

Myriapodologica

A SERIES OF OCCASIONAL PAPERS PUBLISHED BY THE
VIRGINIA MUSEUM OF NATURAL HISTORY
ISSN 0163-5395

Vol. 2, No. 10

August 28, 1992

Golovatchia, new genus, and *Golovatchiidae*,
new family, from the Far East of the Russian
Republic, with a comment on *Hoffmaneumatidae*
(Diplopoda, Chordeumatida)

By William A. Shear

ABSTRACT

The new family *Golovatchiidae* is established to include only the type genus and species, *Golovatchia magda*, n. sp., from the Russian Far East. The new family seems referable to the superfamily *Brannerioidea* Cook, and is related to *Branneriidae* Cook (North America) and *Kashmireumatidae* Mauriès (Nepal, Viet Nam). The gonopods of *Hoffmaneuma exiguum* Golovatch 1978, incorrectly interpreted in the original description, are redescribed; a reduced tenth leg pair is shown not to be part of the posterior gonopods (ninth legs). The family *Hoffmaneumatidae* Golovatch is considered to be related to the *Mastigophorophyllidae* Verhoeff, possibly as its sister group.

INTRODUCTION

As exploration of the soil and litter fauna of the Far East of the Russian Republic continues, a distinct group of chordeumatid diplopods is emerging. At least one family and genus — *Underwoodia*, *Caseyidae* (Golovatch, 1980) — is shared with North America, while others (*Crassotyla*, *Megalotyla*; Golovatch & Mikhailjova, 1978; Golovatch, 1980) express relationships with faunas of Central Asia and the

Himalayas. The speciose family Diplomaragnidae (Shear, 1991) extends from Japan and Korea west through the region to the Urals. Most interesting, however, are those forms of obscure affinities which, at present, seem quite isolated in the system. The paradigm of this category is the minute *Hoffmaneuma exiguum* Golovatch (1978), the type and only species of the family Hoffmaneumatidae, discussed briefly later in this paper. As field work and the sorting of museum collections continues to produce relevant material, it may be possible to fit this and other species and genera in our classification with more confidence.

This paper adds a second monotypic family, like Hoffmaneumatidae, from the Russian Far East. It is not possible at this time to be very certain about its relationships, only that the distinctiveness of the type genus and species justifies such a status. Three pairs of legs (8, 9, and 10) are involved in the gonopod complex of males, and all three retain telopodites. Those of the anterior gonopod (legpair 8) retain two articles, while those of the posterior gonopods (legpair 9) and legpair 10 retain three. These are the most plesiomorphic anterior gonopod telopodites known for the order, except for the very leg-like homologs of the tropical Asian heterochordeumatids. The pattern of reduction, however, suggests that *Golovatchia magda*, the new species, belongs to a quite different genealogy, as discussed below.

I am very grateful to my colleague Sergei Golovatch, A. N. Svertlov Institute, Moscow, for sending the specimens of the new species, and for the loan of material of *Hoffmaneuma exiguum*. Dr. Paul Jagasich of Hampden-Sydney College provided Russian translations.

SYSTEMATIC TREATMENT

Golovatchiidae, new family

Diagnosis: Distinct from all other chordeumatid milliped families in that two-articled telopodites are retained on the anterior gonopods and that the tenth legpair is strongly reduced, with enlarged coxae.

Type genus: *Golovatchia*, new genus, by monotypy.

Description: 30 segments. Mentum entire. Anterior male legs enlarged, curved mesally, otherwise not modified. Anterior gonopods with two-articled telopodites, distal article small, button-like. Posterior gonopods widely separated on a broad sternum, with deeply cupped coxae and three-articled telopodites; the distal telopodite article is not swollen. Tenth legs with coxae enlarged, heavily sclerotized, bearing glands; telopodites much reduced, consisting of three articles. Eleventh legs without glands.

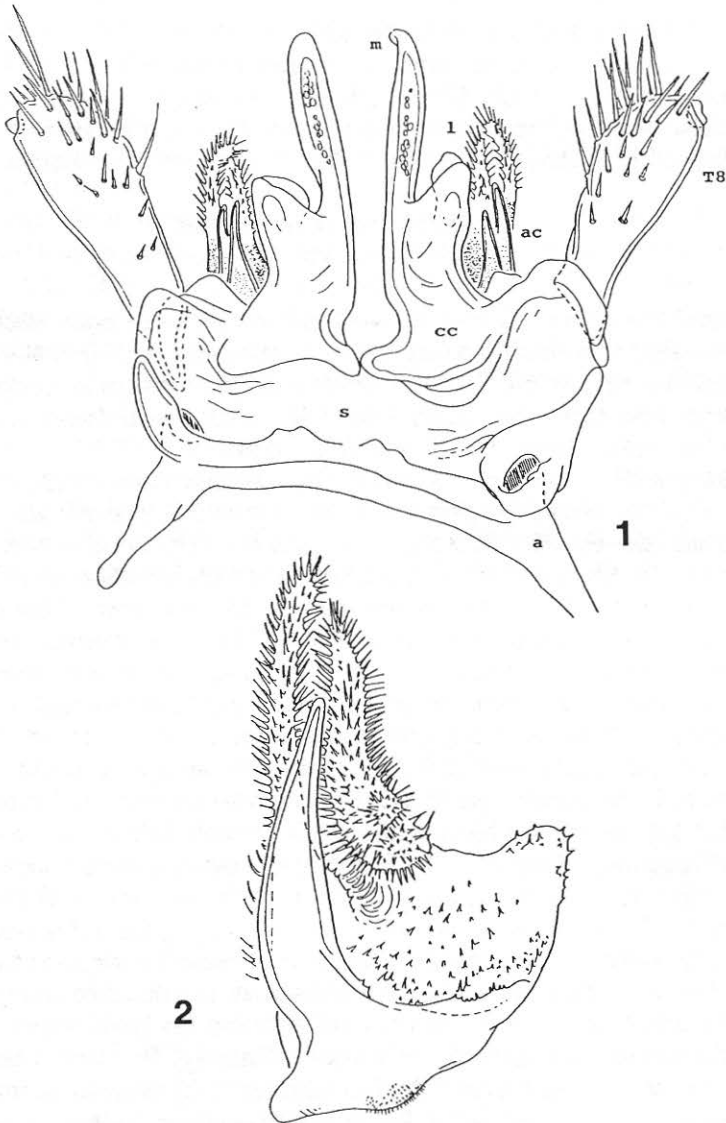


Fig. 1. Anterior gonopods of *Golovatchia magda*, anterior view, 200X.
Fig. 2. Right anterior gonopod angiocoxites, anterior view, 400X.

Golovatchia, new genus

Diagnosis and description: as for the family.

Type species: *Golovatchia magda*, new species, by monotypy.

Name: In honor of Dr. Sergei Ilych Golovatch, premier Russian myriapod specialist, with many thanks for his help and cooperation over the years.

Distribution: Yerkhne-Buriansk District, Khabarovsk Province, Russian Far East.

Golovatchia magda, new species

Figs. 1-6

Material: Male holotype, male and two female paratypes (Zoological Museum of the University of Moscow), two male and two female paratypes (Virginia Museum of Natural History), one male and one female paratypes (Museum of Comparative Zoology) from *Larix* taiga, Magda River, Yerkhne-Buriansk District, Khabarovsk Province, Russian Far East, 25 June 1987, N. Ryabinin leg.

Holotype: Adult male about 15 mm long, 1.2 mm wide. Head smooth, rounded, with about 30 uniform, well-pigmented ocelli on each side in a triangular group. Antennae relatively short, third antennomere 0.5 mm long. Metaterga with small, somewhat clavate setae, without pronounced shoulders, sculpture, or tubercles. Legpairs one and two reduced in size, but with full complement of podomeres. Legpairs three to seven enlarged, prefemora curved inward, not otherwise modified.

Sternum of anterior gonopods (Fig. 1, *s*) broad, unmodified, with pronounced tracheal openings and short, rod-like apodemes (*a*). Coxae enlarged, medially contiguous, with biramous colpocoxites, the lateral branch (*l*) curved strongly posteriorly and laterally flattened; the mesal branch (*m*) erect, more rod-like, slightly curved at tip. Angiocoxites (Fig. 2; *ac* in Fig. 1) with several branches, two of these anterior and acuminate, smooth; three posterior strongly fimbriate, with a "bottle brush" appearance. Telopodites (*T8*, Figs. 1, 4) of anterior gonopods comparatively large, basal article setose, clavate; distal article without setae, very small. Posterior gonopods (Fig. 3) with broad, unmodified sternum (*S9*). Coxae widely separated from one another, strongly depressed, with margins drawn out into three flattened branches (*x*, *y*, *z*); single small seta on posterior rim. In undissected animals (Fig. 4), the anteriormost of these branches (*x*) embraces the lateral branch of the anterior gonopod colpocoxite (*l*), and the posteriormost (*y*) fits lateral to the tenth leg coxa (the functional position of the third, basal branch [*z*] cannot be ascertained). Telopodites (*T9* on Figs. 3 and 4; Fig. 5) with three articles, the basal a ring-like trochanter (*tr*); second arched, heavily setose; third small, conical, lacking setae. Tenth legs (Fig. 3) with normal sternum; coxae (*cx10*) enlarged and lobed, in contact in midline, heavily sclerotized, with much-roughened cuticle, large coxal

glands (*cg*). Telopodites (*T10*) nearly identical to those of posterior gonopods (Fig. 6). Postgonopodal legs not modified. Color light brown, anterior segments mottled darker dorsally.

Paratype: Female, ca. 16.5 mm long, 1.4 mm wide. Antennal segment 3 0.5 mm long. Cyphopod (Fig. 7) with rather small receptacle (*r*), drawn out to a point between the valves; inner (*iv*) and outer valves (*ov*) both with posterior laminae (*b*) recurved anteriorly.

Remarks: While somewhat obscure, the relationships of the new family are postulated to be with a group of families that has been treated differently by myself (Shear, 1972, 1988) and Mauriès (1982, 1987). However, our disagreement is not great, centering around the recognition of Superfamily Brannerioidea as separate from, but probably the sister group to, Superfamily Cleidogonoidea. I postulate a separate Brannerioidea to include Branneriidae, Tingupidae (North America), Niponiosomatidae (Japan; Shear, 1988), Brachychaeteumatidae (Japan; including Macrochaeteumatidae as a synonym), Kashmireumatidae (Nepal, Viet Nam; including Vieteumatidae as a synonym [Shear, 1987]), and Peterjohnsiidae (Australia). Pending further study, the European families Chaemosomatidae and Acrochordidae may also belong here. Mauriès (1982, 1987) places all these families in a more inclusive Cleidogonoidea. However treated, the family Golovatchiidae must now be added to this list.

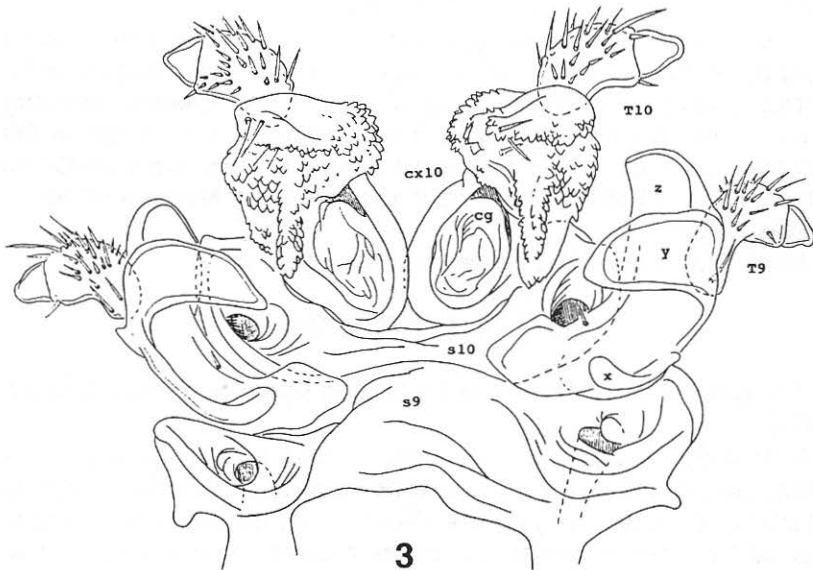


Fig. 3. *Golovatchia magda*, posterior gonopods and tenth legs, anterior view, 200X.

The socketed anterior gonopod telopodite of *Golovatchia magda*, with its clavate shape and small, terminal, second segment is less modified than the same structure in kashmireumatids, where the telopodite appears as a single, rod-like structure (Mauriès, 1982; Shear, 1987; Golovatch, 1984). In *Peterjohnsia* (Mauriès, 1987) the telopodite is slightly more reduced. In branneriids the telopodites (mistakenly called "lateral coxites" in Shear, 1972) are expanded and in contact in the midline, while the same structures in tingupids and niponiosomatids (Shear, 1981, 1988) are separated by true coxal elements.

The pattern of posterior gonopod structure is similar in all known forms of the superfamily — clearly a case of simple reduction to get the ninth legs "out of the way" of the functional anterior gonopods. In golovatchiids and kashmireumatids, coxites which seem to aid in supporting and orienting the anterior gonopods are present, but in branneriids, tingupids, niponiosomatids, and peterjohnsiids the ninth legs are simply very much reduced. In peterjohnsiids they have nearly disappeared, consisting only of a small, flattened coxosternum and very small single telopodite articles.

Reduction of the tenth legpair has taken place in several families and genera of chordeumatid millipeds, evidently as a convergent development. Among the brannerioid families, it is found in a rather similar form in *Golovatchia* and *Branneria*. Telopodite reduction is accompanied by the expansion of the coxae on the posterior surface, as if to protect and orient the coxal glands.

Presently there are no defined synapomorphies to unite the brannerioid families listed above; the retention of separate, sometimes articulated telopodites on the anterior gonopods is a primitive feature. More information is needed, particularly regarding the homologies of various gonopod elements. I might add in this connection that I now have less confidence than before in my own interpretations (Shear, 1972, etc.) and am beginning to lean toward the scheme presented by Mauriès in 1986.

Name: The species epithet *magda* refers to the type locality.

A NOTE ON HOFFMANEUMATIDAE

The figure numbers referred to in the following section are all from Golovatch (1978).

In his original description of *Hoffmaneuma exiguum*, the only known species of hoffmaneumatid, Golovatch (1978) erred in his interpretation of the highly complicated and tiny gonopods. Using material which he kindly donated to me, I carefully digested the gonopod complex with trypsin, mounted the parts temporarily on microscope slides, and studied them at high magnification (400–1000X) and Nomarski interference contrast. This treatment revealed that the gonopod complex

illustrated in posterior view in Golovatch's Fig. 15 actually consists of elements derived from three legpairs, not two, as confirmed by the presence of three pairs of tracheal apodemes. The articulated structures labeled "te" in Fig. 15, and shown separately in Fig. 14, are in fact legpair 10, not the posterior gonopod telopodites. Golovatch combined the real anterior and posterior gonopods into a single structure, and "anterior coxal processes" he described as being on the anterior gonopods (*acp* in Figs. 15 and 16) are in fact the telopodites of the posterior. Thus, his statement that coxal glands are present on legpair 10 actually refers to legpair 11.

The anterior gonopods consist only of the left half of Fig. 12, including the elements labeled *fl1*, *h*, and *pl*. The right half of this illustration shows the true posterior gonopods, including the elements labeled *fl2*, *al*, and *rd*.

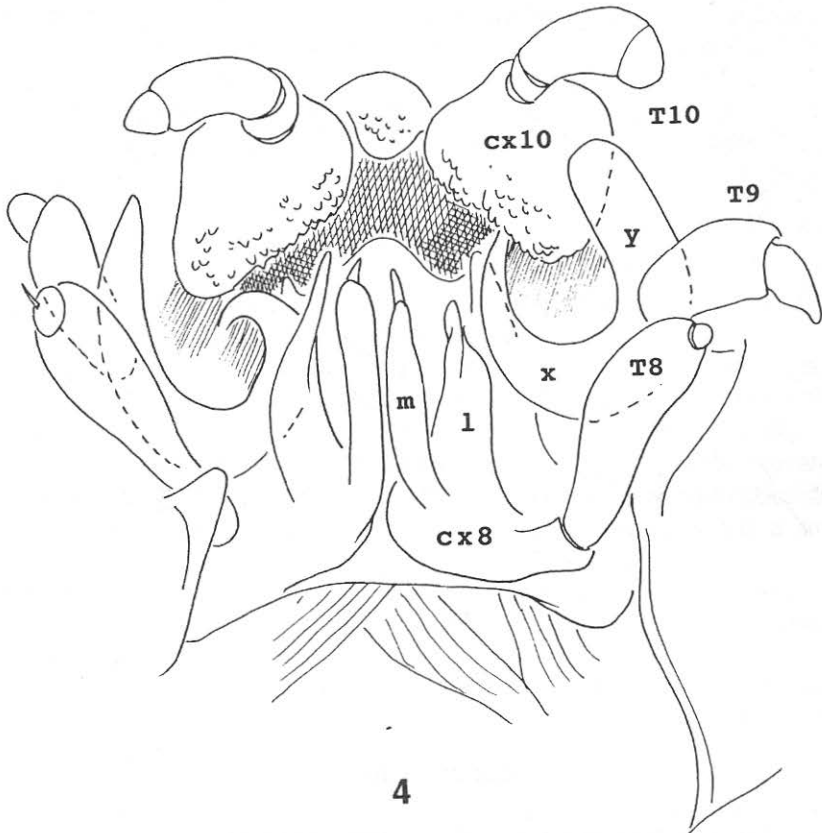
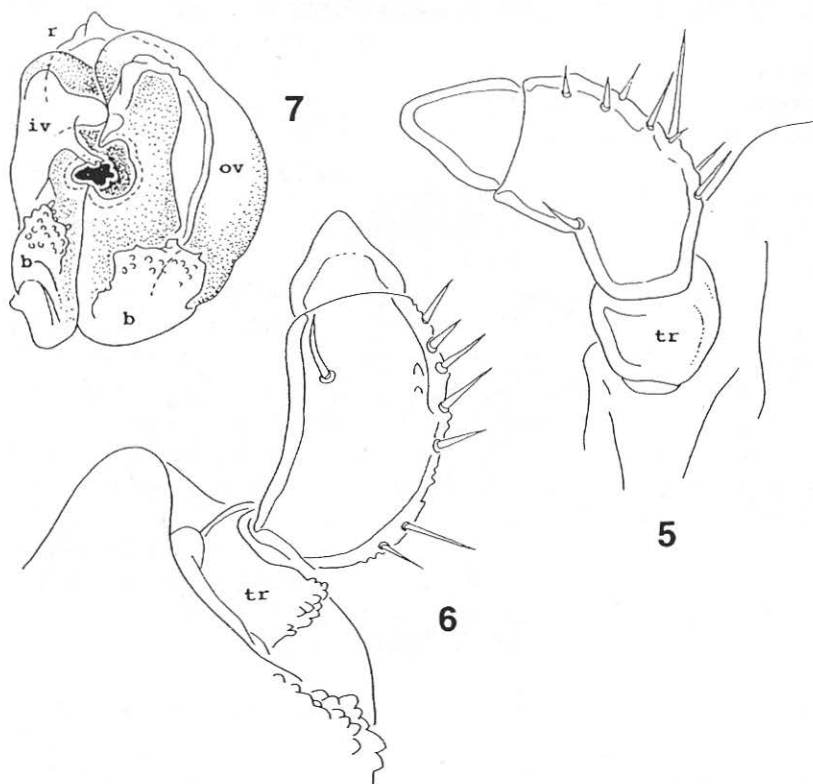


Fig. 4. *Golovatchia magda*, sketch of gonopod complex *in situ* in undissected male, 64X.

Each anterior gonopod has a long flagellum (*fl1*) which originates anteriobasally from the coxa. A lateral enveloping coxite or modified telopodite (*pl*) has a fimbriate rim and inner surface, and there is an inner coxal branch (*h*, Fig. 11) that is entirely fimbriate. The flagellum is sheathed by a mesal, anterior coxite which makes about three complete spiral turns from base to apex and ends with very complex details.

The posterior gonopod has an extremely long flagellum (*fl2*) arising from the coxa much more distally; it has a very thick, sharply curved base. The main coxite has an exceptionally complicated termination. A single-articled, rod-like telopodite is articulated on the anteriolateral coxal surface and is tipped with a small group of setae.



Golovatchia magda

Fig. 5. Left posterior gonopod telopodite, posterior view, 400X.

Fig. 6. Left tenth leg telopodite, posterior view, 400X.

Fig. 7. Left female genitalia, ventral view, 200X.

The tenth legs are as depicted in Fig. 14. The sternum is wide and band-like, with lateral serrate expansions, the coxa bears a clavate median lobe, and the telopodite is 3-articled, with the middle article much the largest. Legs 11 (Fig. 9) have coxal glands; legs 12 (fig. 10) mesal prefemoral hooks.

Long flagella on both gonopod pairs and the absence of the usual tarsal papillae link this family to the Mastigophorophyllidae, with many genera and species in the Balkans, Caucasus, and extending to northwestern Europe. *Hoffmaneuma exiguum* differs from any mastigophorophyllid in the reduction of legpair 10, in the presence in females of a normal second leg, and in the absence of a promentum. Golovatch suggested that the resemblances between *H. exiguum* and the mastigophorophyllids was due to convergence, citing the lack of a promentum in the former, as well as the absence of coxal glands on legpair 11. As demonstrated above, coxal glands are in fact present on legpair 11 (which Golovatch considered legpair 10). The absence of a promentum could be due to the very small size of *H. exiguum*; at only 6 mm in length it is one of the smallest chordeumatid millipeds. It seems at this time a reasonable hypothesis to consider Hoffmaneumatidae and Mastigophorophyllidae sister groups, united by the presence of a flagellum on both anterior and posterior gonopods.

LITERATURE CITED

- Golovatch, Sergei I., 1978. A new family of East-asiatic Chordeumida (Diplopoda). Zool. Zh. (Moscow), vol. 57, pp. 1008-1111 [in Russian].
- . 1980. New forms of Diplopoda from the Soviet Far East and their zoogeographical relationships. Zool. Zh. (Moscow), vol. 59, pp. 199-207 [in Russian].
- . 1983. Contributions to the milliped fauna of Vietnam (Diplopoda). I. Chordeumatida. Act. Zool. Acad. Sci. Hungar., vol. 29, pp. 123-127 [in Russian].
- Golovatch, S. I., & E. V. Mikhajlova, 1978. A new family of east-Palaeartic Chordeumida (Diplopoda), with a description of a new genus and a new species. Bull. Soc. Nat. Moscow, vol. 83, pp. 66-71 [in Russian].
- Mauriès, J.-P., 1982. Une famille nouvelle et deux genres nouveaux de Cleidogonoidea, avec notes sur la classification de la superfamille (Diplopoda, Craspedosomida). Steenstrupia, vol. 8, pp. 165-176.
- . 1986. Un diplopode cavernicole relictuel des Alpes calcaires suisses: *Niphatrogleuma wildbergi*, n. g., n. sp. (Craspedosomida, Cleidogonoidea). Rev. suisse Zool., vol. 93, pp. 249-256.
- . 1987. Craspedosomid millipedes discovered in Australia: *Reginaterreuma*, *Neocambrisoma* and *Peterjohnsia*, new genera (Myriapoda: Diplopoda: Craspedosomida). Mem. Queensland Mus., vol. 25, pp. 107-133.
- . 1988. Myriapodes du Népal. II. Diplopodes Craspedosomides nouveaux de

l'Himalaya et de la région indo-malaise (Craspedosomidea et Chordeumidea).

Rev. suisse Zool., vol. 95, pp. 3-49.

- Shear, William A., 1972. Studies in the milliped Order Chordeumida (Diplopoda): A revision of the Family Cleidogonidae and a reclassification of the Order Chordeumida in the New World. Bull. Mus. Comp. Zool., vol. 144, pp. 151-352.
- . 1981. The milliped Family Tingupidae (Diplopoda, Chordeumatida, Brannerioidea). Amer. Mus. Novitates, no. 2715, pp. 1-20.
- . 1987. Chordeumatid Diplopoda from the Nepal Himalayas, II. Courier Forsch.-Inst. Senckenberg, vol. 93, pp. 229-240.
- . 1988. Systematic position of the milliped Family Niponiosomatidae (Diplopoda, Chordeumatida, Brannerioidea). Myriapodologica, vol. 2, pp. 37-43.
- . 1990. On the Central and East Asian milliped Family Diplomaragnidae (Diplopoda, Chordeumatida, Diplomaragnoidea). Amer. Mus. Novitates, no. 2977, pp. 1-40.

Address of the author:

Dr. William A. Shear
Hampden-Sydney College
Hampden-Sydney, VA 23943, USA