♀ scarcely longer than pronotum; of ♂ broadly rounded apically, with the dorsal field distinctly margined with pallid throughout except at base.

ambitosus.

A². Ovipositor distinctly (at least one-fourth) shorter than the hind femora, usually a little arcuate.

b¹. Tegmina of ♀ nearly or quite as long as the abdomen; wings generally twice as long as tegmina.

c¹. Ovipositor no longer, or scarcely longer, than head and pronotum together.

d¹. Face without vertical pale stripes; lateral field of ♀ tegmina tapering only on the apical third, subequal before it.

neomexicanus.

d². Face with a pair of narrow, vertical, percurrent, pale stripes next the inner margin of the eyes; lateral field of ♀ tegmina regularly tapering almost from the base. . . . **trinitatis**.

c². Ovipositor distinctly longer than head and pronotum together.

d¹. Tegmina of ♀ apically truncate, a little shorter than the abdomen; wings wanting **aterrimus**.

d². Tegmina of ♀ apically rounded, as long as the abdomen; wings generally present and then very long. . . . **cubensis**.

b². Tegmina of ♀ much shorter than the abdomen; wings wanting.

c¹ Ovipositor barely arcuate.

d¹. Tegmina of ♀ no longer than head and pronotum combined.

mormonius.

d². Tegmina of ♀ distinctly longer than head and pronotum combined.

e¹. Longitudinal markings of head continuous to extreme back of same; ovipositor with distinct and well separated teeth at apex.

toltecus.

e². Longitudinal markings of head interrupted at the crown, the whole back portion immaculate, sharply defined from the portions in front at the summit, which is feebly subcarinate transversely; ovipositor with fine, close, minute denticulations.

mexicanus.

c². Ovipositor distinctly though but feebly arcuate.

carolinus

N. delicatus sp. nov. Head piceous marked by a slender longitudinal luteous stripe on either side next the eye and extending from the antennal scrobes to the back of the head, sometimes accompanied by a pair of shorter dorsal stripes posteriorly; without bristles; eyes moderate, rather prominent; antennae dark fuscous; maxillary palpi pale luteous, the outer side of the antepenultimate joint and more than the apical half of the last joint dark fuscous, the latter bent in the middle where the oblique apical excision begins. Pronotum equal, slightly less than twice as broad as long, blackish fuscous, glistening, rather sparsely beset with not very long black bristles. Tegmina reaching scarcely beyond the middle of the abdomen, apically rounded, more broadly in the ♀ than in the ♂, infumated or testaceous, the upper portion of the lateral field narrowly and the inner border of the dorsal field broadly dark fuscous; wings very long, reaching in the ♀ the tip of the ovipositor. Legs fuscous, more or less luteo-testaceous beneath. Cerci delicately tapering, a little shorter than the ovipositor in the ♀. Ovipositor straight except for a slight basal bend, a little longer than the hind femora, the apical blades rather small,

slightly enlarged at the base, with straight inferior margin, unarmed. Length of body, ♂, 8 mm., ♀, 8.75 mm.; of hind femora, ♂, 5.5 mm., ♀, 6 mm.; of ovipositor, 6.9 mm.

2 ♂, 2 ♀, San Rafael, Vera Cruz, Mexico, Townsend (L. Bruner).

N. pictus sp. nov. Head rather prominent anteriorly, luteous, heavily marked with blackish fuscous above, which does not reach the eyes and is broken by a pair of obliquely longitudinal, narrow, luteous dashes on either side, the outer more posterior, more oblique, and open in front toward the eyes; clypeus infuscated; eyes not very large, very full and prominent; antennae luteous; maxillary palpi luteous, the last joint feebly and narrowly infuscated at extreme tip, the very oblique apical excision beginning well beyond the middle. Pronotum equal, less than twice as broad as long, dull luteous, obscurely and broadly fuscous in the middle of either side of the disk and having an impressed crescentic darker spot, sharply margined with black, opening forward on either side just before the middle; without bristles except along the front and hind margins and there short. Tegmina scarcely exceeding the middle of the abdomen, dull

luteous, the veins and the middle of the cells more or less infuscated and the outer margins of the dorsal field black between the veins; wings very long. Legs luteous, the hind femora dotted with fuscous exteriorly. Ovipositor somewhat longer than the hind femora, straight, the apical blades long and tapering, scarcely enlarged basally, unarmed. Length of body, 12.5 mm.; of hind femora, 8.25 mm.; of ovipositor, 9 mm.

1 ♀, Colorado in New Mexico, T. D. A. Cockerell, B. 59.

N. melleus sp. nov. Dull luteous. Head feebly infuscated above, clothed with sparse black bristles, and with three short longitudinal fuscous stripes posteriorly; eyes rather prominent; antennae luteous, feebly infuscated; maxillary palpi luteous, the last joint infuscated only at extreme transversely truncate tip. Pronotum very sparsely beset with black bristles, transverse, tapering

rapidly, posteriorly fully twice as broad as long, the incisures fuscous, two small, transverse, oval, fuscous spots in the middle of either side of the disk posteriorly. Tegmina nearly as long as the abdomen, luteous, but infuscated basally along the inner margin; wings more than twice as long as the tegmina. Legs luteous, the hind femora feebly and obscurely infuscated. Cerci slender, reaching to beyond the middle of the ovipositor. Ovipositor straight, a little longer than the tegmina and a little shorter than the hind femora, castaneous, the apical blades black, slightly enlarged basally, beyond tapering regularly to a fine point, the teeth exceptionally minute and crowded. Length of body, 11.5 mm.; of hind femora, 8 mm.; of ovipositor, 7.1 mm.

1 ♀, San Rafael, Vera Cruz, Mexico, Townsend (L. Bruner).

NOTES ON THE WINTER INSECT FAUNA OF VIGO COUNTY, INDIANA.—VII.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

COLEOPTERA (*Cont.*).

ELATERIDÆ.

Fifty-three species of this family are known to occur in the county. Representatives of but twelve of these have been taken during the winter months, as follows:

184, *Adelocera discoidea* Web. On several occasions in winter beneath loose bark of logs. An uncommon species.

185, *Lacon rectangularis* Say. Occurs only on a dry sandy hillside where the river terrace meets the old canal.

There it is frequent beneath chips and chunks. Dec. 12. Jan. 1.

186, *Cryptohypnus pectoralis* Say. One specimen only from the county. Jan. 7, beneath chunk.

187, *C. obliquatulus* Melsh. Frequent in winter beneath logs on sandy hillsides.

188, *Monocephidius auritus* Hbst. Very common in winter beneath logs and mullein leaves on sandy hillsides. Varies from reddish-brown with black markings to deep black, three distinct color forms occurring. Usually two or three hibernate together.

189, *M. bellus* Say. Frequent throughout the winter. Beneath chunks in damper localities than the preceding.

190, *Elater sanguinipennis* Say. A handsome but uncommon elaterid. Taken but once in winter, Feb. 2, from beneath a log in the sandy bed of the old canal.

191, *Dolopius lateralis* Esch. Dec. 23 and Jan. 5, from beneath logs on sandy hillside. Scarce.

192, *Melanotus fissilis* Say.

193, *M. communis* Gyll. Both are among the most common of winter beetles. Usually two to six together beneath loose bark, logs, mullein leaves, etc. In common with most elaterids they feign death when disturbed.

194, *Corymbites rotundicollis* Say. A single specimen, taken Dec. 12, from beneath a log, on the sandy hillside mentioned under No. 185 above, represents the species in my collection.

195, *Asaphes memnonius* Hbst. Scarce. Winters beneath the bark of red oak logs.

THIROSCIDAE.

196, *Throscus chevrolati* Bonv. One only, Jan. 21, from beneath a rail on the side of the old canal.

PTINIDAE.

197, *Endecatomus rugosus* Rand. Several at intervals in winter in woody fungi and beneath logs.

CIOIDAE.

198, *Cis fuscipes* Mellie. One. Jan. 7, from beneath a chunk near the border of a swamp.

LUCANIDAE.

199, *Dorcus parallelus* Say. A single specimen, Dec. 8, from beneath a partly burned log. Most common in June.

200, *Passalus cornutus* Fab. Abundant throughout the winter in its usual abiding places—the juicy depths of half decayed logs.

SCARABAEIDAE.

This family is represented in the county by ninety-eight known species. Of these, but ten have been found in the imago stage in winter.

201, *Choeridium histeroides* Web. Winters sparingly in dry cow-dung and beneath logs.

202, *Copris minutus* Drury. Once in winter. Feb. 28th, beneath chunk in upland open woods.

203, *Ataenius cognatus* Lec.

204, *Aphodius fimetarius* Linn.

205, *A. inquinatus* Hbst.

206, *A. terminalis* Say. Of these, *cognatus*, *fimetarius* and *inquinatus* winter in large numbers in dry cow-dung and in the earth beneath it; also beneath logs on sandy banks. On warm sunny days, even in midwinter, they may be taken on the wing and they fly by thousands in early spring. *A. terminalis* has similar habits but is much less common. Three additional species of *Ataenius* and seven of *Aphodius* have been taken in the county and most, if not all, of them doubtless hibernate as imagoes; several having been taken in March but not in the winter months.

207, *Geotrupes splendidus* Fab. This very common beetle has been seen on the wing on numerous occasions in March, and a pair was found in copulation beneath a log on Dec. 20th. They usually mate in May.

208, *Trox aequalis* Say. The only one of the nine species known to occur in the county which has been found in winter. Once, Dec. 12, beneath rail in fence corner.

209, *Valgus canaliculatus* Fab.

210, *V. squamiger* Beauv. Both have been taken on several occasions in winter, notably on Dec. 10, 1893, when they were found gregarious in numbers beneath a half hollow decaying chunk which was filled with dry dirt and situated in an upland thicket. A single specimen of *canaliculatus* taken at that time is unique in having the tergite of the terminal ring of the abdomen prolonged into a sharp spine, 3 mm. in length. Mr. H. F. Wickham mentions in a private letter the finding of an example of the same species in Michigan, which possesses a similar abdominal projection.

CHRYSOMELIDAE.

One hundred and nine species of this family have been collected in the county. Of these, mature specimens of but twenty-six have been taken in the winter months.

211, *Myochrous denticollis* Say. Represented in my collection by a single specimen, taken Feb. 28, from beneath a chunk in the river terrace woods.

212, *Metachroma angustula* Cr. Once in winter, Feb. 14, from beneath mullein leaves. Common in June on the flowers of *Cornus* and *Ceanothus*.

213, *Doryphora clivicollis* Kirby. Uncommon at any time. Once, Jan. 5, from beneath mullein leaves. Several times, single specimens in March. On milkweed flowers in June.

214, *D. 10-lineata* Say. Much less common than 20 years ago. Usually hibernates in the ground at a depth of 18 to 20 inches, but sometimes beneath logs, rubbish, etc. On the wing in early spring.

215, *Chrysomela suturalis* Fab. Dec. 10.

216, *C. similis* Rog. Feb. 21.

217, *C. praecelsis* Rog. These three winter sparingly beneath chunks near the borders of sandy cultivated fields and along the old canal. *Suturalis* is rare, the others frequent. Three additional species, *elegans* Oliv., *multipunctatus* and *auripennis* Say, have been taken in the county, the first and last on dates (Mar. 14 and Nov. 21) which lead me to infer that they also hibernate as imagoes.

218, *Cerotoma caminea* Fab. Rare. Three only from county. One, Feb. 21, beneath log in lowland woods.

219, *Diabrotica vittata* Fab. On numerous occasions in winter from beneath logs and rubbish in dry sandy places, especially along the borders of fields in which melons and cucumbers had been cultivated.

220, *Galeruca notulata* Fab. Be-

neath chunks and mullein leaves. Dec. 10, Jan. 16.

221, *Hypolampsis pilosa* Ill. One only, from beneath a chunk in the bed of canal. Jan. 1.

222, *Oedionychis gibbitarsis* Say.

223, *O. vians* Ill.

224, *O. indigoptera* Lec.

The above are the winter representatives of the six species of the genus found in the county. *Gibbitarsus* and *vians* were taken on numerous occasions: *indigoptera*, once, Feb. 14, all from beneath logs and rubbish.

225, *Disonycha discoidea* Fab.

226, *D. collaris* Fab.

227, *D. collata* Fab.

228, *D. cervicalis* Lec. These four frequent throughout the winter beneath mullein leaves and rubbish. Four additional species of the genus occur in the county.

229, *Haltica chalybea* Ill. One of the two specimens taken, was found Dec. 10th beneath the bark of an oak log.

230, *Systema frontalis* Fab. Once

in winter, Feb. 14, from beneath the bark of the White Maple (*Acer dasycarpum* Ehrh.) Common in June on the leaves of the great ragweed (*Ambrosia trifida* L.).

231, *Longitarsus turbatus* Horn. Feb. 10, from beneath logs. Frequent in June on the leaves and stems of the false gromwell, *Onosmodium carolinianum* D. C.

232, *Chaetocnema denticulata* Ill. Frequent beneath chunks in fence corners filled with dead leaves. Jan. 6.

233, *Odontota dorsalis* Thumb. But once in winter, Dec. 25, from beneath the bark of a locust (*Robinia pseudacacia* L.) log. Frequent in summer.

234, *Cassida bivittata* Say.

235, *C. thoracica* Ill. Dec. 29.

236, *Coptocycla guttata* Oliv.

Of these *bivittata* and *guttata* are frequent in winter; the other rare at any season and once on date given. All hibernate beneath chunks and chips in damp localities.

SOME ADDITIONAL SPECIES OF PROSAPIS.

BY T. D. A. COCKERELL, MESILLA, N. MEX.

Prosapis labiatifrons, n. sp., ♂.—Length, 5½ mm., black with orange markings. Head fairly large, face only moderately narrowed below; clypeus, supraclypeal mark and lateral marks dull orange-yellow with a slightly buff tint. Supraclypeal mark quite broad, elongated, extending up between antennae. Lateral marks strongly excavated by antennal sockets on inner side, at the same level strongly curving inwards, reced-

ing from the orbital margin; the lateral marks as a whole strongly recall the corolla of a labiate flower, whence the specific name. Scape orange in front, hardly dilated at all. Flagellum dark brown, reaching a little beyond tegulae. Vertex and front strongly punctured, the punctures on front not running into grooves. Mesothorax, scutellum and pleura strongly punctured, the punctures on hind part of mesothorax conspicuously

closer than those on scutellum. Enclosed area of metathorax ill-defined, strongly wrinkled. Pubescence very sparse, except on pleura, where it is pale and rather conspicuous. Hind border of prothorax wholly dark, except the large orange patch (without a dark spot) on tubercles. Tegulae with an orange spot. Femora black with the extreme apices orange. Tibiae and tarsi entirely reddish-orange. Wings smoky-hyaline, second submarginal cell little narrowed towards marginal. Abdomen very shiny, without distinct hair-bands or spots, but very small and narrow hair-bands or lines on lateral hind margins of first three segments, only noticeable in certain lights. First segment impunctate.

Hab.—Georgia, exact locality and collector unknown. Sent by Mr. Fox. In Coll. Amer. Ent. Soc. Much larger than *pygmaea*, which it resembles in its face-marks. In the color of its legs it approaches *flammipes*.

Prosapis georgica, n. sp., ♂.—Length 5 mm., rather slender, black with bright lemon-yellow markings. Face rapidly narrowing below, bright lemon-yellow; supraclypeal mark fairly broad, longer than broad, rounded above; lateral marks little excavated by antennal sockets, terminating broadly on orbital margin. Scape moderately swollen, yellow in front; flagellum dark brown above, paler beneath. Vertex and occiput strongly punctured. Mesothorax, scutellum and pleura finely granular, with numerous but rather small and not very close punctures. Enclosed space of metathorax granular and irregularly cancellated. Pleura with short white pubescence. Hind border of prothorax interrupted in middle, tubercles (without a dark dot), and large spot on tegulae bright yellow. Extreme apices of femora, and tibiae and tarsi wholly, yellow, the tarsi becoming rufescent at ends. Wings hyaline, second submarginal cell high, narrowed about one-third to marginal. Abdomen shining, without hair-bands; dorsum of first segment microscopically reticulate, impunctate.

Hab.—Georgia, exact locality and collector unknown. Four specimens sent by Mr. Fox. In Coll. Amer. Ent. Soc. Easily known by its small size, converging orbits, yellow face and largely yellow scape. The orbits converge below much more than in *modesta*.

Prosapis saniculae Robertson ♂.—Length 4½ mm., slender, black with yellow markings. Face broad above, rapidly narrowing below; face-marks dull pale, lemon-yellow, including clypeus, a narrow elongate supraclypeal mark obtuse at its apex, and very peculiar narrow lateral marks. These lateral marks leave the clypeus about its middle and run along the orbital margin, narrow and uniform in width, until a point about level with the middle of the supraclypeal mark, when they suddenly terminate in a short linear projection directed towards the upper margin of the antennal socket. Scape wholly dark, dilated to its apex, forming an elongated triangle. Flagellum very dark brown, last joint only about one-fourth longer than the one before it. Front and vertex rather sparsely punctured. No yellow on mandibles. Mesothorax, scutellum and pleura granular, with numerous small punctures, close, but not so close as to obscure the granular surface. Enclosed area of metathorax strongly pitted, not at all ridged. Thorax without any yellow, even the tubercles and tegulae wholly dark. Anterior tibiae except a large blotch behind, basal third of middle tibiae, and nearly the basal half of hind tibiae, yellow. Tarsi rufous, first joint of hind tarsi becoming whitish-yellow. Wings hyaline with a yellowish tinge, second submarginal cell little narrowed to marginal. Abdomen without hair-bands, hind margins of first three segments becoming rufescent, dorsum of first segment impunctate.

Hab.—Iowa, exact locality and collector unknown. Sent by Mr. Fox. In Coll. Am. Ent. Soc. Easily known by the peculiar lateral marks of face, the dark tubercles, etc.

Prosapis coquilletii, n. sp. ♂.—Length 7 mm., black with the face-markings dull orange, the other pale marks very light yellow or yellowish-white. Face little narrowed below, vertex strongly and closely punctured, mandibles mostly pale yellow without, strongly bifid at tips. Supraclypeal mark considerably longer than broad, but not narrow, shaped like a mitre. Lateral marks excavated by antennal sockets, passing upwards along the orbital margin broadly, coming to a point a considerable distance above the level of the tip of the supraclypeal mark, sometimes extending even to the top of the orbit. Scape not dilated, having a broad yellow stripe in front.

Mesothorax; scutellum and pleura strongly punctured; the scutellum not so closely as the hind part of the mesothorax. Enclosed space of metathorax irregularly wrinkled. Hind border of prothorax interrupted in the middle, patch of varying size on tubercles, and spot on tegulae, light yellow. Anterior tibiae in front, middle tibiae at extreme base and apex, and basal two-fifths of hind tibiae, yellowish-white. Extreme end of hind tibiae with a reddish-yellow spot. Tarsi with the first joint very pale yellow, the terminal joints becoming dark brown. The hind tibiae may be yellowish-white at tip.

Wings dull hyaline, hardly smoky. Abdomen rather short and broad, with fine sparse pubescence, lateral hind margin of first segment with a conspicuous white hair-band. Abdomen strongly punctured, the second segment more closely than the first.

Hab.—Los Angeles Co., California. (Coquillet). Three specimens in U. S. Natl. Museum.

Nearest to *episcopalis*, which it much resembles, but differs in its clear wings, lateral face-marks extending far upwards along orbital margin, and scape with a broad pale stripe.

Prosapis pennsylvanica, n. sp. ♂.—Length $5\frac{1}{2}$ mm., rather slender, of the

build of *modesta* ♂, black with chrome-yellow markings. Face little narrowed below, vertex very closely punctured, mandibles wholly dark. Scape stout but not swollen, punctured, wholly black. Flagellum dark brown above, coffee-color below. Face below antennae all deep yellow; supraclypeal mark rounded above, about as broad as long; lateral marks triangular, scarcely at all notched by antennal socket, following the orbital margin, ending thereon at an angle of about 30° . no very great distance above the level of the tip of the supraclypeal mark. Mesothorax, scutellum and pleura strongly punctured, median groove of mesothorax very distinct, parapsidal grooves short but also distinct, enclosed space of metathorax with large confluent pits. Hind border of prothorax with a very little yellow. tubercles with a large yellow patch, tegulae wholly dark. Legs very dark brown; anterior tibiae in front, anterior femora in front near end, middle tibiae for basal fourth, and basal third of hind tibiae yellow. Tarsi yellow the terminal joints becoming rufescent. Wings hyaline. Abdomen narrow, first segment with sparse and small, but distinct punctures. A small patch of white hair on lateral hind margin of first segment.

Hab.—Montgomery Co., Pa., May 28, 1890. Collector unknown. In U. S. Natl. Museum. Also one from Virginia, June 27, 1880; through C. V. Riley. Very near to *citrinifrons*, but rather smaller, face-marks chrome-yellow instead of lemon-yellow, lateral marks differently shaped. Differs from *affinis* by its smaller size, punctured abdomen, and lateral face-marks hardly notched by antennal sockets. It looks most like *modesta*, at a glance, but differs in the shape of the face-marks.

CAPTURES OF ORTHOPTERA.—Mr. F. H. Sprague reports the capture at Walpole, Mass., Aug. 30, of *Paroxya floridana* and *Hesperotettix brevipennis*. The latter species, described from New Jersey, is known from but one other New England locality.

A NEW VOLUME OF PSYCHE

Begins in January, 1897, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. Numbers are issued on the first day of each month. Libraries and individuals generally ordering through subscription agencies (*which only take annual subscriptions*) will please notice that it is cheaper to subscribe for the entire volume at once directly of us.— Any early volume can be had for \$5.00, unbound. Address Psyche, Cambridge, Mass.

Vols. 1-7, Complete, Unbound = = = = = \$33.00.
Vols. 1-7, and Subscription to Volume 8 = = = = = \$37.00.
Vol. 7 contains nearly 500 pp. and 10 plates, besides other illustrations.

The Butterflies of the Eastern United States and Canada.

With special reference to New England. By SAMUEL H. SCUDDER.

Illustrated with 96 plates of Butterflies, Caterpillars, Chrysalids, etc. (of which 41 are colored) which include about 2,000 Figures besides Maps and Portraits. 1958 Pages of Text.

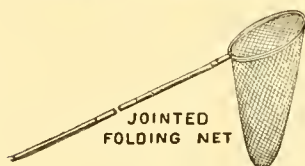
- Vol. 1. Introduction; Nymphalidae.
 Vol. 2. Remaining Families of Butterflies.
 Vol. 3. Appendix, Plates and Index.

The set, 3 vols., royal 8vo, half levant, \$75.00 net.

HOUGHTON, MIFFLIN & CO.,

4 Park St., Boston, Mass.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.
 78 Ashland Place,

BROKLYN, N. Y.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 247.

NOVEMBER, 1896.

CONTENTS:

NOTES ON THE ACRIDIDAE OF NEW ENGLAND.—II.—TRYXALINAE.—VII.— <i>A. P. Morse.</i>	443
NEW SMYNTHURI, INCLUDING MYRMECOPHILOUS AND AQUATIC SPECIES.—(Plate 10.) — <i>J. W. Folsom.</i>	446
PARTIAL LIFE-HISTORY OF <i>HALISIDOTA CINCTIPES</i> GROTE.— <i>H. G. Dyar.</i>	450
NOTES ON LEPIDOPTERA.— <i>Caroline G. Soule.</i>	451
TUTT'S BRITISH BUTTERFLIES.	452

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]

5.70573

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

~~For~~ Subscriptions not discontinued are considered renewed.

~~For~~ Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE,

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

~~For~~ Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,

Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7.45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, Danaia archippus. Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichthyology of New England. Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, Retinia frustrana. col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung. Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report. Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

MANUAL OF N. A. DIPTERA.

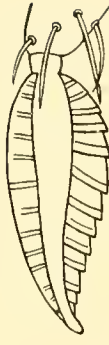
Manual of the Families and Genera of North American Diptera, by S. W. Williston. Paper, \$2.00; Cloth, \$2.25.

J. T. HATHAWAY,
297 Crown St., New Haven, Conn.

DULAU & CO., FOREIGN BOOKSELLERS
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.



1



2



3



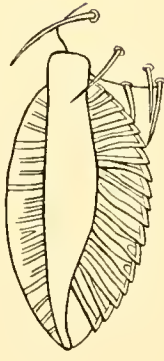
4



5



6



7



8

J. W. F.

PSYCHE.

NOTES ON THE ACRIDIDÆ OF NEW ENGLAND.—II.—TRYXALINÆ.—VII.

BY ALBERT P. MORSE, WELLESLEY, MASS.

10. MECOSTETHUS Fieb.

Mecostethus Fieber 1853. Syn. d. eur. Orth., p. 10.

This genus is sharply distinguished from the other New England Tryxalinae by the structure of the tegmina which possess a highly-developed intercalary vein. In this particular it is closely allied to the Oedipodinae. This vein in the male is provided with a rasp for stridulating, a structure found in some Oedipodinae also. The pronotum also is somewhat Oedipodine in character, having the metazona longer than the prozona; and the meeting of the face and vertex is rounded in the female. Referred at first to *Arcyptera* and later to *Stethophyma* (incorrectly *Stethophyma*,—see Brunner, Prod. eur. Orth., p. 139), our species belong to this genus and one of them is very similar to the European one forming the type. Our three species were described by Scudder and have been thought by some authors to be but varieties of one, but they are undoubtedly distinct.

13. *Mecostethus lineatus* Scudd.

Figs. 13, 13a, 13b.

Arcyptera lineata. Scudder, 462.—1862.

Stethophyma lineata. Thomas, 98. Fernald, 38.

Stethophyma lineata. Morse, 105.

This species is very similar to *M. grossus* of Europe. It is the most common one in the southern part of New England while *gracillis* is probably more often met with in the northern States. In addition to the characters given in the key the present species differs from the others in having the tegmina much longer and narrower proportionally and their dorsal (anal) portion is more nearly of the same tint as the rest. The teeth of the rasp are very low and dull. In coloration the females are very much darker than those of *gracillis*, being of a deep purple brown. (See also remarks under other species.)

About 200 specimens show the following measurements:

Antenna.	Hind fem.	Teg.	Body.	Total.
♂ 11-12	14.5-18	21-26.5	23-27	28-32
♀ 10-11.5	18-21	26-31.5	31-38	35-41.5

The abdomen of the ♂ usually passes the end of the hind femora by 1 mm.; that of the ♀ by 3 mm.

Though somewhat local this species is rather common in southern New England in wet, sedgy meadows along rivers and brooks and in swampy tracts where water often stands on the ground for days at a time. It has a powerful, swift, and sustained flight, often prolonged for one or two hundred feet in a straight, slightly rising, then gradually descending course. It is quite shy, taking flight readily, and rising rapidly when flushed, and is best secured by marking down, following up, and capturing while on the ground or on starting to rise. The ♀ is more difficult to flush than the ♂ and seems to be less abundant; I have captured over 200 specimens but in ordinary collecting only about a tenth as many ♀ as ♂. It may be looked for from the middle of July till the end of the season; I have taken it at Readville, Mass., July 21, ♂, ♀, yg.; Sherborn, Mass., Oct. 6, ♀; and on intermediate dates at Newtonville, Mass., and North Haven and Thompson, Conn. Mr. Scudder reports it from Andover and Williamstown, Mass., and Norway, Me. (Dist. Ins. N. H.).

14. *Mecostethus gracilis* Scudd.

Fig. 14.

Arcyptera gracilis. Scudder, 463, — 1862.

Stethophyma gracilis. Thomas, 99.

Stethophyma gracilis. Morse, 105.

This species may be readily distinguished from *lineatus*, which it most resembles in the form of the pronotum, by the absence of a pale streak on the base of the tegmina near the anterior margin; by the more compressed form of the body, especially of the head and prozona; the smaller size; the broader tegmina, which have the internal border noticeably expanded; and in the case of the male by the height of the teeth of the rasp, which are as high as wide and acutely pointed. (See *platyp-terus* for comparison with that species).

Antenna.	Hind fem.	Tegmina.	Teg. > Hind fem.
♂ 9-10	12-14	16.5-21	3-5
♀ 8.5-9.5	14.5-16	17-23.5	-2.5-+4
	Body	Total.	
	19-23	22.5-28	
	26-33.5	24-31.6	

The tip of the abdomen in the ♂ usually reaches just about to the tip of the hind femora; in the ♀ exceeds them by half the length of the ovipositor, one-and-a-half mm. It will be seen that the tegmina of the ♀ are very variable in length.

This species is not uncommon in the northern States, even plentiful locally, but rather shy, taking readily to wing and flying two or three rods. Its flight is straight and it drops rather suddenly into the grass. On the summit of Greylock Mt., where most of my specimens were procured, it was rather difficult to distinguish from *Camnula pellucida* when flying. Both sexes fly well but the ♂ is the more active,

seeming three or four times as plentiful. I have found it in wet, sedgy meadows and bushy swamps, and on mountain-tops. On Greylock it is common in the low bushes and grass of the extreme summit; on Washington in the sedgy area called the "cow-pasture" or "Semidea plateau." Its note, a fine, dry "scâpe," is the loudest produced by any of our Tryxalinae, and can be heard at a distance of two or three rods. A description and notation of it will be found in Scudder's Distribution of Insects in N. H. and the 23rd report of the Entomological Society of Ontario.

I have taken it in the following localities: Norway, Me., Aug. 16, 2 ♂; Montgomery, Vt., July 18, 2 ♂, 1 ♀; Newport, Vt., 2 ♂; Greylock Mt., Adams, Mass., Aug. 17, 80 ♂, 22 ♀. Mr. Scudder reports it abundant in Jefferson and other parts of the White Mts., and I have found it not uncommon on the summit of Mt. Washington in early Sept.

15. *Mecostethus platypterus* Scudd.

Figs. 15, 15a, 15b.

Arcyptera platyptera. Scudder, 463.—1862.

Stethophyma platyptera. Thomas, 99.

Stethophyma platyptera. Morse, 105.

This species, while of a darker, less yellowish, brown, is very similar in coloration to *gracilis*. The prosteronum is less elevated than in either *lineatus* or *gracilis*, being scarcely

more than strongly convex. In the male, the teeth of the rasp, while larger than in *lineatus*, are less elevated and acutely pointed than in *gracilis*, and the mid-line of the sternum of segment 9 of the abdomen is black. It is also distinguished from *gracilis* by the larger head, and longer and more slender antennae.

Antenna.	Hind fem.	Teg.	Teg. > Hind fem.
♂ 11-12.5	15 16.5	19-21	1 -3
♀ 10-11	17.6-20.6	24-25	-1 5-0
	Body.	Total.	
	23-26	26.5-29	
	35-40	34 -40	

The end of the abdomen of the ♂ is usually 2 to 3 mm. short of the tip of hind femora; in one ♀ it is of equal length, and in another it exceeds them by 2.5 mm.

Of this species I have seen less than a score of specimens. Of those I took 15 ♂, 1 ♀, at Thompson, Conn., Aug. 4, 25, the ♀ on the latter date, and one ♀ was taken at Sherborn, Mass., by Mr. A. L. Babcock. These are the only localities known to me though it will probably be found to occur over a wide area. At Thompson it is found in company with *lineatus* and is impossible to distinguish from that species when flying, though its flight is somewhat less sustained, and it is decidedly more difficult to flush. It is a less shy and active species than *lineatus*, and the female, while perfectly well able to fly, is very sluggish.—the single one taken personally was secured while endeavoring to start specimens up out of the long sedge of a swamp, and being seen perched upon the grass was at once swept into the net.

NEW SMYNTHURI, INCLUDING MYRMECOPHILOUS AND AQUATIC SPECIES.

BY JUSTUS WATSON FOLSOM, CAMBRIDGE, MASS.

Smynturus benitus, n. sp.

White everywhere, excepting ferruginous mottlings as specified below, which are absent in young and occasionally in adult specimens. Head free, capped with ferruginous patches, and covered with short, stiff bristles denser on the front; front with two ferruginous patches which are elliptical, oblique and often united above. Eyes absent. Antennæ four-fifths the body in length, geniculate, segments nearly as 1: 2: 3.5: 9; basal segment very stout, naked; second clavate, petiolate, three-whorled; third cylindrical, four-whorled; terminal segment (Plate 10, fig. 5) subpetiolate, about ten-whorled, interrupted just beyond the middle by three distinct subsegments, barrel-shaped and subequal. Body oval from above, anteriorly almost naked, posteriorly with short, recurved bristles, longer upon the small, rounded anal tubercle; posterior of abdomen with a pair of broad, subdorsal stripes composed of ferruginous mottlings; sides mottled with ferruginous. Ventral tube stout, emitting two rounded tubercles. Thoracic rings distinctly visible. Legs stout, bristly. Superior claws of fore-feet slender, well-curved, scarcely tapering; of mid-feet stout, twice the preceding in width; of hind feet also stout, but smaller and more tapering; all these unidentate on the middle of the inside. Inferior claws of fore-feet very slender and tapering, exceeding the opposing claws in length; of mid-feet half as long as the superior claws, stout, almost straight, obliquely truncate; of hind-feet similar to the last, but smaller and more tapering. Tenent hairs absent. Furcula slender, extending to mouth; manubrium exceeding anal tubercle, swollen ventrally; dentes scarcely tapering, with lateral and ventral

rows of stiff bristles at moderate intervals, an extra long ventral bristle beyond the base and another before the apex of each dens; an apical, finger-like process external to the base of each mucro; mucrones nine-tenths dentes in length, slender, tapering, distinctly serrate, with rounded apex. Maximum length, .78 mm. Described from fifteen types.

S. benitus is blind and myrmecophilous. I found it at Arlington, Mass., within a single decaying log in swampy soil, along with a colony of ants of the genus *Formica*. It was common in early June and disappeared in the middle of August of the present year. Easily recognized by the terminal antennal segment and absence of eyes.

S. benitus is quite distinct from any species yet described but must be placed near *S. plicatus* Schött, of California.*

Smynturus socialis n. sp.

Lemon yellow, with three broad, longitudinal, broken-margined, maroon stripes: a median dorsal and two lateral, the latter continued across the head; all connected above the anal tubercle by a broad transverse band. Median stripe often absent and dorsum greenish. Stripes rarely obsolete or broadening until confluent. Head large, yellow, smooth elongate-ovate in side view, with short, white bristles, especially on the face; oral region, often maroon; a spreading, lobed mark between the bases of the antennæ. Eye spots very large, black, connected by a pale, pandurate swelling. Antennæ of females a little longer than the head, segments

* Schött, Harald. Beiträge zur Kenntniss Kalifornischer Collembola. Bih. Kon. Sven. Vet. Akad. Hand. Bd. 17, Afd. IV. No. 8, p. 13, Taf. II. figs. 2-5, 1891.

as 2:2.5:4.5:7; basal segment yellow, cylindrical, twice as long as broad, almost naked; second yellow or purplish, cylindrical, almost naked; third purple, cylindrical, subpetiolate, with four distant whorls; terminal segment purple, tapering, blunt at apex, not ringed, with eight or nine distant whorls of moderately long hairs behind the apex.

Antennae of males show the following remarkable sexual modification (fig. 4). Segments as 1:1.5:1:2; basal segment cylindrical, twice as long as broad, and nearly twice as broad as the other segments; second petiolate, sparsely hairy, bearing on the distal half a row of three stout cylindrical processes, the proximal of which bears a long, falcate, chitinous hook, and the next a similar, but small, hook; third segment continuing the row with three finger-like processes, the distal of which is two-thirds and the proximal one-third the length of the segment, the remaining process being small; terminal segment simply shorter and stouter than in the female.

Body oval from above, with short bristles, especially posteriorly; anal tubercle small, hemispherical, yellow, with longer bristles; sternum white, swollen at base of manubrium; ventral tube stout, cylindrical, emitting two subpyriform processes. Legs stout, bristly, pale yellow excepting purple apices of tibiae. Superior claws of fore and mid-feet (fig. 1) unusually long, half as long as tibia, a little curved, clearly unidentate beneath, two-fifths from apex, purple internally; inferior claw half as long, purple at base, straight, slender, tapering, with a subapical bristle much exceeding the opposing claw. Superior claws of hind-feet (fig. 3) two-thirds as long as those of fore- and mid-feet, stouter, smoothly curved and tapering, not dentate, purple basally; inferior claw two-thirds as long, white, broad, rounded-triangular, inner edge convex, outer straight, near the latter a stout rib prolonged as far again, as an apical bristle. A conspicuous colorless space on the lower side of the

apex of each hind tibia. Tenent hairs absent throughout. Furcula slender, mostly white, attaining ventral tube; manubrium exceeding anal tubercle; dentes three times as long ventrally, swollen at base, with dorsal, lateral and ventral rows of close, stout bristles; mucrones (fig. 2) four-fifths dentes in length, spoon-like, lanceolate laterally, broadly lanceolate from above, unsymmetrical, with narrowly lanceolate, purple, apically produced midrib from which radiate stout ribs to the inner serrate margin of the colorless limb and shorter weaker ribs to the opposite, entire margin.

Maximum length, .65 mm. Described from fifty types.

I found *S. socialis* abundant at Belmont and Arlington, Mass., from April 19 until May 14, 1896. It is found on the surface of ponds and streams, feeds upon Desmids and skips on the water in a lively manner, for which purpose the furcula is peculiarly adapted. The antennae of the male, modified to encircle and hold those of the female, are strikingly like those of the European *S. elegantulus* Reut.* which Schött, with apparent reason, considers a variety of *S. malmgrenii* Tull. In fact, *socialis* represents *elegantulus* in this country, but is different in the following important respects among others: *socialis* has distinctly unidentate superior claws and lanceolate mucrones with coarsely serrate inner and entire outer margin, with produced midrib and without subapical incision; while *elegantulus** has naked superior claws and elliptical mucrones with both margins dentate, without produced midrib and with a subapical incision.

Smythurus amicus n. sp.

General color from rose pink to deep rose purple or violet. Head free, with short, dense, deflexed bristles above the mouth,

*Schött, Harald. Zur Systematik und Verbreitung Palaearctischer Collembola. Kon. Sven. Vet. Akad. Hand. Bd. 25, No. 11, p. 35, Taf. 11, figs. 20, 21, 26, 1893.

Vertex sparsely bristly, with a median longitudinal purple stripe. A prominent black patch between the bases of the antennae. Eye spots large, black, broadly surrounded by chrome yellow. Antennae purple, often yellow basally, three-fifths the body in length, segments about as 1:1.5:3:5; basal segment stout, almost naked; second twice as long as broad, sparsely hairy; third cylindrical, with four whorls; terminal segment cylindrical, not ringed, with seven or eight distant whorls of hairs. Body from above elongate-ovate with a small reentering angle; body segments distinctly visible. Thorax with intersegmental rows of small, pale yellow dots. Sides of abdomen with pale spots often round. Posterior dorsum with short, erect bristles. Anal tubercle rounded, with long deflexed bristles. Abdomen swollen at base of furcula. Ventral tube stout, as long as a tibia, emitting two rounded tubercles. Legs stout, bristly, pale purple with yellowish patches. Superior claws (fig. 6), except of hind feet, remarkably long, as long as a mucro, slender, tapering, little curved apically, unidentate beneath, one-third from apex, purple up to the tooth; inferior claw less than half as long, narrow, tapering, straight. Superior claws of hind feet (fig. 8) two-thirds as long as those of the other feet, stout, smoothly tapering and well-curved throughout, not toothed; inferior claw half the last in length, broad, rounded-triangular, inner edge concave, outer convex, near the latter a stout rib continued into an apical bristle longer than the claw itself. Tenent hairs absent throughout. Furcula reaching beyond the mouth, purple to almost white, segments ventrally as 1:3.5:1. Manubrium laterally oblong, almost naked; dentes with stout bristles longer and thicker apically; mucrones (fig. 7) spoon-like, elongate-ovate from above, unsymmetrical with a stout, lanceolate, purple midrib from which radiate stout ribs to the inner coarsely serrated margin of the colorless limb and shorter weaker ribs to the outer entire margin of the opposite limb.

Maximum length, .97 mm. Described from fifty types.

S. amicus occurred abundantly with *S. socialis*, last described, to which it is closely related, also having similar habits. I had the good fortune frequently to observe the probable copulation of both and was able to verify in most details the observations made upon the allied European species by Reuter* and Levander.†

S. amicus appears to represent in this country the European *S. aquaticus* Bourl., although it cannot be considered the same species. The body of *amicus* is quite different in form and markings, the superior claws of fore and mid feet are much longer, entirely different in shape‡ and clearly unidentate, the opposing inferior claws having no subapical bristle, tenent hairs being absent while the mucrones have a differently shaped midrib and margins coarsely serrate within and entire without.

Smythurus remotus, n. sp.

Bluish black. Head free, black, almost naked. Eye spots black, broadly surrounded by yellow, especially within. Antennae short, two-fifths the body in length, stout, subclavate, segments as 1:1.5:3:5; basal segment as broad as long, black, naked; second clavate, petiolate, yellow, with a few minute bristles; third subpetiolate, yellow, with few such bristles; terminal segment subclavate, blunt, black, unringed, with many close whorls of moderate bristles. Body distinctly segmented, from above smoothly oval, posteriorly with scattered minute bristles, sides with several rows of pale, circular spots; anal tubercle visible from above, small, rounded, distinctly of two segments with longer bristles. Ventral tube stout;

*Reuter, O. M. Sur l'accouplement chez deux espèces de l'ordre des Collemboles. Ent. Tidsk. 1 Årg. p. 159, 1880.

†Levander, K. M. Einige biologische beobachtungen über *Smythurus apicalis* Reuter. Act. Soc. p. Fauna et Flora Fenn. IX, no. 9, 1894.

‡Schött, Zur. Syst. etc., p. 36, 37, Taf. II figs. 22-25.

processes three times its length, cylindrical, not papillate, truncate. Legs short, stout, yellow, black basally, with short, sparse bristles, claws small, stout. Superior claw blunt, with straight, untoothed inner edge; inferior claw two-thirds as long, broadly triangular, untoothed. Tenent hairs two. Furcula short and stout; manubrium short, almost naked; mucrones with a few short bristles in lateral and ventral rows, also a long ventral bristle beyond the base and a second before the apex; mucrones one third dentes in length, long triangular, apex down-bent but not hooked, ventral margins usually entire, rarely with a few minute teeth near the base only.

Maximum length .75 mm. Described from ten types.

S. remotus occurred during last May at Belmont, Mass., on dead logs in a peat bog. Its nearest allies are *S. niger* Lubb. and *S. minutus* MacG.

Smynthurus fitchii, n. sp.

Pale, translucent yellowish-green. The contents of the alimentary canal, which show through the skin, give the appearance of a large, blackish, backward pointing triangle, extending the length of the dorsum. Body in largest specimens dusky throughout with large, pale, rounded spots laterally. Head free, pale green, with stout, white, curving bristles. Eye spots black, often pyriform. Antennae over half the length of the body, purplish, paler at base, geniculate, segments as 1:3:6:16, cylindrical; basal segment short, stout, almost naked; second sparsely bristly; third more bristly; terminal segment with seventeen or eighteen distinct subsegments, each with a whorl of moderate bristles. Body oval from above, sometimes strongly angulated behind, with stout recurved bristles denser behind, each often arising from a pale, circular spot; anal tubercle distinctly of two segments, pale green, bristly. Sternum posteriorly with many small, rounded, white spots, closely in

four groups. Ventral tube stoutly cylindrical processes almost as long as the antennae, cylindrical, densely papillate except basally. Legs pale green, bristly, hind claws largest. Superior claws spoon-like; outline, when viewing the concave surface, broadly oblong with rounded apex and a long tooth on the middle of either side; outline in side view finger-shaped. Inferior claws, except hind pair, perfectly distinct, as long as the opposing claws, straight, slender, acuminate, with a projecting angle on the inside near the base; hind pair two-thirds the opposing in length, broadly triangular with straight external edge and obtuse internal angle, the latter bearing a stout tooth. Tibiae apically with two or three long, unknobbed hairs. Furcula pale green, reaching beyond ventral tube; manubrium short, stout, not swollen, with short bristles; dentes each with three long ventral bristles, also ventral and lateral rows of short bristles, eight in a row, not half as long as the width of a dens; mucrones spoon-like, spatulate, crenate on inner edge, in side view tapering and with apex down, bent and obliquely truncate.

Maximum length, 2.2 mm. Described from thirty types.

I found this species common after a rain on dead sticks in pine woods at Arlington, Mass., Aug. 19, 1892. Two days later few could be found. It is nearest to *S. spinatus* MacG. but differs notably in markings, claws and furcula. I take pleasure in dedicating *S. fitchii* to the first careful student of North American Thysanura.

Smynthurus henshawii, n. sp.

Orange. Dorsum dusky in large specimens. Head free, moderately clothed with short, stiff bristles. Eye spots black, a large buff spot against the inner side of each and a small, black, ocellus-like spot in front of and between them. Face strongly gibbous above the mouth. Antennae three-fifths the body in length, outer half blackish, segments as 1:2:3:6; basal segment stout, naked;

second subclavate, petiolate, sparsely bristly; third cylindrical, bristly; terminal segment subpetiolate, rather blunt, unringed, with about ten separated whorls of bristles. Body ovate from above, anteriorly almost naked, posteriorly with short, sparse bristles; anal tubercle small, bristly, composed of two segments. Both the ventral tube and its processes are cylindrical and stout. Legs stout, bristly; tibio-tarsal articulation constricted. Superior claw finger-shaped, almost straight, not dentate; inferior claw two thirds as long, triangular with straight outer edge. Tenent hairs two. Furcula short and stout; manubrium not exceeding the anal tubercle, sparsely bristly; dentes scarcely tapering, with lateral and ventral rows of separated bristles; mucrones two-thirds dentes in length, long-triangular with entire margins and rounded apices.

Maximum length, 1.1 mm. Described from ten types.

I found this uncommon species, especially under the bark of dead oak logs, at Arling-

ton, Mass., this year, from March 26 until April 12, inclusive. With pleasure I name it after Mr. Samuel Henshaw.

Types of all the above species have been given to the Museum of Comparative Zoölogy at Cambridge, Mass.

EXPLANATION OF PLATE 10.

Fig. 1. *Smynthurus socialis*, fore foot, x 472.

Fig. 2. *Smynthurus socialis*, mucro, x 472.

Fig. 3. " " hind foot, x 472.

Fig. 4. *Smynthurus socialis*, modified male antenna, x 171.

Fig. 5. *Smynthurus benitus*, terminal antennal segment, x 116.

Fig. 6. *Smynthurus amicus*, fore foot, x 353.

Fig. 7. *Smynthurus amicus*, mucro, x 353.

Fig. 8. " " hind foot, x 353.

PARTIAL LIFE-HISTORY OF HALISIDOTA CINCTIPES GROTE.

BY HARRISON G. DYAR, NEW YORK, N. Y.

Larva a large *Halisidota*, like *tesselaris*, but dark brown or silver gray brown with all the hair tufts white. Feeding on sea-grape, Lake Worth, Florida.

I assume eight stages, though some of them may be omitted in the actual ontogeny.

Stage IV. Skin orange brownish, a black subdorsal shade on joints 5 to 11, connected dorsally at the ends and most pronounced there (5 and 11); tubercles i to iii black on 5 and 11, elsewhere the warts are brownish. Head round, shining black over apex, brown below, labrum bright white; width 1.3 mm. Hair short, thin, white, with a few black ones, especially on the dark marks and on joints 5 and 11; a short, yellowish subdorsal

pencil on joints 4 and 12; a few longer pale hairs at the anterior end. Wart iv absent on the abdomen, leg plate shining; two warts on joints 3 and 4 above the stigmatal wart, one below it; joint 2 considerably retracted. The subdorsal pencil on joint 4 arises from tubercle i; on joint 12 from iii.

Stage VII. Head red-brown, a little blackish immediately above the white line on labrum and the white bases of the antennae; width 3.5 mm. Hair thinner than in the following stage, the color of the skin visible, violaceous brown with black dorsal shade and spiracular marks or blackish gray, shading darker stigmatically. Hair brown, varying from violaceous brown to chocolate:

hair pencils as in next stage. A mark in the incisure between joints 3 and 4 pinkish, divided by a dorsal black line and surrounded by black spottings.

Stage VIII. Head round, shining mahogany red, paler along the sutures; a line above the mouth and bases of antennae white; width 5 mm. Hair thick, obscuring the body, uniform pale chocolate brown or gray brown with a whitish cast on the sides, crested and appearing darker along the dorsal line. The hairs separate around the incisure between joints 3 and 4 exposing the skin which is here slightly orange tinted, the three upper warts on 3 and 4 being whitish and set off by black patches on the skin. A white hair pencil from warts i and iii on joint 4, a few long whitish hairs from the same warts on joint 3; a white pencil from wart iii on 12. Skin red brown more or less spotted with black or all black except the legs; spiracles white. Joint 2 is retracted, its hairs directed forward over the head. Hairs all finely barbed; warts i to vi on abdomen; wart iv distinct, but not full size; four warts on thorax. Length of larva about 30 mm. The orange colored incisure on the thorax forms a rather distinct mark, set off by black and the six white rays.

Cocoon. Firm, compact, the larval hairs closely felted and many of them projecting through, so that the cocoon cannot be handled without receiving their sharp points. The cocoon has the color of the hairs.

Food Plants. Sea grape (*Coccoloba floridana* and *C. uvifera*), kindly determined by Mr. F. Kinzel. The larvae were found on no other plants and I think their occurrence on *Hibiscus*, as recorded by Gundlach, must have been accidental or at least exceptional.

The species has a wide range. It occurs in our country in Florida (*cinctipes*) and Arizona (*davisi* Hy. Edw.), extending southward through the West Indies and Mexico to Venezuela, through Brazil (*interlineata* Walk, *jucunda* H. S.) to Argentina. Moths from Buenos Ayres are paler than Cuban

specimens, the marks less contrasted, but all essential features are the same even to the banded legs. The markings on the fore wings are irregular and variable as in *H. tessularis*.

Doubtless there is some local variation in the larvae in different parts of this wide range. Cocoons from Buenos Ayres are almost black, indicating that the larvae must be considerably darker there than in Florida.

NOTES ON LEPIDOPTERA.—On cutting open a cocoon of *A. luna* to see if the pupa was alive, I found that the moth had crawled out of the pupa-skin and, being unable to get out of the cocoon, had laid eggs all over the inner side of it. The eggs were almost black, instead of being white.

For three summers I have noticed that male orioles preferred sphingid larvae to all others, and by following them I have found many larvae of *D. inscripta*, *A. nessus*, and *T. abbottii*, besides *E. myron*. I saw one oriole carry from a woodbine fifty sphingid larvae in an hour and a half. So far it has been only the male who has hunted in the woodbines, though the female was getting food in elms and ash trees close by.

Each June, for three years a *P. cardui*, has rested on the gravel of our driveway almost every night. It appears between five and six o'clock, settles in almost the same place in the driveway, drops its forewings between its hindwings, and stays quiet until some carriage, person, or dog disturbs it, when it flies about for a few moments, and then settles down again. If an English sparrow flies anywhere near it the butterfly flies towards it, flutters around it as it does around one of its own race, then rests again on the gravel, and is to be seen there as long as there is light enough to see it!

Of course it cannot be the same butterfly, and it is queer that only one should come at a time, and that the resting place should not vary by ten inches either on different nights or years.

Caroline G. Soule.
Brookline, Mass.

TUTT'S BRITISH BUTTERFLIES. George Gill and Sons of London have just published a small octavo volume on British Butterflies by J. W. Tutt, which is far and away the best manual of the subject we have seen. For once in England equal value is given to the early stages and histories of these insects. Particular, perhaps overmuch, attention is given to varietal forms, numerous new names being given to slight aberrations. Illustrations of all the butterflies are given and a number of the caterpillars and chrysalids are also figured, the illustrations being in general above the average.

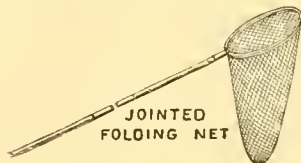
The classification adopted follows in general the best recent work, the only real novelty, and an objectionable one, being the position of the Apaturinae, which are made a subfamily of Satyridae. A dozen preliminary chapters deal with the general subject. One may find fault here and there with some of the over-confident statements in the book, but taken all in all it is an excellent work and must arouse in the embryo naturalist a real interest in the problems which any serious study of these attractive creatures brings to the front.

A NEW VOLUME OF PSYCHE

Begins in January, 1897, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. Numbers are issued on the first day of each month. Libraries and individuals generally ordering through subscription agencies (*which only take annual subscriptions*) will please notice that it is cheaper to subscribe for the entire volume at once directly of us.—Any early volume can be had for \$5.00, unbound. Address Psyche, Cambridge, Mass.

Vols. 1-7, Complete, Unbound = = = = = \$33.00.
 Vols. 1-7, and Subscription to Volume 8 = = = = = \$37.00.
 Vol. 7 contains nearly 500 pp. and 10 plates, besides other illustrations.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,
 Klaeger and Carlsbad Insect Pins, Setting
 Boards, Folding Nets, Locality and
 Special Labels, Forceps, Sheet Cork, Etc.
 Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a speciality. Price List sent on application.
 78 Ashland Place,

BROKLYN, N. Y.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

Vol. 7. No. 248.

DECEMBER, 1896.

CONTENTS:

NOTES ON THE WINTER INSECT FAUNA OF VIGO COUNTY, INDIANA.—VIII.— <i>W. S. Blatchley.</i>	455
LIFE HISTORY OF <i>DEILEPHILA LINEATA</i> .— <i>Caroline G. Soule.</i>	458
INDEX OF NAMES OF INSECTS.	461

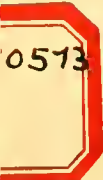
[TITLE PAGE AND TABLE OF CONTENTS.]

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMBERS, 20c.

[Entered as second class mail matter.]



Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Beginning with January, 1891, the rate of subscription is as follows:—

Yearly subscription, one copy, postpaid,	\$2.00
Yearly subscription, clubs of three, postpaid,	5 00
Subscription to Vol. 6 (1891-1893), postpaid,	5.00
Subscription to Vol. 6, clubs of 3, postpaid,	13.00

The index will only be sent to subscribers to the whole volume.

Five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free

Author's extras over twenty-five in number, under same conditions, each per page, 1c

Separates, with changes of form—actual cost of such changes in addition to above rates.

Remittances, communications, exchanges, books, and pamphlets should be addressed to

EDITORS OF PSYCHE.

Cambridge, Mass., U.S.A.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " " "	1.25	1.00
Half " " " "	2.25	1.75
One " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by
R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

CAMBRIDGE ENTOMOLOGICAL CLUB.

The regular meetings of the Club are now held at 7:45 P.M. on the second Friday of each month, at No. 156 Brattle St. Entomologists temporarily in Boston or Cambridge or passing through either city on that day are invited to be present.

A very few complete sets of the first six volumes of PSYCHE remain to be sold for \$29.

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

The following books and pamphlets are for sale by the CAMBRIDGE ENTOMOLOGICAL CLUB:

Burgess, E. Contributions to the anatomy of the milk-weed butterfly, <i>Danais archippus</i> . Boston, 1880. 16 p., 2 plates.	1.00
Hitchcock, Edward. Ichnology of New England, Boston, 1858	1.50
Scudder, S. H. The earliest winged insects of America. Cambridge, 1885, 8 p., 1 plate . . . . .	.50
Scudder, S. H. Historical sketch of the generic names proposed for Butterflies. Salem, 1875.	1.00
Scudder, S. H. The pine-moth of Nantucket, <i>Retinia frustrana</i> . col. pl. Boston, 1883. . . . .	.25
Scudder, S. H. The fossil butterflies of Florissant, Col., Washington, 1889	1.00
Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant. 9 plates. Philadelphia, 1894.	2.00
Stettiner entomologische Zeitung, Jahrg. 43-44. Stettin, 1882-1883.	2.00
U. S. Entomological Commission.—Fourth Report, Washington, 1885	2.00

SAMUEL HENSHAW, Treas.,
Cambridge, Mass.

EXCHANGE.

I wish to obtain any literature on insects, especially Coleoptera, not already in my possession. In exchange for such works in any language I offer good material from the west and the far north, mostly Coleoptera.

H. F. WICKHAM,
Iowa City, Iowa.

MANUAL OF N. A. DIPTERA.

Manual of the Families and Genera of North American Diptera, by S. W. Williston. Paper, \$2.00; Cloth, \$2.25.

J. T. HATHAWAY,
297 Crown St., New Haven, Conn.

DULAU & CO., FOREIGN BOOKSELLERS
37 Soho Square, London (W.), England, will forward gratis and post free to any address their new Entomological Catalogues, Parts 23-30.

PSYCHE.

NOTES ON THE WINTER INSECT FAUNA OF VIGO COUNTY, INDIANA.—VIII.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

COLEOPTERA (*Concluded*).

TENEBRIONIDÆ.

Thirty-one species of this family were taken in Vigo County, during my collecting. Of that number representatives of the following twenty were secured in the winter months:

237. *Nyctobates pennsylvanica* DeG. Common at all seasons of the year. Hibernates in its usual abiding places, beneath the loose bark of logs and stumps. Usually six or more together or in close proximity.

238. *N. barbarata* Knoch. This variety is much less common. But once in winter, Dec. 19, from beneath rail.

239. *Haplandrus femoratus* Fab. But one specimen secured in the county. Taken Jan. 13, from beneath log on sandy hillside near large pond.

240. *Tenebrio obscurus* Fab.

241. *T. molitor* Linn. Both hibernate in rubbish in garrets, store rooms, and about stables. Taken on various occasions in winter, especially in buildings which were kept warm.

242. *T. tenebrioides* Beauv. Hibernates sparingly beneath the bark of walnut and beech logs. Feb. 20.

243. *Opatrinus notus* Say.

244. *O. aciculatus* Lec. These two were found in but one locality in the county viz.: beneath logs, chips and pieces of bark, on the sandy hillside, near large pond. They appeared to be as common in winter as in summer.

245. *Blapstinus lecontei* Muls.

246. *B. moestus* Melsh. Of these, *lecontei* was frequent in winter with the species of *Opatrinus* above mentioned; while *moestus* was common in dried fungi and beneath logs and rails along the borders of sandy upland woods.

247. *Tribolium ferrugineum* Fab. This was a common museum pest in the High School building at Terre Haute. It was taken on numerous occasions in winter from the boxes of dried insects.

On Jan. 17, 1896, I received from Dr. Robert Hesslar, Logansport, Ind. a pill box full of Cayenne pepper in which were a dozen or more adult specimens of this beetle. The box was placed in a drawer of my writing desk, and not opened again until March 20, when the beetles were as lively as ever. On September 14, the date of the present writing, it was opened for the third time. Two

living adults and numerous half grown larvae were found therein, together, with the uneaten bodies of the dead adults. The pepper being perfectly dry, the question arises, how do the insects secure sufficient moisture to live and flourish while enclosed in so small a box.

248, *Dioedus punctatus* Lec. The single specimen in my collection was taken Dec. 25, from beneath a partly burned log.

249, *Uloma impressa* Melsh.

250, *U. imberbis* Lec. Both rather common in winter in rotten oak and beech logs.

251, *Anaedus brunnens* Ziegl. But once in the county, Dec. 25, when four specimens were found together beneath a half buried locust log on a sandy hillside.

252, *Hoplocephala bicornis* Oliv. Common in winter in dried fungi, especially those growing on beech logs; also beneath the bark of logs.

253, *Platydema excavatum* Say.

254, *P. ruficornis* Sturm.

255, *P. picilabrum* Melsh.

256, *P. subcostatum* Lap. Of seven species of the genus taken in the county, specimens of the above four were found in the winter. *Picilabrum* was scarce, the others common, in fungi and beneath bark on oak and elm logs and stumps.

MELANDRYIDAE.

257, *Penthe obliquata* Fab.

258, *P. pimelia* Fab. Both hibernate in small numbers beneath logs,

preferably those of beech, in open up-land woods.

259, *Eustrophus bicolor* Say.

260, *E. tomentosus* Say. *Bicolor* frequent, *tomentosus* rare in winter, beneath rails and chunks.

ANTHICIDAE.

261, *Notoxus monodon* Fab. Taken several times in January from beneath chunks on sandy hillside. Common in June in company with *N. bicolor* Say, and *N. bifasciatus* Lec. on flowers of *Cornus*.

262, *Tomoderus constrictus* Say. Dec. 5 and Jan. 21, from beneath rubbish on towpath of old canal.

263, *Anthicus obscurus* Laf. Feb. 11.

264, *A. floralis* Linn.

265, *A. cervinus* Laf.

266, *A. pubescens* Lec. Jan. 13. Of the above *floralis* and *cervinus* were frequent in winter beneath chunks and logs along the canal; the other two but once each from beneath mullein leaves. *A. cinctus* Say was the only additional species seen in the county.

MELOIDAE.

267, *Meloe impressus* Kirby. A single male of this insect was found crawling along a pathway, near the borders of a stream on Dec. 25, 1889.

OTIORHYNCHIDAE.

268, *Tanymericus confertus* Gyll. Jan. 7.

269, *Pandeletejus hilaris* Hbst. Jan. 1. But six members of this family

were taken in the county during my collecting there. The above two in winter, frequent, beneath logs on sandy hillsides.

CURCULIONIDAE.

270, *Listronotus inaequalipennis* Boh.

271, *L. nebulosus* Lec. These were common in sandy places near the borders of large ponds. They feed on leaves of Rumex, and Polygonum, which grow abundantly in the shallow waters. In winter they bury themselves in the sand beneath logs and rubbish. Three other species of the genus, viz., *sordidus* Gyll., *callosus* Lec., and *latiusculus* Boh., are known from the county.

272, *Macrops porcellus* Say. Plentiful in winter. Singly beneath logs in low places.

273, *M. sp.?* Once only. Jan. 21. A single specimen from beneath mullein.

274, *Lixus concavus* Say. On several occasions beneath bark and logs in dry upland woods.

275, *L. macer* Lec. Common in winter beneath logs on sandy hillsides, near ponds. Plentiful in summer on the leaves of Rumex and Peltandrus.

276, *Gymnetron teter* Fab. Hibernates in numbers beneath mullein leaves, on which plant it swarms in summer.

277, *Tyloderma acreum* Say. Once or twice in winter from masses of dried fungi on red oak logs.

278, *Rhinonchus pyrrhopus* Lec. A single specimen, Jan. 7, from beneath chunk in low ground.

279, *Centrinus sp.?* Once only, Jan. 6, locality as above.

CALANDRIDAE.

280, *Sphenophorus ochreus* Lec. This, our largest "snout beetle", hibernates in little burrows in the sand beneath logs and rubbish. It was found in but one locality, viz., near the borders of the large ponds, close to the towpath of the "old canal."

281, *S. pertinax* Oliv.

282, *S. sculptilis* Uhler.

283, *S. melanocephalus* Fab. These three were taken from beneath logs on the sandy margin of the canal, on Feb. 6. *Pertinax* is rare in the county, the others common. In addition to the four named, *costipennis*, Horn, *cariosus* Oliv., *sayi* Gyll., *placidus* Say, *parvulus* Gyll. and *zaca* Horn, were taken in the county, and some, if not all of them doubtless hibernate as imagoes.

284, *Allomimus dubius* Horn. Found but once, Jan. 7. In numbers, gregarious, beneath the bark of a dead walnut (*Juglans nigra* Linn.) snag.

ANTIHRIBIDAE.

285, *Cratoparis lunatus* Fab. Common in winter in dry fungi, and partly rotten wood of beech and sugar maple stumps.

286, *Brachytarsus variegatus* Say. A single specimen, Jan. 6, from beneath a log near the border of an upland pond. Frequent in early June, on the flowers of the button-bush (*Cephalanthus occidentalis*, L.).

With this article the present series of "Notes on Winter Insects" is brought to a close. In addition to the 18 species of Orthoptera, 64 of Hemiptera-Heteroptera and 286 of Coleoptera, of which especial mention has been made, numerous other forms were taken, the most of which are, as yet, unidentified.

Among them are some twenty or more species of Coleoptera; six of Diptera; twelve winged Hymenoptera, besides numerous species of ants (among the former being females of *Vespa arenaria* and *maculata* and several species of *Bombus* and *Apis*). Five butterflies were also found in hibernation, viz., *Danaüs archippus* Fab., *Grapta interrogatoris* Fab., and *comma* Harr., *Pyrameis atalanta* Linn., and *Vanessa antiopa* Linn., the last most common, and on the wing on Jan. 21, 1894.

Numerous species of myriapods and

a number of spiders were also taken and preserved in alcohol, but are not yet identified.

If, on account of repetition in giving the detail of places of hibernation, the notes have not been as interesting as they otherwise might have been, I trust that they will go to prove that many insects live as adults through the cold season, and that their places of hibernation are not difficult to find. An extended investigation, carried on through a series of years would undoubtedly show many additional species to hibernate in the perfect stage, and if laboratory investigations were made in conjunction—there might be a solution of one of the great entomological problems; viz. How can a living insect be frozen solid for weeks and yet retain vitality sufficient to fully recover and perpetuate its kind when the halcyon days of spring roll round once more?

LIFE HISTORY OF DEILEPHILA LINEATA.

BY CAROLINE G. SOULE, BROOKLINE, MASS.

The eggs were sent me by Dr. J. M. Schaffer, from Keokuk, Iowa. They were laid on July 4th and 5th., and were ovoid, small in proportion to those of other sphingid moths of the same size as this *D. lineata*, and yellow green, becoming bluer in a few days.

July 10th they hatched. The young larva was $\frac{5}{2}$ inch in length, pale green, with a short, smooth, caudal horn with two setae at the tip, which turned gray. The head was round, had many gray setae, and was held nearly horizontal. The first segment had a row of setae projecting over the head, and

the setae of the body were dark enough to be noticed without a glass. The larvae were very active and restless, and dropped by a thread when disturbed. They did not eat their shells, and ate grape-leaves but sparingly.

On the second day some had a distinct brownish-red dorsal line from the now black caudal horn half-way to the head, giving a pinkish look to the posterior part of the body. A few had the first few segments decidedly pinkish and looked (without a glass) striped longitudinally, the stripes being the black setae, which were most numerous on the

head and anal segment. On the third day a whitish subdorsal line showed faintly, extending from head to horn. The head was like old ivory in color and the body was almost as *glassy green* as that of a young *Thyrus abbottii*.

June 18th.—*First moult*. Head round, bilobed, orange-brown, smooth and large. Body, $\frac{1}{4}$ inch long, slender, dark green, speckled with lighter green, and had a bilobed horny plate of lighter green on the dorsum of first segment. There was a faint yellow stigmatal line on first three segments, and a bright yellow subdorsal line from head to horn, in most cases, but some larvae had no yellow lines. Feet and props of lighter green. Horn lighter green at base, black and rough above. Some larvae had the anal shield orange-brown. Ate very little.

June 22d. *Second moult*. Larvae $\frac{1}{2}$ inch long. Head large, round, bilobed, orange-brown, speckled with lighter. Body almost black, speckled with yellow-white. Subdorsal line of bright yellow, widening into a yellow patch on each segment. Stigmatal wavy line of bright yellow. Body tapered from the third segment to the head. Feet, props and anal shield orange-brown. Horn orange-brown at base, black and rough above. Gave woodbine, which they ate eagerly, leaving the grape for it.

June 27th.—*Third moult*. $\frac{3}{4}$ inch long. Head round, large, bilobed, deep orange-brown, with white dots and many setae. Body black, with transverse lines of white dots, velvety black on the dorsum and between the segments. Subdorsal line of bright yellow, widening into a spot on each segment. Bright yellow stigmatal line wavy and broken. Feet and props orange-brown. Horn black, shining, rough, still ending in two setae. Anal shield black, speckled and edged with yellow-white, and looking very high above the props.

July 1st. *Fourth moult*. $1\frac{1}{4}$ inches long. Head orange-brown, speckled with lighter, small, round. Body pale green, with black transverse lines from stigmatal line to dorsal

band. Dorsal band velvety black, giving off a short band of black, on each side, between each two segments. Subdorsal and stigmatal lines yellow, the yellow dot of the former occurring in the short black band. Dorsal plate on first segment orange-brown, speckled with lighter, as were the anal props and shield. Feet and abdominal props orange-brown. Horn slender, rough, orange-brown at base, black above, ending in two tiny tubercles. Spiracles yellow-white, encircled with black. Venter paler, and mottled, as well as striated, with black. One larva had the head, dorsal plate, and anal props and shield, green speckled with orange, the body hardly striated with black, the yellow lines very pale and greenish, and on each segment an orange spot. The dorsal black band was very faint and divided by a dorsal line of green, but the short black bands were very velvety and deep in color. In this stage all the larvae had a habit of moving the caudal horn as a finger might be moved, not merely depressing it backwards. They were very active, dropped from the stems when disturbed, and jerked their heads from side to side like larvae of *T. abbottii*. The body still tapered from the third segment to the head.

July 5th. *Fifth moult*. $1\frac{3}{4}$ inches long. Head, dorsal plate on first segment, anal props and shield orange-brown, speckled with lighter. Body mustard-yellow with short blue-black bands between the segments. Dorsal line very fine and yellow. Subdorsal and stigmatal lines yellow, broken, with a yellow dot on each segment. Feet, props, and horn orange brown, the horn longer in proportion, and rough. Spiracles orange, circled with black. The second form had the head, dorsal plate, anal props and shield green, dotted with lighter; feet, abdominal props, and horn dull, pale orange. Body green, with much less black striation; dorsal line broad, green, in a wide, but less black band. Subdorsal yellow line contracted into a yellow spot, enclosing an orange dot set in the short black band on each

segment, with a very faint yellowish trace between the spots. Stigmatal line faint and broken, with an orange spot under each spiracle. One specimen had no orange in the subdorsal line of spots. In this stage also they moved their horns like fingers or antennae. In every moult they ate their cast skins even to the horns. July 11th, the longest one was $3\frac{3}{4}$ inches, the shortest 3 inches in length. They stopped eating, chewed holes in the cloth over their tins, and were very restless, then grew quiet, and two days later, spun loose nets between leaves or between leaves and the tin.

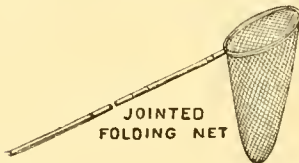
July 16th. Pupated. Pupa $1\frac{1}{2}$ inch long, slender, of a pale tan-color, slightly pitted on abdominal segments. The head was much prolonged, and the eyes were well defined. The tongue case was not raised. The anal point had two short hooks. On each side of the abdominal segment below the tip of the wing covers was a rough oval patch of a deeper tan-color than the pupa. In two cases the wing covers kept a greenish tinge. Aug. 11th.—♀ emerged between 1 and 2 P.M. Sept. 25th, ♂ emerged before 12 M. The others show no signs of emerging.

A NEW VOLUME OF PSYCHE

Begins in January, 1897, and continues through three years. The subscription price (payable in advance) is \$5.00 per volume, or \$2.00 per year, postpaid. Numbers are issued on the first day of each month. Libraries and individuals generally ordering through subscription agencies (*which only take annual subscriptions*) will please notice that it is cheaper to subscribe for the entire volume at once directly of us.—Any early volume can be had for \$5.00, unbound. Address Psyche, Cambridge, Mass.

Vols. 1-7, Complete, Unbound = = = = = \$33.00.
 Vols. 1-7, and Subscription to Volume 8 = = = = \$37.00.
 Vol 7 contains over 500 pp. and 10 plates, besides other illustrations.

A. SMITH & SONS, 269 PEARL STREET, New York.



JOINTED
FOLDING NET

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added, Send for List.

JOHN AKHURST,

TAXIDERMIST AND DEALER IN ENTOMOLOGICAL SUPPLIES.



IMPROVED ENTOMOLOGICAL FORCEPS.

Fine Carlsbader Insect Pins a specialty. Price List sent on application.
 78 Ashland Place,

BROOKLYN, N. Y.

INDEX TO NAMES OF INSECTS.

Figures prefixed by *s* refer to Supplement I. The 674 names of Coleoptera in Supplement II are not indexed.

- Acalthoe caudata*, 6.
Acanthia lectularia, 279.
Acanthocinus obsolens, 299.
Acantholips argillacea, 89,
 144; *caoxanthæ*, 87, 144; *detersa*,
 87; *pustulata*, 87; *transversata*,
 88; *triangulifera*, 87, 144; *um-*
brosa, 88.
Achaea faber, 69, 144.
Acidota subcarinata, 381.
Acontia briola, 127, 144; *chia*,
 128, 144; *glaphyra*, 144; *zelia*,
 36, 144.
Acroetrichus americanus 273.
 Acrididae, 155.
 Acridinae, 325.
Acridium aegyptium, 195.
Acroglossa, 261; *hesperidum*,
 261.
Actias luna, 167, 231, 275, 451.
Adalia bipunctata, 339.
Adelocera discoidea, 434.
Adranes lecontei, 89.
Aedia apicata, 36, 67, 144;
costimacula, 36, 67, 144; *eremita*,
 36, 68, 144; *scotosa*, 36, 68, 144.
Aegeria rubi, 425.
Aetroxis analis, 316.
Agallia bigeloviae, *s* 26.
Agaristidae, 398.
Agathidium sp., 379.
Ageusia architecta, 66; *bomby-*
cina, 66; *corticalis*, 66; *mellipes*,
 66.
Agonoderus pallipes, 339; *parti-*
arius, 339.
Agraulis vanillae, 130.
Agrion aquilo, 320.
Agrilus sinuatus, 425, 426.
Agrotis auger, 175; *harnspica*,
 175; *rubi*, 175; *rubifera*, 175.
Agyraemoeba simsens, 25.
Akidoproctus, 377.
Aleochara bimaculata, 380; sp.,
 380.
Allomimus dubius, 457.
Alypia octomaculata, 6.
Analopis, 291.
Anara basillaris, 337.
Amathusiinae, 180.
Amblycera, 377.
Ammobates, 387.
Ammophila cementaria, 66;
gryphus, 65; *pictipennis*, 65; *sab-*
ulosa, 65; *yarrowii*, 66.
Amnestus pusillus, 268.
Amphibolips cinerea, 77; *con-*
fluens, 40, 77.
Amphigonja sinistra, 123, 144.
Amphion nessus, 212, 275, 451.
Ampulax compressum, 64.
Anaëta andria, 130.
Anaeus brunneus, 456.
Anasa tristis, 269.
Ancistroma, 379.
Ancyloxipha numitor, 131.
Andrena, 386; *albicans*, 386;
americana, 386; *canadensis*, 386;
clypeata, 386; *clypeolata*, 386;
fimbriata, 386; *flavoclypeata*, *s* 5;
laticeps, 386; *provancheri*, 386;
robertsonii, 386; *salicella*, *s* 4;
salicis, 386, *s* 5; *scutellaris*, 386;
scutellata, 386; *serotina*, 386; *sin-*
ulata, 386; *trizonata*, *s* 5; *vicina*,
 43.
Aneristus, *s* 17; *ceroplastae*, *s*
 18.
Anisodactylus agilis, 339;
baltimorensis, 339; *lugubris*, 339;
rusticus, 339; sp., 339; *supersti-*
tialis, 339; *terminatus*, 339.
Anisota senatoria, 397; *stigma*,
 155.
Anobium paniceum, 23.
Anomala binotata, 371.
Anomis finipunctula, 34.
Anomoglossus pusillus, 339.
Anophthalmus hornii, 82.
Anosis plexippus, 320, 396,
 398, 427.
Anoura gibbosa, 422; *musco-*
rum, 423; *sextuberculata*, 423.
Antherophagus ochraceus, 23.
Anthicus cervinus, 456; *cinc-*
tus, 456; *floralis*, 456; *melauch-*
olicus, 371; *obscurus*, 456; *pubes-*
cens, 456.
Anthidium cressonii, 387; *man-*
icatum, 40; *venustum*, 387.
Anthocoris musculus, 279.
Anthomyia, 62; *brassicæ*, 426;
incanum, 76; *pluvialis*, 44.
Anthophora, 25, 386; *abrupta*,
 25; *carbonaria*, 387; *parietina*,
 25; *taurea*, 25.
Anthraenus varius, 401.
Anthrena, 386.
Aonidia blanchardi, 178.
Apanteles nephopterigis, 23.
Apatela, 411; *acericola*, 413;
aceris, 412; *clarescens*, 411; *ex-*
tincta, 412; *hamanacis*, 411;
hastulifera, 413; *interrupta*, 414;
limba, 412; *longa*, 413; *morula*,
 414; *obliquata*, 414; *persuasa*,
 412; *pruni*, 412, 414; *scirpicola*,
 412; *spinigera*, 414; *telumi*, 414;
ulmi, 414; *verillii*, 412.
Apatelodes torrelacta, 316, 397,
 398.
Apathus, 23; *elatus*, 21, 387.
Apatura celtis, 130; *proser-*
pina, 130.
Apatarimæ, 452.
Apenes sinuata, 339.
Aphaenogaster fulva, 81, 372.
Aphis enonymi, 353; *maidira-*
dicis, 358; *mali*, 354; *persicæ*
niger, 6.
Aphodius finetarius, 435; *in-*
quinatus, 435; *terminalis*, 435.
Aphorista vittata, 399.
Aphoromma, 423.
Aphrophora spumaria, 60.
Apis mellifera, 387; *mellifica*,
 20, 387.
Apophorhynchus, 184; *flavi-*
us, 184, 186.
Aradus americanus, 279; *cre-*
natus, 279; *robustus*, 279; *sinu-*
lis, 279; sp., 280.
Arcte maurus, 144.
 Arctiidae, 398.
 Arctoptera, 443.
Argynnis alberta, 155; *astarte*,
 155.
Arphia sulphurea, 105, 249;
xanthoptera, 105.
Asaphes memnonius, 435.
 Asilidae, 363.
Aspidiotus albopunctatus, *s* 20;
bowreyi, *s* 8; *destructus*, 178;
duplex, *s* 20; *ficus*, 178; *hartii*,
s 7; *lentisci*, 178; *nigropuncta-*
tus, *s* 20; *obscurus*, *s* 8; *perni-*
osus, *s* 21; *perseæ*, *s* 8; *perso-*
natus, *s* 8, *s* 15; *phormii*, *s* 8;
prosopidis, *s* 15; *secretus*, *s* 20;

- sophorae, *s* 8; sphaeroides, *s* 7; townsendi, *s* 20; vitis, *s* 87; yuccae, *s* 8, *s* 20.
Astarta boops, 64; nubecula, 64.
Asterodiaspis quercicola, 6.
Asterolecanium bambusae, 178; miliaris, 178.
Ataenius cognatus, 435.
Atheta exilissima, 80; iowana, 80; limatula, 80; terminata, 80.
Athysanus acuminatus, *s* 25.
Atomaria mesomela, 81.
Attacus promethea, 275.
 Attidae, 203.
Angiochlora, 43; pura, 44.
Axina zabriskii, 25.

Badister pulchellus, 338.
Balaninus nasius, 60.
Bauiana biangula, 144.
Barex annulipes, 280.
Bareia incidens, 144; tenebrosa, 90, 144.
Basilarchia arthecippus, 320; arthemis, 263, 320, 347.
Batrachidea carinata, 54; cristata, 54, 107, 149, 249.
Batriscus foveicornis, 372; lineaticollis, 80; scabripes, 371; sp., 380.
Baumberia analis, 262.
Belostoma, 281.
Bombecia marginata, 425.
Bombex fasciata, 61; obsoleta, 61; rostrata, 19, 61, 62.
Bembidium, 139; dorsale, 337; intermedium, 337; mundum, 347; quadrimaculatum, 337, 347; sp., 337; variegatum, 337.
Berosus striatus, 379.
Besseria, 252.
Bittacomorpha, 200; clavipes, 200, 201; occidentalis, 200, 201, 230; sackenii, 200.
Blapstinus lecontei, 455; moestus, 455.
Blissus leucopterus, 269.
Bombomelecta alfredi, *s* 11; thoracica fulvida, *s* 11.
Bombus americanorum, 21; borealis, 21; fervidus, 20, 21; lapidarius, 78; separatus, 20; ternarius, 20, 21; vagans, 20; virginicus, 20.
 Bombycidae, 398.
Bombyx callunae, 173; quercus, 173; sparti, 173.
 Boopis, 378.
Boreus brumalis, 247; nivoriundus, 247.
Bothrioides geminatus, 400.
Bothriometopus, 378.
Botis nelumbialis, 5.
Brachynus fumans, 339.
Brachyrhynchus lobatus, 280; simplex, 280.

Brachytarsus variegatus, 457.
Bradycellus rupestris, 339.
Brentiis chariclea, 319; freija, 319; tricularis, 319.
 Brepthidae, 398.
Brepthos infans, 397.
Bromymena annulata, 268.
Brochtes dubius, 401.
 Bruchidae, 6.
Bruchophagus, 43.
Butalis basilaris, 252.

Calathrus gregarius, 338; opaculus, 338.
Calophelis borealis, 403.
Calligatus angusii, 36, 143.
Callicapsus histrio, 279.
Callidryas philea, 347.
Callipterus discolor, 352.
Callirhytis sp., 262.
Callosamia promethea, 155, 167, 320, 426.
Calodera cavicola, 81.
Caloptenus borealis, 105.
Calosoma calidum, 139; frigidum, 139; scrutator, 139; willcoxi, 139; pellucida, 139.
Camponotus pennsylvanicus, 283; piectus, 80, 371.
Cantharis biguttata, 102; cyanipennis, 102; deserticola, 102; nuttali, 102; sphaericollis, 102.
Capnodes acidalia, 112; haematoessa, 110, 144; nana, 111; sideris, 111.
Carphoxera ptelearia, 6.
Cassonia pennsylvanica, 333.
Cassida bivittata, 437; thoracica, 437.
Castania ardalus, 237.
Catephia discistriga, 36, 144.
Catocala concumbens, 395, 398.
Catogenus rufus, 400.
Catopsilia eubule, 130.
Caute hia grotei, 385.
Cecidomyia bigeloviae-strobiloides, 176.
Celatoria, 251; crawi, 251.
Celissa, 386.
Cellularia bassoni, 95.
Comonus westmaeli, 46.
Conrinus sp., 457.
Coephyllus monilis, 80, 380.
Ceraleptus americanus, 269.
Ceratina dupla, 25.
 Ceratompidae, 398.
Cereeris arenarius, 59; aurita, 59; bupresticida, 59; fumipennis, 60; ornata, 59; trilineata, 59; tuberculata, 59; venator, 60.
Cerococcus elrhorni, 255; quercus, 255.
Ceropales rufiventris, 60.
Ceroplastes euphorbiae, *s* 17; floridensis, *s* 17; iberingi, *s* 17; mexicanus, *s* 29; mimosae, 178; myricae, 178; vinsoni, 178.
Ceroplastodes acaiae, *s* 2.

Cerotoma caminea, 436.
Cerrua vinula, 237.
Cerylon castaneum, 400.
Ceuthophilus, 155, 168.
Ceuthophilus blatchleyi, 249.
Chaetocnema denticulata, 437.
Chaitophorus lonicera, 46; neugundoides, 352; salicicola, 45; sp., 46.
Chalcophora liberta, 6; virginiensis, 6.
Chalybion caeruleum, 45, 65.
Chelostoma, 387; sp., 78.
Chilocorus bivulneris, 399.
Chionaspis bambusae, *s* 21; difficilis, *s* 21; latus, *s* 21.
Chionobas assimilis, 15; californica, 307; erambis, 15; gigas, 307; iduna, 307; macounii, 15; oena, 15; semidea, 155.
Chironomus nivoriundus, 247.
Chlaenius erythropus, 339; nemoralis, 339; pennsylvanicus, 339; sericeus, 339.
Chloealtis, 327, 419; conspersa, 13, 104, 327, 419; punctulata, 14; viridis, 14, 104, 324.
Chlorion caeruleum, 65.
Choridium histeroides, 435.
Choleva alsiosa, 81; basillaris, 379.
Chortophaga viridifasciata, 63, 105, 180, 249.
Chrysis, 59, 303; bella, 79; coeruleans, 79; densa, 79; parvula, 316; perpulchra, 76; verticalis, 45, 79.
Chrysobothris dentipes, 60; femorata, 387.
Chrysochraon dispar, 195, 419.
Chrysomela auripennis, 436; elegans, 436; multipunctatus, 436; praecelsis, 436; similis, 436; suturalis, 436.
Cicada dorsata, 60; marginata, 60; tibicen, 60.
Cicadula quadrilineata, 6.
Cilissa, 44; trizonata, *s* 5.
Cireotettix verruculatus, 105, 323.
Cis fuscipes, 435.
Clerus quadriguttatus, 387.
Clinidium sculptile, 400.
Clinocephalus, 326, 402; elegans, 326, 402.
Clisocampa ambisimilis, 189; americana, 189; californica, 189; constricta, 189; disstria, 189; fragilis, 189, 259; pluvialis, 189, 259.
Clisodon, 387.
Clivina ferrea, 337.
Clythra, 59.
Cnemodius mavortius, 270.
Cnephalia, 261.
Coccinella 9-notata, 399; sauguinea, 399.
Coccus cacti, 178.

- Coelioxys*, 40; *altis*, 387; *brevis*, 387; *crossonii*, 387.
Coelometopia, 183.
Coleophoridae, 398.
Colias chrysotheme, 227; *elis*, 219, 275; *eurytheme*, 130; *hecla*, 219, 244, 275; *meadii*, 219, 275; *minisui*, 228; *nastes*, 227, 244; *philodice*, 130; *thisoa*, 227; *vernandi*, 227.
Collembola, 15, 180.
Colletes, 44; *punctata*, 386; *robertsonii*, 386.
Colpocephalum, 378.
Conchaspis angriaeci hibisci, s 19.
Conops, 23.
Conosoma crassum, 381.
Conotrachelus nenuphar, 6.
Copris minutus, 435.
Coptocyba guttata, 437.
Corimelaena atra, 268; *pulicaria*, 268.
Coriscus ferus, 280.
Coriscus punctipes, 280; *sp.*, 280.
Corizus hyalinus, 269.
Corticaria sp., 401.
Corymbites rotundicollis, 435.
Corythuca ciliata, 279.
Cosmosoma auge, 414.
Cossidae, 398.
Cossus ligniperda, 239.
Coxelus guttulatus, 400.
Crabro cephalotes, 44; *cribarius*, 44; *leucostoma*, 44; *patellatus*, 44; *sexmaculatus*, 45; *singularis*, 45; *vagus*, 45.
Crambidae, 398, 416.
Crambus, 138; *laqueatellus*, 395.
Cratoparis lunatus, 457.
Crematogaster lineolata, 282.
Cressonja juglandis, 191.
Crypticerva, s 15.
Cryptobium badium, 380; *bicolor*, 380; *latebricola*, 380; *pallipes*, 380.
Cryptolypnus obliquatus, 434; *pectoralis*, 434.
Cryptorhynchus lapathi, 6.
Crypturus argiolus, 76.
Cteniste piceus, 380.
Ctenuchidae, 398.
Cucujus clavipes, 400.
Cuculia scrofulariae, 175; *verbasci*, 175.
Culex hyemalis, 247.
Cyllene robiniae, 425.
Cymindis americana, 339.
Cymodema tabida, 269.
Cynips kollari, 46.
Cystodemus wislizeni, 100.
Daedalus, 100.
Daedalus, 100.
Daedalus, 100.
Daedalus, 100.
Dactylopius aphyllonis, s 8; *broneliae*, 178; *citri*, s 16; *graminis*, 178; *olivaceus*, s 18; *pandani*, s 16.
Danaus archippus, 15, 130, 176, 215, 458.
Dasychira groenlandica, 328; *rossii*, 328; *selenitica*, 328.
Decitidae, 155.
Degeeria decemfasciata, 199.
Deidamia inscripta, 317, 451.
Deilephila euphorbiae, 174, 175; *lineata*, 458; *nicaea*, 175.
Deinopalpus, 47; *africana*, 47.
Deinypena, 123; *ereboides*, 125, 144; *laeista*, 124, 144; *lathetica*, 124, 144; *marginepunctata*, 125, 144.
Dendrolasma, 11; 12; *mirabilis*, 12.
Dermestes caninus, 401; *lardarius*, 401; *vulpinus*, 401.
Derodontus maculatus, 401.
Deva africana, 10; *speciosissima*, 141, 144.
Diabrotica soror, 251; *vittata*, 6, 436.
Diadasia, 386.
Diamorus zabriskii, 26.
Diaspis asparagi, 178; *tommyi*, s 4.
Dichonia aprilina, 172.
Dicraeura cockerellii, s 14.
Dichromorpha, 326, 383; *viridis*, 326, 383; *viridis punctulata*, 383.
Diodontus americanus, 46; *minutus*, 46; *tristis*, 46.
Dioedus punctatus, 456.
Dionychopus niveus, 395, 415.
Diplochila laticollis, 338; *obtusata*, 338.
Diplosis pyrivora, 6.
Diplotaxis, 78.
Disonycha cervicalis, 437; *collaris*, 437; *collata*, 437; *discoidea*, 437.
Dissosteira carolina, 105, 179, 180.
Docophorus, 377.
Dolopus lateralis, 435.
Dorcus parallelus, 435.
Dorymyrmex pyramicus, s 15.
Doryphiara clivicollis, 436; 10-*lineata*, 436; *lineolata*, s 11.
Dryocampa rubicunda, 397.
Dysgonia camerunica, 85, 144; *humilis*, 85, 144; *joiviana*, 84.
neptunia, 84, 144; *plutonia*, 84, 144.
Eacles imperialis, 397.
Ectobia flavocincta, 248.
Elaphidion sp., 425.
Elaotr sanguinipennis, 435.
Ellochnoea chloroptila, 68, 144.
Elymniinae, 180.
Elyra gabunalis, 126, 144.
Emblethis arenarius, 270.
Emphor, 386.
Emphytus cinctus, 6.
Enallagma annexum, 207; *as-*
persum, 207, 211; *calverti*, 208; *carunculatum*, 208; *civile*, 207; *clausum*, 209; *divagans*, 207; *doubledayi*, 207; *durum*, 207; *ebrium*, 207; *exsulans*, 207; *hageni*, 207; *laterale*, 274; *minusculum*, 207; *pictum*, 274, 307; *pollutum*, 207; *signatum*, 207; *traviatum*, 207, 211.
Encoptolophus sordidus, 105, 323.
Encyrtus sp., 316.
Endecatonus rugosus, 435.
Endomychus biguttatus, 400.
Entechinia, 387; *taurea*, 25.
Entomobrya decemfasciata, 197, 199; *hexfasciata*, 196; *multifasciata*, 197, 199; *pygmaea*, 198.
Entomogramma pardus, 144.
Epeira insularis, 306.
Epeolus donatus, 41; *variegatus*, 41.
Ephemeridae, 311.
Ephestia interperctella, 426.
Epicauta cinctipennis, 101; *corvina*, 101; *funebria*, 101; *maculata*, 101; *pardalis*, 101.
Epiurus pulicarius, 401.
Episparis complex, 121, 144; *connubens*, 119, 144; *hieroglyphica*, 120, 144; *lamprina*, 118, 144; *lunata*, 120, 144; *simplex*, 121, 144.
Epistenia odyneri, 336.
Epitrix parvula, 347.
Erechia periploca, 68, 144; *subsignata*, 68, 144.
Erechomus ventriculus, 381.
Eriades, 386, 387.
Eriococcus dubius, s 18; *neglectus*, s 8.
Eristalis, 62; *tenax*, 6, 61.
Erynus comma ceteina, 320.
Erythromia conditum, 207, 211.
Eucapnodes, 110; *sexmaculata*, 110, 144.
Eucera, 386; *arctos*, 387; *enavata*, 387; *tristis*, 387; *ursina*, 387.
Euceras burrus, 76.
Eudamus bathyllus, 131; *pylades*, 131; *tityrus*, 131.
Eudrapa multiscripta, 50, 144.
Eugorgia, 122; *vidua*, 123, 144.
Eudepis athamas, 388.
Eumenes fraterna, 77, 79.
Eumicrus motschulskii, 80.
Eunomia, 386.
Euphaessa mendica, 397.
Euphoades glaucus, 155.
Euploea midamus, 172.
Eupompa fissiceps, 102.
Euptoeta claudia, 130.
aurum, 378.
Eurymetopus, 377.
Eurymus nastes, 329; *pelidne*, 320.

- Eurytoma, 43; sp., 202; stigmii, 271.
 Euschistus ictericus, 268; tristigmus, 268.
 Eustrophus bicolor, 456; tomentosus, 456.
 Eutelia strigula, 31, 36, 144.
 Entettix pulchella, s 24; strobi, s 24.
 Exorista, 329; blanda, 330; cecropiæ, 330; chrysophani, 330; ciliata, 330; dataiæ, 330; deilephilaæ, 330; doryphoræ, 330; eudryæ, 330; futilis, 329; hirsuta, 329; infesta, 330; lagoæ, 329, 330; leucaniæ, 330; nigripalpis, 329, 330; phycitæ, 330; platysamiæ, 330; proserpiua, 330; scudderi, 330; theclarum, 329.
 Facidia horrida, 143, 144.
 Falagria venusta, 380.
 Feniseca tarquinius, 320.
 Podina euclidicola, 144.
 Formica fuscogagates, 371; obscuripes, 281, 371; rufa, 283; subsericea, 80, 81, 370.
 Frontina acroglossoides, 262; flavicauda, 330.
 Galechiidae, 398.
 Galerita janus, 338.
 Galeuca notulata, 436.
 Geocoris discopterus, 269; fuliginosus, 270.
 Geometridæ, 398.
 Geometrimima, 142; callista, 142, 144.
 Geotrupes splendidus, 436.
 Giebèlia, 377.
 Gonioctes, 378.
 Goniodes, 378.
 Gonitis benitensis, 34, 36, 143; marginata, 33, 36, 144; punctulata, 34.
 Gorna apicata, 121, 144; partita, 122, 144.
 Gorytes fargei, 60; mystaceus, 60.
 Gossyparia mannifera, 178; ulmi, 6.
 Gracillaria syringella, 237.
 Grammodes benitensis, 85, 144; euclidicola, 85; psilla, 86, 144.
 Grapholithidæ, 398.
 Grapta comma, 458; interrogations, 130, 458.
 Gryllidae, 155.
 Grylloides sp., 4.
 Gryllotalpa borealis, 3, 250; columbia, 250.
 Gryllus abbreviatus, 250; lucuosus, 65, 250; neglectus, 250; pennsylvanicus, 250.
 Guerinia serrataluæ, 178. *U*
 Gymnetron teter, 457.
 Gyropus, 378.
 Habropoda, 387; mucida, 387.
 Haematopinus vitula, 250.
 Halictus, 14; cephalicus, 386; cephalotes, 386; constrictus, 386; disparalis, 60; distinctus, 386; distinguendus, 386; foxii, 386; fulvipes, 386; gracilis, 386; gracillimus, 386; interruptus, 386; macouniensis, 386; nymphaeum, 386; paludicola, 386; palustris, 386; parallelus, 43; provancheri, 386; quadrimaculatus, 386; rhododactylus, 386.
 Halisidota caryæ, 191; cinctipes, 450.
 Haltica chalybea, 437.
 Hapladrus femoratus, 455.
 Harmostes reflexulus, 269.
 Harpalus compar, 339; longior, 339; montanus, 339; pennsylvanicus, 339.
 Harrisina coracina, 306.
 Heliolithis marginata, 174.
 Hemaris difinis, 191.
 Hemimerus, 203.
 Heodes hypophlaeas, 263, 396, 398; hypophlaeas fullola, 320.
 Hepialidae, 398.
 Hepialus mustelinus, 238.
 Heriades, 336.
 Hesperia centaureæ, 320.
 Hesperotettix brevipennis, 367, 439; viridis, 103, 106.
 Hetaerius brunnipennis, 371.
 Heterocoma obliqua, 240; subalbicans, 65.
 Heterospila calescens, 117, 144; cinerea, 116; hecate, 115, 144; piperita, 117, 144; sestia, 115, 144; taeniata, 116, 144; umbrina, 117, 144.
 Heterothrops fumigatus, 80.
 Hexagenia sp., 314.
 Hippiscus discoideus, 107; rugosus, 105; tuberculatus, 105, 249.
 Hippodamia convergens, 399; glacialis, 399; parenthesis, 399; 13-punctata, 399.
 Hister americanus, 401; carolinus, 401; lecontei, 401; subrotundus, 401; vernus, 401.
 Holopyga semirufa, s 17.
 Homoptera pulcherrima, 36, 48, 143.
 Hoplocephala bicornis, 456.
 Hormomyia capraeæ, 173.
 Hyblaea occidentalis, 33, 36, 144.
 Hydrotaea, 44.
 Hydrotrechus remigus, 281.
 Hymenareys aequalis, 268; nervosa, 268.
 Hypatus bachmani, 320.
 Hyperaspis dissoluta, 399; undulata, 399.
 Hypphantria cunea, 6.
 Hypodectes carpophagæ, 99; filippi, 95; nycticoracis, 96.
 Hypoderas columbae, 95, 99.
 Hypodeva, 27; barbata, 27, 36, 143.
 Hypolampsis pilosa, 437.
 Hypopus, 98.
 Hypospila anguillinea, 89, 144; jaculifera, 90, 144; nigribasis, 90, 144.
 Icerya aegyptiaca, 178; purchasi, 178; rileyi, s 15; seychellarum, 178.
 Ichthyura apicalis, 424; strigosa, 424.
 Ino pumi, 253.
 Ips fasciatus, 401.
 Ischnocera, 377.
 Ischnoptera pennsylvanica, 248; unicolor, 248.
 Ischnorhynchus didymus, 269.
 Ischyropsalinae, 51.
 Ischyropsala, 400.
 Isodontia elegans, 64; tibialis, 64.
 Isosoma, 43; orchidearum, 6.
 Jalysus spinosus, 269.
 Julus canadensis, 282.
 Junonia coenia, 130, 427.
 Kermes quercus, 178.
 Kodiosoma cavesii, 14.
 Labia atriventris, 338; bivittata, 338; fureatus, 339; grandis, 338; scapulus, 339; tricolor, 339; viridipennis, 338; viridis, 339.
 Lachnopterna sp., 425.
 Lachnus ploi, 354; platiniola, 356; strobi, 6, 354.
 Lacon rectangularis, 434.
 Laelaps equitans, 282.
 Laemobothrium, 378.
 Laemophlaeus biguttatus, 401; testaceus, 401.
 Languria mozardi, 400.
 Laria rossii, 328.
 Larra argentata, 63; semirufa, 63; terminata, 63.
 Larroda semirufa, 63.
 Lasius alienus, 80; aphidicola, 80, 372; minutus, 80; niger, 80; sp., 358.
 Lathrobium armatum, 381; collare, 381; dimidiatum, 381; longiusculum, 381; simplex, 381.
 Laverna vanella, 239.
 Labena ovilla, 137.
 Lecamioidiaspis celtidis, s 19; quercus, s 190.
 Lecanium asparagi, 178; batatae, s 7; cerasifex, 425; guerinii, 178; hesperidum, 178; imbricatum, s 19; mirabile, s 3; nauum, s 19; quadrifasciatum, s 3.
 Lepidoptera, 234.
 Leucosomus ophthalmicus, 59.

- Libythea bachmaui*, 130.
Lichitensia dubia, 255; *lutea*, 255; *lycii*, 254; *viburni*, 255.
Ligyrocoris constrictus, 270.
Limacodes scapha, 55.
Limacodidae, 393.
Limnitis arthemis, 203; *disippus*, 130.
Limnoporus rufoscutellatus, 281.
Limnotrechus marginatus, 281.
Limulodes paradoxus, 371, 372.
Linoceras juncens, 78.
Lipara lucens, 46.
Liparidae, 398.
Liparus, 378.
Listronotus inaequalipennis, 457; *nebulosus*, 457.
Lithocolletidae, 398.
Lithosia complanata, 175; *luridola*, 175.
Lithosiidae, 398.
Lixus ascanii, 59; *concavus*, 457; *macer*, 457.
Lomechusa cava, 80, 371.
Longitarsus turbatus, 437.
Lophyrus abbotii, 6.
Loxandrus agilis, 338; *erraticus*, 338; *rectus*, 338.
Lucilia, 62.
Lycæna comyntas, 130; *pseudargiolus*, 130; *xerces*, 275.
Lycoperdina ferruginea, 399.
Lycæna lineatus, 6; *reclivatus*, 270; *turcius*, 270.
Lygus lineolaris, 6; *pratensis*, 270.
Lyroda subita, 63.
Macrobasis gissleri, 101; *louzicornis*, 101; *ochrea*, 101.
Macroductylus subspinosus, 5, 6.
Macrops porcellus, 457; *sp.*, 457.
Mallophaga, 375, 416.
Mecostethus, 443; *gracilis*, 327, 444; *lineatus*, 327, 443; *platypterus*, 327, 445.
Megachile brevis, 39; *carbonaria*, 387; *centuncularis*, 26; *crossonii*, 387; *simplex*, 387; *siuphacis-sima*, 387.
Megalodaene fasciata, 400; *heros*, 400.
Megalonotus unus, 270.
Megaloptera crispata, 253.
Meganomyia caesonia, 130.
Megetra vittata, 100.
Megilla maculata, 399.
Melanolestes abdominalis 280; *picipes*, 280.
Melanoplus, 367; *atlantis*, 106, 180, 368, 369; *bivittatus*, 106, 367; *borealis*, 320; *collinus*, 53, 106, 368, 370; *curtus*, 53; *cyanipes*, 63; *extremus*, 367, 368, 369, 370; *fasciatus*, 320, 367, 368, 369, 370; *femoratus*, 367, 368, 369; *femor-rubrum*, 53, 106, 179, 180, 368, 369; *griseus*, 55; *hellus*, 55; *junius*, 106, 367; *maucus*, 367, 368, 369; *minor*, 368, 370; *punctulatus*, 55, 106, 368, 370; *rectus*, 53, 106; *scudleri*, 367, 368, 369; *spretus*, 63.
Melanotus communis, 435; *fissilis*, 435.
Melanoxanthus bicolor, 356, 361; *flocculosus*, 355, 361; *salicis*, 6, 355, 361; *salicti*, 356, 361.
Melecta, 42.
Melipona, 387; *crossonii*, 387.
Melissodes, 386; *bimaculata*, 25; *bravicornis*, 387; *californica*, 387; *crossonii*, 387; *smithii*, 387; *tristis*, 387.
Melitobia megachilis, 26.
Melinus arvensis, 59.
Meloe, 23; *impersatus*, 456; *sublaevis*, 101.
Meloidae, 425.
Menopon, 379.
Mesostenus arvalis, 76; *thoracicus*, 76.
Mestleta discifascia, 113, 144; *flavico-stata*, 113, 144; *lathraea*, 114, 144, *lithina*, 113, 144.
Metachroma angustula, 436.
Metathorax complicata, 7; *cornu-scapae*, 7; *eximia*, 7.
Microdonia occipitalis, 80.
Micropterygidae, 398.
Microtona carbonaria, 270.
Miltogramma conica, 44; *punctata*, 44.
Mimesa, 59.
Minucia david, 70, 144; *despecta*, 70, 144; *producta*, 70, 144.
Moma orion, 172.
Monedula carolina, 61.
Monobia quadridens, 77.
Monocrepidius auritus, 431; *bellus*, 435.
Monodes, 411.
Monodontomerus montivagus, 25.
Monothamus confusor, 6.
Monophlebus raddoni, 178.
Monotoma fulvipes, 371.
Mormidea lugens, 268.
Musca, 62; *corvina*, 174.
Mutilla europaea, 78.
Mycetina perpulchra, 399; *testacea*, 400.
Mycocorina lineolata, s 11.
Mygale hentzii, 66.
Myochrous denticollis, 436.
Myrolocha serripes, 270.
Myrmecochara criuiata, 80.
Myrmecodia caliginosa, 80.
Myrmecleon obsoletus, 250.
Myrmica rubra, 214.
Myrmobiota crassicornis, 81.
Mytila-pis carinatus, s 21; *crawii*, s 21.
Myzus cerasi, 354, 425.
Nathalis iole, 130.
Naxia debilis, 83, 144; *infirma*, 83, 144; *multilineata*, 83, 144; *senior*, 83; *xanthodera*, 83, 144.
Necrophorus orbicollis, 379.
Nectarophora rudbeckiae, 356.
Neelidae, 391.
Neelus, 391; *murinus*, 391.
Nehalennia gracilis, 274.
Nemastoma 51; *inops*, 52; *modesta*, 52; *troglydites*, 52.
Nemastomatidæ, 51.
Nemastominae, 51.
Nematus erichsonii, 77.
Nemobius, 63; *ambitiosus*, 432; *aterrimus*, 432; *cauus*, 432; *carolinus*, 433; *cubensis*, 431, 432; *dolicatus*, 431, 433; *distinguendus*, 431; *ensifer*, 431; *fasciatus*, 432; *mellens*, 432, 434; *mexicanus*, 433; *mormonius*, 433; *neomexicanus*, 432; *pictus*, 431, 433; *socius*, 432; *tolteus*, 433; *trinitatis*, 432; *utahensis*, 432; *vittatus*, 180.
Nemognatha immaculata, 101.
Nemouca nivalis, 247.
Neominois ridingsii, 15.
Neonympha curytris, 130; *gemma*, 130; *sosybius*, 130.
Nephasia menapia, 427.
Nephopteryx edwardsii, 23.
Neuronia semifasciata, 396, 398; *stygipes*, 396.
Nezara hilaris, 269.
Nirmus, 377.
Nisoniades juvenalis, 131.
Nitzschia, 379.
Noctuidæ, 15.
Nomada erythraea, 387; *imbricata*, 43; *integerrima*, 387; *integra*, 387; *provancheri*, 387; *punctata*, 387; *rubra*, 387; *vineta*, 43.
Nomia, 44; *foxii*, 386; *punctata*, 386.
Nomotettix, 149, 150; *cristatus*, 147, 149, 150, 166.
Notolontidae, 398, 416.
Notolophus antiquus, 341, 342; *badia*, 342; *cana*, 342; *definita*, 342; *inornata*, 342; *leucostigma*, 341, 342; *vetusta*, 310, 342.
Notonecta, 281.
Notoxus monodon, 456.
Nycteolidae, 398.
Nyctobates barbarata, 455; *pennsylvanica*, 455.
Nysius angustatus, 269.
Nysson, 60.
Oberea bimaculata, 299.
Oenieria dispar, 6.

- Odontota dorsalis*, 437.
Odynerus albopaleratus, 77;
capra, 77; *errinsy*, 77; *fulvipes*,
77; *quadrisectus*, 79; *rufobasilla-*
ris, 335.
Oecanthus niveus, 4, 64.
Oedionychis gibbittarsis, 437;
indigoptera, 437; *vians*, 437. ▲
Oedipodinae, 325.
Oeneis jutta, 319; *oeno*, 319;
polyxenes, 319.
Olibrus con-imilis, 381.
Oligia exesa, 411; *strigilis*,
411.
Olisthopus parvatus, 338.
Omalus iridescens, 271.
Oncerothelus acuminatus,
280.
Onchophorus, 378.
Opatrinus aciculatus, 455;
notus, 455.
Opomala brachyptera, 13, 106,
324.
Ophiogomphus aspersus, 209.
Opsicoetus personatus, 280.
Orchelimum gracile, 64; *vul-*
gare, 64, 180.
Orgyia, 340; *leucostigma*, 6,
126.
Orixa fascifera, 126, 144.
Ornithobius, 378.
Orphula, 326, 407; *aequalis*,
326, 409; *maculipennis*, 326, 408;
olivacea, 327, 411.
Orphulella, 407.
Ortholasma, 11; *rugosa*, 12.
Orthonia natalensis, 178.
Oryctes nasicornis, 78; *simia*,
78.
Osmia, 155; *conjuncta*, 387;
eressonia, 387; *gallarum*, 49;
halicicola, 78; *leucomelaena*, 41;
lignaria, 49; *lignivora*, 39; *pacif-*
ica, 40; *parietina*, 39; *parva*,
387; *parvula*, 387; *quadridentata*,
387; *simillima*, 40.
Osprynochotus juncens, 66.
Oxybelus, 44; *coloradensis*, s
23; *cornutus*, s 23; *heterolepis*, s
22; *heterolepis defectus*, s 23;
packardii, s 23; *quadricolor*, s
21; *quadrinotatus*, s 23; *trifidus*,
s 23.
Oxyptila, 241; *americana*, 242;
cinerea, 241; *conspurcata*, 241,
242; *floridana*, 241, 243; *georgi-*
ana, 241; *mouroeensis*, 241; *nevad-*
ensis, 241, 243; *pacifica*, 242,
243.
Oxyptilus periscelidactylus,
253.
Oxytelus placusinus, 81; *sus-*
pectus, 81, 371.
Ozophora picturata, 270.

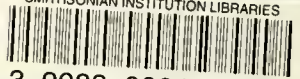
Pachygaster picipes, 59; *ran-*
cuss, 59.
Pachyophthalmus aurifrons, 306.
Pachypsylla celtidis-pubescentis,
187.
Pacidara venustissima, 143;
littoraria, 381.
Palaegyridinae, 162.
Palochium repandam, 78.
Palomena dissimilis, 64; *virid-*
issima, 64.
Pamera basalis, 270.
Pampbila accius, 131; *campes-*
tris, 131; *cernes*, 131; *eufala*,
131; *fusca*, 131; *phylaeus*, 131;
pontica, 131.
Panagaenus fasciatus, 337.
Panchlora viridis, 219.
Pandelejeus hilaris, 456.
Panilla major, 50, 144; *obscu-*
ris, 48, 144; *octomaculata*,
49, 144; *quadrinaculata*, 49, 144;
sexmaculata, 36, 49, 144.
Papilio, 299; *ajax*, 130; *eres-*
phontes, 130, 263, 299; *paradoxa*,
172; *phileor*, 130, 155; *troilus*,
130; *turnus*, 130, 398.
Papirius hagenii, 344; *pinii*,
344; *testudineatus*, 345; *texen-*
sis, 384.
Paratettix, 149; *caucullatus*,
147, 149, 163, 167.
Parlatoria theae, s 21; *theae*
viridis, s 21; *zizyphus*, 178.
Parnassius smintheus, 307.
Paromalus bistriatus, 401; *es-*
triatius, 401.
Parorgyia achatina, 136; *cin-*
namomea, 137; *clintonii*, 136;
leucophaea, 135; *plagiata*, 137.
Paroxya atlantica, 105, 367;
floridana, 367, 368, 439.
Passaloecus annulatus, 46;
corniger, 46; *gracilis*, 46; *insig-*
nis, 46; *turionum*, 46.
Passalus cornutus, 435.
Patrobis longicornis, 337.
Pedicia, 201; *albivitta*, 201;
obtusa, 202, 229.
Pelecinus polycerator, 139.
Pelecyclus, 195.
Peliopelta abbreviata, 270.
Pelopaeus, 45; *cemetaryius*,
65, 78, 79.
Pemphigus tessellata, 359.
Pemphredon angularis, 46;
lugubris, 46.
Penicillaria menalcas, 141, 144;
morosa, 32, 36, 144; *solitaria*, 32,
36, 144.
Penthe obliquata, 456; *pimelia*,
456.
Pepsis formosus, 66.
Perdita, 416; *beata*, s 10;
luteola, 189; *martini*, s 6; *niti-*
della, s 6; *nitidella exclamans*, s
5; *punctosignata*, s 6.
Periplaneta americana, 248;
orientalis, 248.

Periplusia, 39; *cinera-cens*, 39,
36, 143; *eclipsis*, 30, 36, 143;
nubilicola, 30, 36, 143.
Peritrechus fraternus, 270.
Perla nivicola, 247.
Pezotettix, 195, 215; *borealis*,
53, 106, 367; *glacialis*, 106, 367,
manca, 53, 106, 367; *pedestris*,
195; *scudderii*, 106, 367; *septen-*
trionalis, 53, 106.
Phalacrus sp., 381.
Phaethra, 412; *auriconia*, 412.
Phenococcus pergandei, s 18.
Phenolia grossa, 401.
Philanthus punctatus, 60; *tri-*
angulum, 60;
Phileremus, s 9; *nanus*, s 9;
vigilans, s 9.
Phileremus, 387; *mesillae*, s 10;
verbesinae, s 10.
Philhydrus cinctus, 379.
Philonthus baltimorensis, 380;
brunneus, 380; *microphthalmus*,
80.
Philothermus glabrivalis, 400.
Phlegmaecra, 51; *cavicolens*,
51, 52; *crassipalpis*, 52; *occiden-*
talis, 51.
Phlepus inornatus, s 13; *neo-*
mexicanus, s 13; *superbus*, s 13.
Pholisora catullus, 131.
Phorodon humuli, 6, 353.
Phthiria sulphurea, 188.
Phyciodes tharos, 130.
Phycitidae, 398.
Phyllostomium germanica, 248.
Physotomia, 378.
Phytomyza aquilegiae, 426;
chrysanthemii, 6.
Picromerus bidens, 64.
Pieris brassicae, 173, 238; *pro-*
todice, 139; *rapae*, 130, 173, 396.
Piesma cinerea, 279.
Pimophilus latipes, 381.
Plagiognathus obscurus, 6.
Platyedra excavatum, 456;
picilabrum, 456; *ruficorne*, 456;
subcostatum, 456.
Platymedon laticolle, 371.
Platynus aeruginosus, 338;
brunneomarginatus, 338; *cuppi-*
pennis, 282, 338; *decorus*, 338;
extensicollis, 338; *lutulentus*,
338; *melanarius*, 338; *nutans*,
338; *obsoletus*, 338; *octopuncta-*
tus, 338; *punctiformis*, 338; *pu-*
sillus, 338; *rubripes*, 338.
Platyphyma, 215; *giornae*, 195.
Platypsyllus, 168.
Platypterygidae, 398.
Platysamia cecropia, 131.
Plochiomera nodosa, 270.
Plusia gorilla, 9; *mapongna*,
8; *ogovana*, 9; *sciulifera*, 8.
Plusiocalpe, 29; *pallida*, 29, 36,
143; *prosieta*, 29, 36, 143.
Plusiopalpa, 9; *dichora*, 9.

- Plusiotricha*, 10; *livida*, 10.
Plutella porrectella, 253.
 Plutellidae, 398.
Podalirius, 386, 387; *eressoni*, 387; *infernalis*, 387.
Podisma, 195, 215, 346; *glacialis*, 367; *primna*, 196.
Podisus spinosus, 268.
Podops cinctipes, 268.
Podura fasciata, 139; *nivicola*, 247.
Poecilocapsus lineatus, 6.
 Polistes, 75.
Polybia cubensis, 76.
Pompilus fumipennis, 75; *niger*, 75; *petiolatus*, 75; *tenebrosus*, 75.
Porthetria dispar, 395.
Prometopia sexmaculata, 401.
Prosopis, 43, 44, s 26; *affinis*, 439; *asinina*, s 30; *bakeri*, s 26, s 31; *citriifrons*, 439, s 27; *coloradensis*, s 30; *coquilletti*, 439; *digitatus*, s 30, s 31; *divergeus*, s 29; *episcopalis*, 439, s 29; *georgica*, 438; *labiatiifrons*, 437; *modesta*, 439; *nevadensis*, s 32; *pennsylvanica*, 439; *rudbeckiae rufidensis*, s 30; *rudbeckiae subdigitata*, s 31; *rugulosus*, s 28; *rugulosus fallax*, s 28; *saniculae*, 438; *suffusa*, s 32; *triangularis*, s 31; *tridens*, s 28; *tridentulus*, s 27; *wootoni*, s 26.
Prosopis, s 26; *varifrons*, 315.
Prosopophora celtidis, s 19; *quercus*, s 19.
Prospheya vilis, 262.
 Proticeera, s 15.
Psamphilus, 65.
 Psen, 59.
Pseudogonia obsoleta, 261; *ruficauda*, 261.
Pseudohazis shastaensis, 91.
Pseudolecanium, s 19; *tokionis*, s 19.
Pseudopomala, 325, 342; *brachyptera*, 325, 343, 382.
Psimada africana, 84, 144; *imperatrix*, 84, 144.
Psimidia fenestralis, 105, 180.
Psithyrus elatus, 387.
Psithyrus putnami, 26.
Pterolichus falciger, 96.
Pteromalus sp., 66.
Pterostichus caudalis, 337; *ebeninus*, 337; *femoralis*, 337; *lucublandus*, 337; *mutus*, 337; *patruelis*, 337; *tartaricus*, 337.
Ptomaphagus parasitus, 80, 370.
Pulvinaria aurantiae, s 19; *broadwayi*, s 19; *gasteralpha*, 178; *japonica*, s 20.
Pygalampis pectoralis, 280.
 Pyralidae, 398.
Pyraeis atalanta, 458; *cardui*, 130, 451; *huntera*, 130.
 Pyraustidae, 398.
Pyrgus tessellata, 131.
 Pyromorphidae, 398.
Pyrota postica, 101; *terminata*, 101.
Quedius fulgidus, 380.
 Ranatra, 281.
Remigia venusta, 144.
Retinia frustrana, 6.
Rhescipha hypocaloides, 33, 36, 143; *siderosticta*, 32, 36, 143.
Rhinonchus pyrhopus, 457.
Rhinopsis caudiculata, 64.
 Rhinotoria, 183.
Rhipiphorus dimidiatus, 77; *paradoxus*, 76.
Rhissodes exaratus, 400.
Rhodites bicolor, 307; *tumidus*, 272, 307.
 Rhopalocera, 416.
Rhopalomera, 183; *ciliata*, 184, 186; *clavipes*, 183, 184, 185; *femorata*, 183, 184, 185; *flaviceps*, 183, 184, 186, 213; *pleuropunctata*, 183; *punctipennis*, 183; *maculipennis*, 183, 184, 185; *rufipes*, 183; *similis*, 183, 185; *stictica*, 183, 184, 185; *tibialis*, 183, 184; *varipes*, 183, 184; *vittifrons*, 183; *xanthops*, 213.
Rhopalomyia, 184; *plenropunctata*, 184, 186.
 Rhopalum, 45.
Riela expansens, 144; *subpallescens*, 115, 144.
Samia cecropia, 426.
Saperda tridentata, 425.
Saprinus maucus, 401.
Sapyga chelostomae, 78; *punctata*, 78.
Sarcophagus affinis, 427.
 Saturniidae, 398.
Saturnus alope, 130; *charon*, 307.
Scaphidium piceum, 381; *quadriguttatum*, 381.
Scaphisoma convexum, 381.
Scapteriscus, 214; *abbreviatus*, 214; *mexicanus*, 214.
Scartus subterraneus, 337.
Schistocerca alutacea, 105; *americana*, 107, 318; *rubiginosa*, 105.
 Scirtes, 215.
Scirtettica marmorata, 105.
Scolia azteca, 78; *flavipes*, 78; *nobilitata*, 78; *oryctophaga*, 78.
Scopaeus brevipennis, 81.
Scydmaenus flavitarsis, 80; *rasus*, 80; sp., 380.
Scymnus haemorrhons, 399; sp., 399.
Seira buskii, 159, 161; *mimica*, 159; *pruni*, 159; *purpurea*, 159, 162.
Selenis limbata, 112, 144; *puncticosta*, 112, 144.
Sericia sericea, 282.
Sericaria mori, 174.
 Sesiidae, 398.
Sibine stimulea, 253.
Silpha inaequalis, 379; *noveboracensis*, 380; *surinamensis*, 379.
Silvanus surinamensis, 400.
Simaethis pariana, 253.
 Siphonaptera, 293.
Sirthenia carinata, 280.
Smernithus astylus, 191; *cerysii*, 331; *geminatus*, 331.
Smynthurus amicus, 447, 450; *aquaticus*, 448; *benitus*, 446, 450; *elegantulus*, 447; *fitelii*, 449; *henshawii*, 449; *packardii*, 385; *remotus*, 448; *socialis*, 446, 450.
Solenopsis debilis, 80.
Soronia undulata, 401.
 Spalgis, 215.
 Spallanzania, 261.
Sphaerococcus tokionis, s 19.
Sphacrophthabna eargilli, s 16; *gloriosa pseudopappus*, s 6; *sacckenii*, s 6; *saubroni*, 79; *simillima*, 42.
Spharagemon, 155, 287; *aequale*, 105, 138, 289, 292, 293; *bolli*, 105, 138, 289, 290; *collare*, 138, 289, 295, 296; *collare angustipenne*, 295, 298; *collare collare*, 295, 296; *collare pallidum*, 295, 299; *collare scudde i*, 295, 299; *collare utahense*, 295, 297; *collare wyomingianum*, 295, 298; *crepitans*, 289, 290; *eristatum*, 289, 295; *humile*, 292; *inornatum*, 290, 291; *saxatile*, 105, 138, 289, 292, 294.
Sphecius speciosus, 62.
 Sphecodes, 43.
Sphecoptaga vesparum, 76.
Sphenophorus cariosus, 457; *costipennis*, 457; *melanopleurus*, 457; *ochreus*, 457; *parvulus*, 457; *pertinax*, 457; *placidus*, 457; *sayi*, 457; *sculptilis*, 457; *zaca*, 457.
Sphericus speciosus, 60.
Sphex ichneumonaea, 64.
 Spingidae, 398.
Sphinx vashiti, 177.
Spilosoma latipennis, 71.
Staphylinus cinnamopterus, 380; *maculosus*, 380; *tomentosus*, 380.
Steganoptycha pinicolana, 426.
Stelis minuta, 41.
Stenobothrus, 327; *aequalis*, 14, 104, 179, 180, 407; *bilineatus*, 408; *curtipennis*, 14, 104, 179, 327, 420; *eurtipennis longipennis*, 420; *longipennis*, 14; *maculipennis*, 14, 105, 179, 180, 407; *melanopleurus*, 419; *occidentalis*, 402; *olivaceus*, 104, 105, 407; *parallelus*, 195; *pelidnus*, 104, 407; *propinquans*, 104, 408; *speciosus*, 104, 408.

- Stenolephus conjunctus*, 339;
ochropepus, 339.
Stenus annularis, 330; *colonus*,
 380.
Stethophyma, 443; *gracilis*, 105;
lineata, 105; *platyptera*, 105.
Stigmus argentifrons, 46; *inor-*
dnatus, 271; *troglydytes*, 46.
Stomoxys calcitrans, 59.
Strophosomus, 59.
Stylops, 23, 76.
Sunius longinseculus, 381.
Symphylia, 28; *frequens*, 28,
 36, 144.
Synhalonia, 387.
Syntomaspis sp., 263.
 Syntomidae, 398.
Synpa aequatorialis, 69.
Syrphus, 62.
Systema frontalis 437
- Tabanus atratus*, 61.
Tachardia fulgens, s 1; *pustu-*
lata, s 2.
Tachina, 230.
Tachycellus atrimelius, 339;
badipennis, 339.
Tachyporus brunneus, 381;
chrysomelinus, 381; *maculipen-*
nis, 381; sp., 371.
Tachys flavicauda, 337; *incur-*
vus, 337; *uanus*, 337; *proximus*,
 337; sp., 337.
Tachytes harpax, 63; *mandi-*
bularis, 63; *pompiliformis*, 63;
rufofasciatus, 63.
Takahashia, s 20; *japonica*, s
 20.
Talaeporia pseudobombycella,
 238.
Tanymecus confertus, 456.
Tarache domina, 128, 144;
mesoleuca, 128, 144; *signifera*,
 36, 144.
Taracus packardii, 51; *spinosa*,
 51.
Targalodes, 31; *rufala*, 31, 36,
 144.
Tatorhinia burrowsii, 144; *fus-*
cosa, 114, 144.
Telca polyphemus, 215.
Telphamus velox, 401.
Tenuopteryx deropeltiformis,
 243.
Tenebrio molitor, 455; *obscurus*,
 455; *tenebrioides*, 455.
Tenebrioides castanea, 401;
laticollis, 401.
- Terias jucunda*, 140; *lisa*, 130;
nicippe, 130.
Tetragona, 387.
Tetragoneuria cynosura, 210;
indistincta, 210.
Tetralonia, 387.
Tettigidea, 149; *lateralis*, 54,
 107, 147, 149, 164, 167, 249, 324;
parvipennis, 325; *pennata*, 325;
polymorpha, 54, 107, 149, 164,
 167, 249, 324.
Tettiginae, 147, 155, 325.
Tettix 149; *arenosus*, 249; *cu-*
callatus, 54, 107, 249; *granulatus*,
 54, 106, 147, 149, 154, 167, 249;
harrisii, 167; *ornatus*, 54, 106,
 147, 149, 152, 167, 249; *triangula-*
ris, 54, 147.
Thamnotettix atridorsum, s 12;
aureola, s 12; *flavicapitata*, s 12;
inornata, s 12; *lucida*, s 12; *tenella*,
 s 24.
Thanaos icelus, 403; *juvenalis*,
 362.
Thecla aedica, 130; *edwardsii*,
 130; *halesus*, 130; *poetas*, 130.
Thermesia aurantiaca, 109, 144;
discipuncta, 110, 144.
Thiasophila laticollis, 372.
Throsacus chevrolati, 435.
Thyanta rugulosa, 64; *custator*,
 269.
Thyatiridae, 398.
Thymus californicus, 78.
Thyreus abbottii, 451, 459.
Thyridopteryx ephemeriformis,
 6.
- Tineidae*, 398.
Tiphia inornata, 78.
Tinesiphorus costalis, 380.
Tomieus calligraphus, 6.
Tomoderus constrictus, 456.
Tortricidae, 398.
Tortrix chlorana, 44; *resinanae*,
 46.
- Torymus* sp., 263.
Toumeyella, s 2; *mirabile*, s 2.
Toxocampa dedocora, 109, 144.
Toxoneuron floridanum, 179;
viator, 178.
Tracta bilinea, 115, 144; *geo-*
metroides, 114, 144.
Trapezonotus nebulosus, 270.
Tremex columba, 397, 398.
Triacna occidentalis, 173; *psi*,
 174.
Tribolium ferrugineum, 455.
Trichocera brumalis, 247; *hir-*
tipennis, 230; *trichoptera*, 230.
- Trichodectes* 377.
Tridactylus terminalis, 3.
Trigona, 387; *nigra*, 387.
Trigonalys bipustulatus, 76.
Trigonodes binaria, 86, 144;
inornata, 86, 144.
Trimerotropis maritima, 105,
 179.
Trinoton, 378.
Triphaena pronuba, 238.
Triphleps insidiosus, 6.
Tritona festiva, 400; *bipunc-*
tata, 400.
Trogulidae, 11.
Trox aequalis, 436.
Trypoxylon albitarse, 45; *albo-*
pilosum, 45, 303; *carinifrons*, 45,
 79; *clavatum*, 45; *collinum*, 45;
rubrocinctum, 303.
Tryxalinae, 325.
Tryxalis brevicornis, 325, 382.
Tyloderma aereum, 457.
Typhlocyba coloradensis, s 14;
comes, s 14.
- Uloa imberbis*, 456; *impressa*,
 456.
Urocerus cressoni, 397.
Uropoda ricasoliana, 232; sp.,
 232.
- Valgus canaliculatus*, 436;
squamiger, 436.
Vanessa antiopa, 130, 398, 458.
Vespa, 75; *arenaria*, 453; *caro-*
lina, 76; *crabo*, 388; *cuneata*, 76;
diabolica, 76; *germanica*, 76;
maculata, 76.
Visionia stellifera, 178.
Volucella, 76.
- Xanthodes canela*, 144; *cannula*,
 36.
Xantholinus cephalus, 380;
emmesus, 380.
Xenoglossa, 387.
Xiphidium brevipenne, 63.
fasciatum, 180.
Xisticus, 241.
Xylocopa, 23; *orpifex*, 24; *tex-*
ana, 24; *violacea*, 78; *virginica*,
 23, 24, 64, 77.
- Zaitha*, 281.
Zethus spinipes, 77.
Zeuzera pyrma, 5.
Zygaena fausta, 174.

SMITHSONIAN INSTITUTION LIBRARIES



3 9088 00842 9268