NASA SP-7011 (58)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NASA Continuing Bibliographies are annotated and indexed compilations of abstracts of reports and journal articles on aerospace subjects. The subjects are selected for their relationship to current developments in the space program and in response to an established interest by the aerospace community. Continuing Bibliographies are updated periodically by supplements.

PUBLICATIONS IN THE CONTINUING BIBLIOGRAPHY PROGRAM

High Energy Propellants	NASA SP-7002
Lunar Surface Studies	NASA SP-7003
Communications Satellites	NASA SP-7004
Bibliographies on Aerospace Science	NASA SP-7006
Lasers and Masers	NASA SP-7009
Aerospace Medicine and Biology	NASA SP-7011
Planetary Atmospheres	NASA SP-7017
Lubrication, Corrosion and Wear	NASA SP-7020

This bibliography was prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by the Technical Information Services Company.

NASA SP-7011 (58)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during December, 1968

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. JANUARY 1969

This document is available from the Clearinghouse for Federal Scientific and Technical Information (CFSTI), Springfield, Virginia, 22151, for $3.00.

INTRODUCTION

Aerospace Medicine and Biology is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project of the Library of Congress (LC), the American Institute of Aeronautics and Astronautics (AIAA), and NASA. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

Each entry consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

a. NASA entries identified by their *STAR* accession numbers (N68-10000 series);
b. AIAA entries identified by their *IAA* accession numbers (A68-10000 series); and
c. LC entries identified by a number in the A68-80000 series.

Many of the abstracts included in this publication have been reproduced from those appearing in *STAR* and *IAA*. This procedure, adopted in the interests of economy and speed, has introduced some variation in size, style, and intensity of type.

AVAILABILITY OF DOCUMENTS

Availability of this Bibliography

Copies of *Aerospace Medicine and Biology* (NASA SP-7011) and its supplements are available to the public from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151, for $3 each. Copies are available on initial distribution without charge to the following:

1. NASA Offices, Centers, contractors, subcontractors, grantees, and consultants;
2. Other U.S. Government agencies and their contractors;
3. Libraries in the United States that have arrangements with NASA to maintain collections of NASA documents for public use;
4. Other organizations in the United States having a need for NASA documents in work related to the aerospace program; and
5. Foreign government or academic organizations that have established appropriate reciprocal arrangements with NASA.

Availability of NASA Documents

NASA documents are identified by an asterisk in the *STAR* Entries section. NASA documents that have been microfiched[1] (identified by the # sign in the *STAR* Entries section) are available on microfiche without charge to an organization eligible to receive *Aerospace Medicine and Biology* without charge.

Availability of Non-NASA Documents

Non-NASA documents are those documents that do not carry an asterisk in the citation. Department of Defense documents (identified by the "AD" number in the citation and indexes) are available, subject to a service charge, in hard copy or microfiche from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151. Microfiche copy of DOD reports will continue to be available to Defense Documentation Center users at no cost from the Defense Documentation Center, Cameron Station, Alexandria, Virginia 22314. National Lending Library (NLL) for Science and Technology translations are available from NLL at the price stipulated in the citation. Requests for purchase should be addressed to:

National Lending Library for Science and Technology
Boston Spa, Yorkshire, England.

Dissertations selected from Dissertation Abstracts are available in xerographic copy (HC) and on microfilm for sale from University Microfilms, Inc., Ann Arbor, Michigan, 48106. All requests should cite the author and Order Number as they appear in the citation. Note that the dissertations are provided on microfilm and not microfiche.

Other non-NASA documents are publicly available as indicated in the citation. Those documents which have been microfiched are available on microfiche without charge only to NASA Offices, Centers, contractors, subcontractors, and consultants.

How to Obtain Microfiche

If you are registered with NASA and eligible to receive reports as described above, send the completed *Document Request* (Facility Form 492) to:

NASA Scientific and Technical Information Facility
P.O. Box 33
College Park, Maryland 20740

(1) A microfiche is a transparent sheet of film, 105 x 148 mm in size, capable of containing up to 72 pages of information reduced to micro images (not to exceed 20:1 reduction).

If you are not registered with NASA and wish to receive information concerning registration, request *Registration Form—Technical Publications* (Facility Form 713) from the NASA Scientific and Technical Information Facility at the address given above. Others may obtain microfiche copies by purchase from:

Clearinghouse for Federal Scientific and Technical Information
(CFSTI)
Springfield, Virginia 22151

U.S. Government Sales Agencies

Publications with a CFSTI availability statement in the citation are sold in hard copy and microfiche copy by:

Clearinghouse for Federal Scientific and Technical Information
(CFSTI)
Springfield, Virginia 22151

The following unit price has been established by CFSTI: $3.00 for hard copy, $0.65 for microfiche.

Publications with a GPO availability statement in the citation are sold in hard copy by:

Superintendent of Documents, U.S. Government Printing Office (GPO)
Washington, D.C. 20402

NASA documents available from the GPO are also available from CFSTI at the GPO price given in the citation.

NOTE: Documents announced without specific availability statement may be requested from the issuing activity.

Bibliographic information, e.g., report number, etc., rather than the NASA accession number (i.e., N68-12345), should be provided when requesting a document from other than NASA.

***IAA* Entries**

All cited documents are available from the AIAA Technical Information Service as follows: Paper copies are available at $3.00 per document up to a maximum of 20 pages. The charge for each additional page is $0.25. Microfiche are available at the rate of $0.50 per microfiche for documents identified by the symbol # following the accession number. A number of publications, because of their special characteristics, are available only for reference in the AIAA Technical Information Service Library. Minimum air-mail postage to foreign countries is $1.00.

Please refer to the accession number, e.g., A68-13193, when requesting documents. Address all inquiries and requests to:

Technical Information Service
American Institute of Aeronautics and Astronautics, Inc.
750 Third Avenue, New York, N. Y. 10017

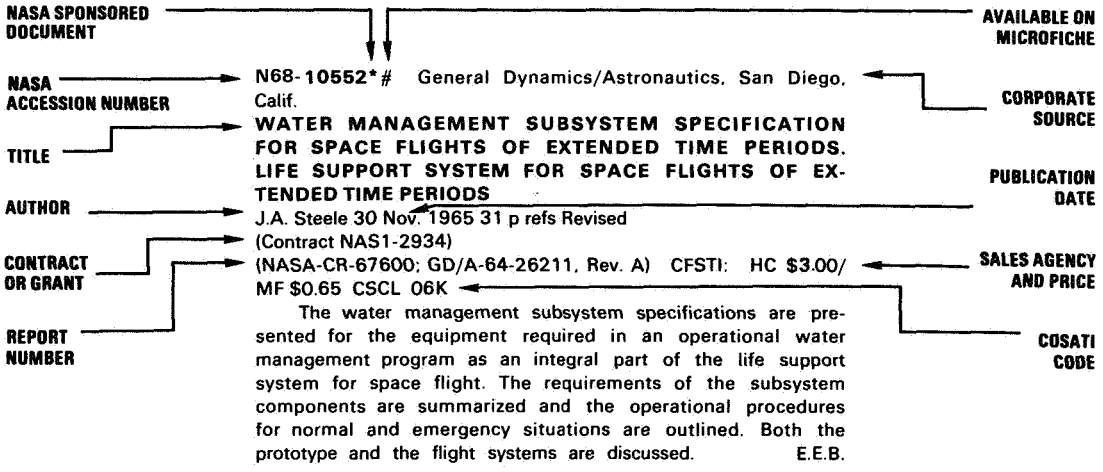
For further details please consult the *Introductions* to *STAR* and *IAA*, respectively.

L C Entries

Articles listed are available in the journals in which they appeared. They may be borrowed or consulted in libraries maintaining sets of these journals. In some instances, reprints may be available from the journal offices.

TABLE OF CONTENTS

TYPICAL CITATION AND ABSTRACT



AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography JANUARY 1969

STAR ENTRIES

N68-36017# Department of Transportation, Washington, D. C. Office of Aviation Medicine.
EFFECTS OF TWO ANTIHISTAMINE-CONTAINING COMPOUNDS UPON PERFORMANCE AT THREE ALTITUDES
E. Arnold Higgins, Audie W. Davis, Jr., Vincent Fiorica, P. F. lampietro, John A. Vaughan, et al Jun. 1968 17 p refs
(AM-68-15) CFSTI: HC$3.00/MF$0.65

In a study of 45 human subjects it was determined that a compound drug containing the antihistamine phenindamine did not statistically impair performance on a modified Mashburn coordinator. Another compound containing the antihistamine chlorpheniramine did impair performance. Performance was also impaired by increasing altitudes. The combined effects of the chlorpheniramine compound and increased altitude proved more detrimental to performance than the sum of the decrements that each influence caused when encountered separately. Although no significant performance decrement resulted from the administration of the phenindamine compound, undesirable side-effects were noted. Author

N68-36044 Stanford Univ., Calif.
THE THERMODYNAMIC THEORY OF THE ELECTROCAPILLARY CURVE INCLUDING A CONSIDERATION OF VARIATION WITH TEMPERATURE
Hayden Wayland Pitman, Jr. (Ph.D. Thesis) 1967 191 p
Available from Univ., Microfilms: HC $8.80/Microfilm $3.00 Order No. 67-17481

The thermodynamic theory of the electrocapillary curve is developed in a rigorous manner by application of the Gibbs adsorption theorem to the ideal polarized electrode, taking into account the electroneutrality conditions applying to the phase interiors and to the surface layer. A general and exact differential equation for the variation of surface tension is obtained in terms of an experimentally observable set of independent variables consisting of the following properties: temperature, pressure, the molalities of the components of the metallic and nonmetallic phases of the polarized electrode, and the applied EMF. From this equation exact expressions for the variation of the electrocapillary curve with each of these variables are set forth; one of the resulting expressions is the well-known Lippmann–Helmholtz equation relating the slope of the electrocapillary curve to the charge density of the double layer. Dissert. Abstr.

N68-36069 Florida State Univ., Tallahassee.
THE EFFECTS OF REPEATED LOW DOSE X-IRRADIATION ON DISCRIMINATION AND RADIOSENSITIVITY
James Michael Johnson (Ph.D. Thesis) 1967 110 p
Available from Univ. Microfilms: HC $5.40/Microfilm $3.00 Order No. 68-361

Twelve male albino rats were trained on a two bar discrimination task. They were required to emit a specified minimum number of responses to the left bar of a Skinner box and then one additional response to the right bar for each reinforcement obtained. Following initial training, the Ss were divided into four groups of three animals each. Each group was then exposed to Or (control), 7r (low), 14r (medium) or 21r (high) each day at the rate of 7r per minute. Employing the same discrimination task, behavioral assessments of the radiation effects were calculated for the days of stable responding on two different ratio requirements. Some of the conclusions were that an amount of radiation is less effective when delivered in fractionated doses than a dose of equal magnitude delivered in a single exposure. Also, a history of low-dose exposures sensitizes an animal to later high dose exposure. It makes him less able to sustain the radiation injury. Dissert. Abstr.

N68-36155# Toho Univ., Tokyo (Japan). Dept. of Physiology.
PHARMACOLOGICAL IMPROVEMENT OF CAPACITY OF PULMONARY CIRCULATION AT HIGH ALTITUDE Final Report, Apr. 1967–Apr. 1968
Kazuo Asahina APO San Francisco, Calif. Army Res. and Develop. Group (Far East) Jul. 1968 24 p
(Grant DA-CRD-AFE-S92-544-67-G77)
(ARDG(FE)-FE-348-2-F; FR-2; AD-673742)

The effect of ascorbic acid on increasing tolerance to hypoxia has been proved. The noticeable findings have been found in our experiments; (1) ascorbic acid moves from organs to blood in hypoxia and (2) the proportion of oxydized ascorbic acid is much larger in the heart than any other organs in hypoxia. The explanation for these findings have not yet been given. However, these results suggest that there may be some important relationship between ascorbic acid and heart activity which was proved in our previous experiments to be the most significant factor limiting the altitude tolerance. Author (TAB)

N68-36172*# General Dynamics/Convair, San Diego, Calif.
FEASIBILITY STUDY OF A CENTRIFUGE EXPERIMENT FOR THE APOLLO APPLICATIONS PROGRAM. VOLUME 4: MANNED CENTRIFUGE TEST REPORT Final Report
J. F. Brady et al 15 Aug. 1968 76 p refs
(Contract NAS1-7309)
(NASA-CR-66684; GD/C-DCL-68-004; SRC-MS-302) CFSTI: HC$3.00/MF$0.65 CSCL 06P

This study examines the application of an on-board centrifuge as a versatile research tool for the measurement of human physiological responses in the space environment. A realistic orbita' centrifuge is configured based on a specified series of experiment

dealing primarily with vestibular and cardiovascular physiology. Experiment feasibility is established in terms of spacecraft stability, reliability, safety, economics, weight, power and other influential factors. A ground based prototype of the orbital machine is defined and the required test prgram outlined. The effect of cross-coupled angular accelerations induced by the interaction of the astronaut/machine/vehicle motions is examined by a series of ground centrifuge tests with human subjects. Author

N68-36235# Technische Hochschule Munchen (West Germany).
PREPARATION AND REACTIONS OF C-PERFLUORALKYL-GLYCINE [DARSTELLUNG UND REAKTIONEN VON C-PERFLUORALKYL-GLYCINEN]
Walter Oettmeier (Ph.D. Thesis) 8 Jul. 1968 83 p refs In GERMAN
CFSTI: HC$3.00/MF$0.65

Free 2, 2, 2 trihalogen N acyl acetaldimines were prepared from 1, 2, 2, 2 tetrahalogen N acyl ethylamines through separation of hydrogen halide with triethylamine in absolute tetrahydrofuran under nitrogen. Also obtained were 3, 3, 3 trifluor 2 aminopropion acid (trifluoralanine), 3, 3, 4, 4, 4 pentafluor 2 aminobutyric acid, and 3, 3, 4, 4, 5, 5, 5 heptafluor 2 aminovalerian acid (heptafluornorvaline) in racemic form by means of addition reactions of vinylmagnesium bromide with N-acylaldimines, oxidation of the vinyl group to the carboxyl group, and separation of the acyl rest. Similarly and starting with hexafluorglutar acid dichloride, the preparation of 3, 3, 4, 4, 5, 5 hexafluor-2, 6 dibenzaminopimeline acid was accomplished. The synthesis of 3, 3, 3, trichloro 2 aminopropion acid (trichloroalanine) was identical with that of trifluoralanine. The chemistry of the trifluoralanine was investigated as an example of the reactions of the C-perfluoralkylglycines. Normal acylation and esterization were possible, and the formation of a crystalline dicyclohexylammonium salt resulted. Transl. by K.W.

N68-36248# Joint Publications Research Service, New York.
PROBLEMS OF SPACE RESEARCH INVESTIGATED
18 Sep. 1968 23 p Transl. into ENGLISH from Nauk i Zhizn' (Moscow), no. 3, 1968 p 25–29, 110–111
(JPRS-46446) CFSTI: HC$3.00/MF$0.65

CONTENTS:

N68-36249# Joint Publications Research Service, New York.
SCIENTIST REVIEWS PROBLEMS OF SPACE PSYCHOLOGY
V. Lebedev *In its* Probl. of Space Res. Invest. 18 Sep. 1968 p 1–12 (See N68-36248 23-04)

Psychophysiological factors affecting interplanetary spacecrews are reviewed. The electromagnetic field influence on mental processes is examined, and it is hypothesized that a system of bioelectrical potentials, located on body surfaces, interacts with the earth's magnetic field. A general physiological mechanism of a conditioned time reflex (biological clock) is considered in terms of the effect of the pulsating geomagnetic field. An understanding of these phenomena is necessary to explain the effects of the absence or variations of terrestrial magnetism on the processes of cosmonauts. An evaluation of the periodical rhythm of plant and animal life activities and its interruption led to the conclusion that a sound rhythm activity must be established for crew members to maintain high operational capabilities and to raise the reliability of man–automaton system. B.P.

N68-36304 Michigan Univ., Ann Arbor.
MEASURING HUMAN PERFORMANCE WITH A PARAMETER TRACKING VERSION OF THE CROSSOVER MODEL
Glenn Alben Jackson (Ph.D. Thesis) 1967 252 p
Available from Univ. Microfilms: HC $11.50/Microfilm $3.25 Order No. 67-17783

The purpose of this research is the evaluation of a particular parameter tracking system for use in measuring the performance of human operators in low order compensatory manual control systems. The system is based on a proposed crossover model which assumes that the entire forward loop of the compensatory control system can be represented by a gain, an integration and a pure time-delay. A continuous parameter tracking system is developed using an approximate version of the crossover model as the basic system model. The approximation involves the use of a first order Padé time-delay in place of the pure time-delay. The parameter tracking system is tested on subjects controlling single and double integrator plants, with input signals of bandwidth limited Gaussian noise. It is concluded that, as long as the input bandwidth is properly chosen, the parameter tracking system developed is an excellent method for measuring human performance in certain low order compensatory control systems. Dissert. Abstr.

N68-36316*# Techtran Corp., Glen Burnie, Md.
ON PERCEPTION AND MEASUREMENT OF SOUND LEVEL [UBER EMPFINPUNG UND MESSUNG DER LAUTSTARKE]
Ulrich Steudel Washington NASA Sep. 1968 28 p refs Transl. into ENGLISH from Hochfrequenztech. u Elektroakust. (Leipzig), v. 41, 1933 p 116–128
(Contract NASw-1695)
(NASA-TT-F-11926) CFSTI: HC$3.00/MF$0.65 CSCL 05E

Initially are measured the sound levels of many-fold noises, generally clicks, both single and periodic, either directly through comparison with a 1,000-c/s tone or by the intermediary of another calibrated comparison noise. From the entirety of the measurements, conclusions are then drawn which have as most important result the establishment of a new sound-level formula which furnishes satisfactory approximation values. The formula can also be expanded to noises and tones. The second part indicates an objective sound-level meter and the development of its individual components, which is capable of accurately measuring any sound, even individual clicks. Author

N68-36318*# Aztec School of Languages, Inc., Acton, Mass.
EFFECT OF GAMMA-RADIATION FROM COBALT-60 ON THE PROCESS OF OVULATION, FERTILIZATION, AND EMBRYONIC DEVELOPMENT OF A FROG [VLIYANIYE GAMMA-IZLUCHENIY CO 60 NA PROTSESS OVULYATSII, OPLODOTVORENIYE I EMBRIONAL'NOYE RAZVITIYE LYAGUSHKI]
A. V. Voyno–Yasenetskiy Washington NASA Oct. 1968 5 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 100, no. 2, 1955 p 389–391
(Contract NASw-1692)
(NASA-TT-F-11966) CFSTI: HC$3.00/MF$0.65 CSCL 06R

The paper discusses the effect of penetrating radiation from cobalt-60 on the ovulation, fertilization, and embryonic development of a frog. Particular significance is given to the role of the pituitary gland of the mother organism. It is established that the embryonic development of a frog is particularly affected by irradiation both of the females and of the males. Author

N68-36356*# Institute of Modern Languages, Inc., Washington, D. C.
LOWER-BODY DECOMPRESSION FOR THE TREATMENT OF LUNG EDEMA

A. Buhlman NASA Aug. 1968 2 p ref Transl. into ENGLISH from Schweiz. Med. Wochschr. (Basel), v. 98, no. 23, 1968 p 972–973
(Contract NASw-1693)
(NASA-TT-F-11903) CFSTI: HC$3.00/MF$0.65 CSCL 06S

Effect of lower body decompression on blood pressure and lung capacity was studied in five patients who exhibited lung congestion. The body below the diaphragm was enclosed in a plastic bag connected to a common suction pump and a water manometer. Within 15 sec of exposure to pressures of 14 to 30 mm Hg, there was a clearly defined pressure decrease in the lung capillaries and the pulmonary artery. Pressure in the right auricle decreased slightly, pulse rate remained almost constant, and peripheral blood pressure dropped slightly. Elimination of decompression immediately restored lung circulation. It was found that lower body compression with a negative pressure of 40 to 60 mm Hg affected diaphragm mobility and resulted in a deterioration of ventilation. M.W.R.

N68-36400# City Univ. of New York. Center for Research in Cognition and Affect.
DETECTION OF AN AMBIGUOUS VISUAL SIGNAL WHILE IMAGING Final Report, Oct. 1967–Jun. 1968
Sydney Joelson Segal Jul. 1968 37 p refs
(Contract F44620-68-C-0013)
(AFOSR-68-1622; AD-673516)

The experiments reported used a simple discrimination task as a baseline, against which to compare the effects of discrimination and imaging. In all the experiments, imaging plus discrimination and discrimination tasks differed significantly in d, regardless of order of presentation, nature of the stimuli, information and familiarity with the stimuli. The d scores for imaging tasks under several conditions were .74, 1.36, 1.61, 1.77, 1.94, and 2.03; for comparable discrimination tasks, d scores were 2.19, 2.68, and 2.71. Response bias (Lx) was also generally higher for imaging, indicating a more conservative criterion. Author (TAB)

N68-36442# Air Force Missile Development Center, Holloman AFB, N. Mex.
A DESCRIPTION AND EVALUATION OF ELECTROENCEPHALOGRAPHIC ANALYSIS TECHNIQUES Technical Report, Mar.–Jul. 1967
Charles E. Todd Sep. 1967 48 p refs
(MDC-TR-67-106; AD-673890)

The report describes and evaluates the data processing procedures and techniques used to qualify and to quantify physiological impairment associated with prolonged sleep deprivation as evidenced by the electroencephalogram. The primary compression of the data was accomplished by computing the power spectra of selected time intervals using digital filters. Consecutive spectral estimates were then used to describe a surface which was contoured and plotted for display. The evaluation of the processing procedures shows the final spectral estimate error to be thirty to fifty per cent of the ideal spectra as a result of a ten to fifteen per cent error in the quantized data being propagated through the digital filters. The data characteristics were determined by autocorrelation and associated statistical functions and the data reduction systems response to these characteristics was investigated. The properties of the data and the limitations of the techniques discussed suggest the need for improved methods for studying the EEG. Author (TAB)

N68-36455# Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
BIOLOGICAL INDICATORS OF ENVIRONMENTAL RADIOACTIVITY
R. S. Harvey 3 Jan. 1968 9 p refs Presented at the Health Phys. Soc. Symp. on Environ. Surveillance in the Vicinity of Nucl. Facilities, Augusta, 24–25 Jan. 1968
(Contract AT(07-2)-1)
(DP-MS-67-99; CONF-680108-11) CFSTI: HC$3.00/MF$0.65

Monitoring the uptake of radionuclides by biota in the environs of a nuclear facility is an important part of environmental surveillance because many of these organisms may be in the food web of man. Although each new facility must develop a monitoring program to suit the nature of its releases and its environment, much use can be made of radioecological data developed at exiting facilities to determine the kinds of organisms that should be samples. Criteria are discussed for the selection and use of specific organisms to indicate the radionuclide content in various segments of man's food web in the environs of the Savannah River Plant. Author (NSA)

N68-36457*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
USE OF AN ELECTROLUMINESCENT DISPLAY IN MANUAL TRACKING AND IN A READING TASK
Frank Neuman and John D. Foster Washington Oct. 1968 22 p refs
(NASA-TN-D-4841) CFSTI: HC$3.00/MF$0.65 CSCL 05H

The purpose of this research was to determine whether performance differences existed between electromechanical and electroluminescent (EL) displays in a closed loop manual tracking task and in reading accuracy tests. Both displays had vertical scales, which are considered acceptable for spacecraft use. Studies were made with two EL displays, a single-scale, and a double-scale bargraph display. Pursuit tracking of sine and random waves and readability tests were conducted. The double scale instrument was used in the tracking tasks and the single scale instrument in the readability tests. The discreteness of the EL instrument's 128 vertical scale segments (12.6/cm) did not appear to cause any problems in either task. In the tracking tasks, the electroluminescent instruments were comparable to the electromechanical instruments in the region of their flat frequency response. In the readability tests, in which the environmental illumination was changed, readability of the EL instruments reduced rapidly with increasing environmental illumination above 550 lumens/m^2. However, at the low ambient light conditions expected in a spacecraft environment, less than 1 lumen/m^2, the readability was adequate. Author

N68-36461*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A SYNTHESIS OF HUMAN RESPONSE IN CLOSED-LOOP TRACKING TASKS
James J. Adams and Hugh P. Bergeron Washington Oct. 1968 35 p refs
(NASA-TN-D-4842) CFSTI: HC$3.00/MF$0.65 CSCL 05H

Experiments have been conducted to determine the variability in a human subject's control stick response to the stimulus of displayed displacement and of rate of change of displacement to aid in the implementation of the time variations to be included in a linear model of the human subject. Additional tracking tests were made to obtain a definition of the characteristics of the random signal to be added to the model. These two factors, the time variations and the random signal, were then added to the linear model, and the resulting composite model was placed in analog representations of single loop and multiloop systems. The results demonstrate that this composite model reproduces the dynamic characteristics of the time histories and mean square system error which more closely match the response obtained with the human subject than does the linear model. Author

N68-36472# Brookhaven National Lab., Upton, N. Y. Medical Research Center.

INFLUENCE OF EXTRACORPOREAL IRRADIATION OF THE BLOOD AND LYMPH ON LYMPHOPOIESIS AND IMMUNITY

Eugene P. Cronkite, Arjun D. Chanana, Darrel D. Joel, Kanti R. Rai, and Lewis M. Schiffer 25 Mar. 1968 25 p refs Presented at the IAEA Symp. on the Effects of Radiation on Cellular Proliferation and Differation, Monaco, 1–5 Apr. 1968 Sponsored by AEC

(BNL-12300; SM-103/18; CONF-680413-1) CFSTI: HC $3.00/MF $0.65

The theoretical and practical aspects of extracorporeal irradiation of blood and lymph are reviewed. The following studies are included: size of intravascular and extravascular pools of lymphocytes; average time spent by lymphocytes in blood; rate of mobilization of lymphocytes from tissue; lymphocyte production rates; function of lymphocytes; comparison of preceding variables in leukemic and normal animals of the same species; factors controlling lymphopoiesis; role of the lymphocyte in immunologic processes; and as a possible adjunct to aid in the allotransplantation of tissues and organs. This technique is extremely useful in delineating basic lymphocyte physiology and immunology and is a powerful tool for the investigation, either alone or in conjunction with cell labeling studies, of normal and leukemic kinetics. NSA

N68-36484# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

AN EXPERIMENTAL INVESTIGATION OF THE SELF ADAPTION FUNCTIONS OF THE HUMAN OPERATOR [EKSPERIMENTAL'NOYE ISSLEDOVANIYE FUNKTSIY SAMONASTROYKI CHELOVEKA-OPERATORA]

G. A. Sergeyev 18 Sep. 1967 24 p refs Transl. into ENGLISH from Samoobuchayushchiyesya Avtomat. Sistemy (USSR), 1966 p 222–232

(FTD-HT-67-337; AD-673784)

The work examines results of experimental studies of the self-adjusting functions of human operators working at consoles under the effect of nonsteady input signals. The following were investigated: The effectiveness indexes of operator self-adjustment function; The structure of informational elements comprising the cybernetic model of the human operator; and Qualitative characteristics necessary for mathematical and physical simulation of self-adjusting systems. An automatic stochastic regulator system operating under the effect of random input signals was the general model used for output signal analysis. Author (TAB)

N68-36545*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

STATUS REPORT ON RECENT LANGLEY STUDIES OF LUNAR AND SPACE STATION SELF-LOCOMOTION

Donald E. Hewes Washington Oct. 1967 21 p refs Presented at AGARD 24th Aerospace Med. Panel Meeting, Brussels, 24–27 Oct. 1967

(NASA-TM-X-60686) CFSTI: HC $3.00/MF $0.65 CSCL 05E

Reduced gravity simulators are described which permit the subjects to experience the sensations and physical effects produced by space environments. The lunar locomotion studies are being made on an inclined-plane technique developed for simulating lunar gravity. It was observed that significant differences between earth and lunar locomotive gait characteristics exist, and that a gravity level equal to that of the moon had a favorable effect on these locomotive capabilities. The space station studies utilize a simulator capable of rotation which together with the inclined-plane technique adapted from the Lunar Walking Simulator can provide weightless and rotational conditions. Subjects could initiate and sustain a walk at gravity levels below 0.2 times earth's gravity. In addition to walking, "space soaring" could be employed under these conditions. K.W.

N68-36566*# McDonnell-Douglas Corp., Huntington Beach, Calif. Missile and Space Systems Div.

EVAPORATIVE COOLING GARMENT SYSTEM (ECGS), PART 1 Final Report

J. G. Bitterly Sep. 1968 186 p

(Contract NAS9-7207)

(NASA-CR-92332; MDAC-62364, Pt. 1) CFSTI: HC $3.00/MF $0.65 CSCL 06K

An Evaporative Cooling Garment System (ECGS) demonstrated high cooling rates during simulated 4-hour heavy work load extravehicular activity. Short run cooling rates exceeded 7,000 Btu/hr, with maximum cooling rates instigated in less than 1 sec. Cooling duration was limited only by the cardiovascular system's ability to transmit internal body heat via the capillaries to the skin surface. Heat rejection rates were controlled to less than 1%, and 1,500 Btu/hr of heat rate were stored within the ECGS patches as water. The ECGS displayed mobility limits comparable to that for the full pressure suit, wearing comfort was adequate during long-duration running speeds on a treadmill, and cooling up to 5,000 Btu/hr metabolic rate carried to the limit of human endurance resulted in a no measurable body sweating and maintained thermal equilibrium. The ECGS operates by conducting body heat through a thin membrane that completely encloses a wick water supply, which undergoes low pressure boiloff. M.W.R.

N68-36567*# McDonnell-Douglas Co., Huntington Beach, Calif. Missile and Space Systems Div.

EVAPORATIVE COOLING GARMENT SYSTEM (ECGS), PART 2 Final Report

J. G. Bitterly Sep. 1968 252 p refs

(Contract NAS9-7207)

(NASA-CR-92333; MDAC-62367, Pt. 2) CFSTI: $3.00 CSCL 06K

Details are presented for the various analyses conducted in connection with the testing of an Evaporative Cooling Garment System (ECGS). The ECGS performance and steam line analysis is presented along with the boiler void pressure drop analysis and the steam line pressure drop effects on overall system performance. Biochemical responses to exercise are discussed. Complete data results on a typical design verification test run are presented in the form of 176 graphs. The patterns used for the patches on the ECGS are included. M.W.R.

N68-36568*# Mayo Association, Rochester, Minn.

STUDIES OF THE EFFECTS OF GRAVITATIONAL AND INERTIAL FORCES ON CARDIOVASCULAR AND RESPIRATORY DYNAMICS Semiannual Status Report, Period Ending 1 Oct. 1968

Earl H. Wood 1 Oct. 1968 22 p refs

(Grant NsG-327)

(NASA-CR-97192) CFSTI: HC $3.00/MF $0.65 CSCL 06S

Biplane roentgen videometry for dynamic studies of the size and shape cardiac chambers was developed, along with computer methods for two and three dimensional dynamic and stop motion displays of the data obtained. Other projects to study the effects of the gravitational-inertial force environment on the cardiopulmonary system of animals are underway. Hydraulic properties of the pleural space, regional differences in pleural and esophageal pressures in head-up and head-down positions, position dependent regional differences in pericardial pressure, and influence of body position on regional pulmonary arterial-venous shunts were investigated in dogs without thoractomies. Effect of gravitational and inertial forces on the regional distribution of pulmonary blood flow was studied in chimpanzees using a radioactive microsphere scintiscanning technique, and transient changes in stroke volume from the aortic pressure pulse were determined. Timing of left ventricular end-diastole was studied in dogs with chronic heart blocking. Low bandpass filters were designed for selective discrimination against high frequency noise to physiological signals. M.W.R.

N68-36571*# General American Transportation Corp., Niles, Ill. General American Research Div.

STUDY FOR EVALUATION OF INCINERATION AND MICROWAVE TREATMENT OF HUMAN FECAL MATTER FOR SPACECRAFT OPERATION

T. L. Hurley, E. J. Rollo, and G. A. Remus [1968] 71 p
(Contract NAS2-4438)
(NASA-CR-73247) CFSTI: HC$3.00/MF$0.65 CSCL 06K

Incineration and microwave treatment of human feces were studied; influence of pressure, oxygen concentration, temperature, and power level were evaluated; and concentration ranges and identities of the liquid, gaseous, and solid products were established. During incineration, gaseous products of complete oxidation were primarily carbon dioxide and some nitrogen; carbon monoxide, methane, and nitrogen oxides accounted for less than 0.1%. With incomplete oxidation, minor gas concentrations were as high as 20%. Water condensate in both complete and incomplete condensation was generally acidic, with a pH from 1 to 8; and the solid residue was grey-white ash. While the condensate and solid residue were generally sterile, there was bacterial growth in isolated cases that might have been externally introduced. Microwave treatment produced minimal amounts of carbon dioxide, carbon monoxide, methane, and hydrogen sulfide; and pressure affected the process only by lowering the water boiling point. Condensates escaping the reactor appeared sterile, but solid residues were sterile only with maximum boiling. M.W.R

N68-36572*# Presbyterian Medical Center, San Francisco, Calif. Inst. of Medical Sciences.

INVESTIGATION OF THE FEASIBILITY OF AN EXTERNAL BIOSENSOR FOR CONTINUOUS DETERMINATION OF BLOOD OXYGENATION (AND CONCOMITANT HEART RATE AND RESPIRATORY RATE) BASED UPON OPTICAL BACKSCATTER FOR USE IN SPACECRAFT AND AIRCRAFT Final Report, 24 Jun. 1964–1 Nov. 1965

Robert F. Shaw and Wali M. Malik 1 Nov. 1965 153 p refs
(Contract NAS9-2937)
(NASA-CR-92318) CFSTI: HC$3.00/MF$0.65 CSCL 06P

Spectrophotometric studies of whole blood indicated that optical backscatter could be used for measuring oxygen saturation of blood samples by implementing an optical geometry in which volume illuminated by the light source and blood volume viewed by the photometric sensor were congruent. Such a method was unsatisfactory for in-vivo measurements in humans and animals because of excessive signals that could not be separated from the signal-bearing photic energy returned from the blood. Signal-to-noise ratio was found to be approximately 1:7. Non-congruent external backscatter mode transducers, however, demonstrated sufficient sensitivity and signal-to-noise characteristics necessary for an external biosensor. Variations in physical and optical coupling of the transducers to the subjects were the chief problem for both backscatter and transmissive external biosensors. External backscatter-mode biosensors were more flexible in terms of positioning and more comfortable than classical transmission-mode devices, but both the backscatter and classical modes exhibit the same perturbations in output caused by variations in pressure, position, and motion. M.W.R.

N68-36637# Howard Univ., Washington, D. C. Dept. of Biochemistry.

CHEMICAL EFFECTS OF IONIZING RADIATIONS ON THE INDIVIDUAL AMINO ACIDS WITHIN INTACT AND PURE PROTEIN MOLECULES Annual Progress Report, 1967–1968

Felix Friedberg 30 Nov. 1967 6 p refs
(Contract AT(30-1)-2735)
(NYO-2735-8) CFSTI: HC$3.00/MF$0.65

Progress is reported in studies on the effects of γ radiation on the induction of changes in the molecular weight of individual amino acids within intact and pure protein molecules. Exposure of native ribonuclease or lysozyme in the dry state in vacuo to γ radiation caused formation of higher molecular-weight components of the protein molecules but no evidence of degradation of protein molecules was observed. Exposure of alkylated form of rubonuclease or lysozyme to γ radiation caused formation of smaller molecular-weight components of the protein molecules. NSA

N68-36674 State Univ. of Iowa, Iowa City.

THE EFFECTS OF FOUR WEEKS OF CENTRIFUGATION ON CARDIOVASCULAR FUNCTION IN THE ALBINO RAT

Brian Russell Duling (Ph.D. Thesis) 1967 145 p
Available from Univ. Microfilms: HC $6.80/Microfilm $3.00 Order No. 67-16789

Male Simonsen albino rats weighing 260–300 g at the onset of exposure were centrifuged at 3.2 G's (36.1 rpm) for four weeks. After centrifugation the animals were removed and anaesthetized with sodium pentobarbital administered intraperitoneally. Measurements were made on: systemic blood pressure, resistance of the perfused hind end vascular bend, and the characteristics of vascular reflex control. Vascular reflex changes, in response to systemic pressure alterations induced by epinephrine or acetylcholine, were compared in 12 centrifuged and 12 noncentrifuged animals. Centrifuged rats exhibited a significantly greater alteration in peripheral resistance for a given change in systemic pressure. These results are discussed in terms of their implications with respect to the interaction between the inertial field and cardiovascular function. Dissert. Abstr.

N68-36681# Princeton Univ., N. J. Dept. of Psychology.

DISPOSITIONAL AND INDUCED INFORMATION PROCESSING STRUCTURES

Robert E. Lee, III (Ph.D. Thesis) Apr. 1968 145 p refs
(Contract Nonr-1858(12))
(TR-18; AD-673677)

In this investigation, short-term training sequences are used to systematically manipulate two major aspects of structural complexity: (1) the number of dimensions of information available to the individual; (2) the level of complexity with which these dimensions are integrated. Ss are 72 undergraduates differing in dispositional conceptual level. The specific experimental concern is the effect of these manipulations upon the ability of these Ss to generate and to entertain alternate perspectives when engaged in a complex problem-solving task. Both training sequence and dispositional conceptual level are found to significantly influence the extent to which the Ss generate alternate perspectives as a strategy of conflict resolution and decision making. However, openness to the perspectives of others is significantly influenced only by conceptual level. Author (TAB)

N68-36700 Baylor Univ., Waco, Tex.

THE EFFECTS OF STRESS OF HUMAN PERFORMANCE OF A TWO COMPONENT TASK

Paul Daniel Jacobs (Ph.D. Thesis) 1967 98 p
Available from Univ. Microfilms: HC $5.00/Microfilm $3.00 Order No. 67-17876

Thirty-six human subjects, eighteen males and eighteen females were employed in an investigation of the effects of stress on the performance of continuous and discrete avoidance tasks. The subjects, all volunteers, monitored two visual displays while the three treatment conditions were presented for fifteen minutes each. The treatments consisted of a no-stress condition, a task-related stress condition, and a task-unrelated stress condition. The stressor used in this study was mild electric shock which the subjects reported as being unpleasant but not painful. The dependent variables were simple reaction time, number of cumulative responses, and cumulative response errors (overestimations of continuous avoidance interval). The results indicate that simple reaction time is faster during the task related stress condition than during the other two conditions. No differences in reaction time performance were found

between the time intervals when the effects of stress were held constant. Dissert. Abstr.

N68-36719# Brookhaven National Lab., Upton, N. Y.
RELATION OF IRRADIATION DOSE-RATE EFFECTS IN MAMMALS AND IN MAMMALIAN CELLS
J. L. Bateman [1968] 20 p refs Presented at the Symp. on Dose Rate in Mammalian Radiation Biology, Oak Ridge, Tenn.
(BNL-12581; CONF-680410-4) CFSTI: HC $3.00/MF $0.65

Data of other investigators were utilized to derive and present certain features of mammalian cell and animal survival after exposure to ionizing radiations. Survival of cells tends, as it decreases, towards an exponential relation to dose. The dose to produce a constant level of survival tends, with decreasing survival, towards a linear relation to the reciprocal cube root of dose rate. Survival of small mammals, expressed in probits, appears to be linear on reciprocal dose. Regressions for various dose rates appear to be parallel. The dose to produce 50% survival bears a linear relation to the reciprocal cube root of dose rate. Species specificity appears to be expressed for animals by different slope constants (K) relating the LD_{50} to the reciprocal cube root of dose rate. Strain specificity appears to be characterized within one species by the infinite dose rate intercept of the extrapolated straight best fit line of LD_{50} on the reciprocal cube root of dose rate. NSA

N68-36748*# Tracerlab., Inc., Richmond, Calif.
RADIO-FREQUENCY PLASMA AND HEAT TREATMENT OF HUMAN FECAL MATTER
Merle M. Millard and Bill B. Stafford Aug. 1968 20 p refs
(Contract NAS2-4702)
(NASA-CR-73249) CFSTI: HC $3.00/MF $0.65 CSCL 06K

Laboratory studies were made to determine the feasibility of adapting the radio-frequency electrodeless discharge method for low temperature ashing of human fecal matter on-board space vehicles. The process assures 100 percent reduction of organic wastes to inorganic forms. The tests were conducted in a 1.5 liter plasma reactor chamber using oxygen, carbon dioxide, hydrogen, water and a carbon dioxide-hydrogen-water mixture. The effects of treatment gas, discharge power, and gas pressure were studied during low temperature plasma ashing of 'normal' fecal material. Author

N68-36749*# Public Health Service, Phoenix, Ariz. Planetary Quarantine Unit.
SERVICES PROVIDED IN SUPPORT OF THE PLANETARY QUARANTINE REQUIREMENTS OF NASA Progress Report, 1 Jul.–30 Sep. 1968
M. S. Favero Sep. 1968 28 p
(NASA Order R-137)
(NASA-CR-97152; Rept.-23) CFSTI: HC $3.00/MF $0.65 CSCL 06M

Studies were continued on the evaluation of the vacuum probe for sampling surface contamination. The probe technique was compared with the standard strip assay procedure for recovering *Bacillus subtilis* var. *niger* spores and naturally occurring microorganisms in dust from stainless steel strips. The dust was prepared by sifting a fresh soil sample, collecting the fraction that passed a 125 μ screen, and drying this fraction at 50 C for 48 hours to reduce the vegetative microbial population. A summary of all comparisons made to date is presented. Although no explanation can be offered for the differences in recovery rates for the three sets of experiments, all rates were considered relatively high compared with those achieved with other sampling procedures currently in use. The relatively good agreement between the coefficients of variation for the probe and the standard strip assay procedure in each set suggested that the probe accurately reflected the inherent variation in the deposition of fallout contamination. Author

N68-36755*# Institute of Modern Languages, Inc., Washington, D. C.
PULMONARY EDEMA IN UREMIA [LUNGENOEDEM BIE URAEMIE]
A. Buhlman NASA Aug. 1968 2 p ref Transl. into ENGLISH from Schweiz. Med. Wochschr. (Basel), v. 98, no. 23, 1968 p 872–873
(Contract NASw-1693)
(NASA-TT-F-11904) CFSTI: HC $3.00/MF $0.65 CSCL 06P

Pulmonary edema can be a complication of acutely worsening uremia. The mechanism of its origin is complex and obscure. The author measured the circulation pressure of 7 uremia patients with roentgenological symbols. In 5 cases a slightly increased median pressure of 20 to 30 mm Hg was found, while pressure in the right auricle was normal, which is the argument against over-hydration as a causative factor. No decrease of pressure was found after peritoneal or hemodialysis respectively. The author interpreted these findings as left cardiac insufficiency. Roentgenologically, 5 out of 5 patients also showed a considerable enlargement of the heart as well as circulatory hypertomia. Author

N68-36759# Johns Hopkins Univ., Baltimore, Md. Dept. of Biochemistry.
ON EFFECTS OF ULTRAVIOLET RADIATION ON NUCLEIC ACIDS AND RELATED COMPOUNDS Progress Report, Dec. 1, 1964–Nov. 31, 1967
Shih Yi Wang Sep. 1967 18 p
(Contract AF(30-1)-2798)
(NYO-2798-32) CFSTI: HC $3.00/MF $0.65

Ultraviolet radiation effects on nucleic acids and related compounds were investigated. Radio-induced formation of cyclobutyl dimers and thymine products in deoxyribonucleic acid was studied, as were the mechanisms of photochemical reactions in pyrimidines. Photochemistry of derivatives of 5-bromo-uracil and thymine in aqueous solutions was studied. NSA

N68-36760# Atomic Energy of Canada, Ltd., Chalk River (Ontario).
TABLES OF BETA DOSE DISTRIBUTIONS
William G. Cross Nov. 1967 32 p refs
(AECL-2793) CFSTI: HC $3.00/MF $0.65

Tables are given of dose distributions near isotropic point and plane beta sources in air and water for 37 nuclides of importance in medicine and health physics. These were calculated from Spencer's dose distribution tables for monoenergetic electrons. A simple method is given for deriving dose distributions in other low-Z media. Author (NSA)

N68-36766# Sensory Systems Lab., Tucson, Ariz.
EXPERIMENTAL STUDIES ON ECHOLOCATION MECHANISMS IN BATS Final Report, Jul. 1965–Jul. 1967
Frederic A. Wesbter and Oliver G. Brazier May 1968 165 p refs
(Contract AF 33(615)-2964)
(AMRL-TR-67-192; AD-673373)

Comparative pursuit studies carried out on three species (Myotis lucifugus, Eptesicus fuscus and Lasiurus borealis) revealed similar tactics of pursuit and capture in Myotis and Eptesicus. Detection and localization capacities of Eptesicus appeared equal to the other species, but discrimination between spheres and mealworms proved highly variable, and the capacity to capture small targets inferior. Though the measured pursuit signals of the three species had definable differences, the phases of pursuit exhibited common characteristics, adequate for real-time machine identification, and thus usable for pursuit-controlled triggering of stimuli or recording equipment. Echoes returned by objects discriminated by bats have been studied by oscilloscope and human listening. Due to the number of relatively nonfluctuating echoes

from mealworms (projected into a sound field of ultrasonic pulses), other details must provide essential clues for the bats observed discriminations. Author (TAB)

N68-36808 California Univ., Los Angeles.
CHOICE REACTION TIMES AND CONFIDENCE IN AUDITORY SIGNAL DETECTION
James Mitchell Smith (Ph.D. Thesis) 1967 318 p
Available from Univ. Microfilms: HC $14.40/Microfilm $4.10 Order No. 68-240

Two preliminary studies and one main study were run using a modified Yes–No procedure in which trial pacing and duration of the stimulus presentation were subject-determined. Subjects initiated stimuli presented on trials and terminated them by making choices as to which stimuli were being presented. The time between onset of a stimulus presentation and its termination, that is, onset of the choice, constituted the choice reaction time for that trial. On each trial, the stimulus presented was either white noise alone (No Tone) or white noise with a 1000 cps tone added (Tone) and the choice made was either a Yes or a No. After his choice, the subject received feedback as to whether or not he was correct. In the second study each subject also indicated his confidence (High, Medium, or Low) in his choice prior to feedback. In the main study, in which confidence was also recorded, 6 paid subjects were run for an extended number of sessions under each of three probability conditions (.2, .5, and .8) for a Tone trial. Dissert. Abstr.

N68-36817# School of Aerospace Medicine, Brooks AFB, Tex.
RELATION OF SIGNAL LIGHT INTENSITY TO PHYSIOLOGIC END POINTS DURING $+G_z$ ACCELERATION Final Report, Apr.–Oct. 1967
James D. Rogge May 1968 14 p refs
(SAM-TR-68-38; AD-673480)

Results of previous studies suggest that lowering the luminance of the signal lights lowers the blackout and grayout level during +Gz acceleration. In this study, variations in luminance of the central and peripheral signal lights in the range that is suitable for routine centrifuge operation failed to produce any detectable change in blackout or grayout levels. The visual phenomena described in the previous studies may have arisen mainly from such local changes in the eye as changes in visual threshold, retinal metabolism, and visual acuity; whereas, blackout obtained with light intensities used in this study resulted from hemodynamic changes caused by +Gz acceleration and possibly some local changes in the eye itself. Author (TAB)

N68-36850# Rochester Univ., N. Y. Dept. of Radiation, Biology and Biophysics.
BIOLOGIC EFFECTS OF MICROWAVE EXPOSURE Final Report
Sol M. Michaelson, Roderick A. E. Thomson, and Joe W. Howland 25 Jul. 1967 131 p refs
(Contracts AF 30(602)-2248; W-7401-eng-49)
(UR-49-810) CFSTI: HC $3.00/MF $0.65

Animals exposed to microwaves at specific frequencies and flux densities experienced thermal stress. Duration of exposure, environmental temperature, and drugs that affect the central nervous system (CNS) and temperature regulation influenced the response of animals. High ambient temperature exaggerated the thermal response, while exposure in a cold environment prolonged the time interval for an increase in body temperature. Microwave effects on hematopoiesis, thyroid function and interaction with ionizing radiation are discussed. Sufficient data were not available to establish a comprehensive safe level for microwave exposure because of microwave frequency related factors that affect biologic response. The subtle nature of some of our findings such as modification of response to x-irradiation and effect on bone marrow and thyroid require careful evaluation. Soviet reports alluded to asthenic reactions, CNS, cardiovascular, and thyroid changes from radar exposure. NSA

N68-36873# Rochester Univ., N. Y. Dept. of Radiation, Biology and Biophysics.
COMPUTER CONTROL OF BEHAVIORAL EXPERIMENTS
Louis Siegel 27 Jul. 1967 11 p Presented at the Am. Psychological Assoc. Meeting, Washington, D. C., 3 Sep. 1967
(Contract W-7405-ENG-49)
(UR-49-814; CONF-670918-1) CFSTI: HC $3.00/MF $0.65

It is shown how the LINE computer goes about executing a particular schedule of reinforcement, a Fixed Ratio 7, for behavioral experiments. NSA

N68-36877# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
APPLICATION OF THE RANQUE-HILSCH VORTEX TUBE TO AIRCREW COOLING PROBLEMS Final Report, Feb.–May 1967
Robert E. Van Patten and Ralph Gaudio, Jr. Jun. 1968 19 p refs
(AMRL-TR-67-124; AD-673345)

The Ranque–Hilsch vortex tube, a device with no moving parts, produces significant refrigeration effect when driven by compressed air. This report disseminates up-to-date information on the performance of current vortex tubes, reports the results of an aircrew cooling experiment using the device, and suggests other uses of potential interest to the Air Force. The history of the vortex tube and its basic theory are presented briefly. Author (TAB)

N68-36888# Israel Program for Scientific Translations, Ltd., Jerusalem.
TOXICOLOGY OF THE RARE METALS
Z. I. Izrael'son, ed. 1967 224 p refs Transl. into ENGLISH of the book "Toksikologiya Redkikh Metallov" Moscow, Medgiz., 1963 p 1–234 Prepared for AEC and Natl. Sci. Foundation
(AEC-TR-6710) CFSTI: HC $3.00/MF $0.65

Problems of industrial hygiene during the production and use of certain metals, metal alloys, and metal compounds are discussed. Emphasis is placed on the toxicity of inhaled aerosols and dusts to personnel. The metals considered were cadmium, cobalt, copper, barium, molybdenum, nickel, niobium, rare earth metals, tantalum, tellurium, titanium, tungsten, vanadium, zinc, and zirconium. Silicon dusts of various metals are also discussed. NSA

N68-36915# Junta de Energia Nuclear, Madrid (Spain). Seccion de Isotopos.
FOOD PRESERVATION BY IRRADIATION. PART 7: INVESTIGATIONS CARRIED OUT WITH TWO VARIETIES (ALAVA AND GINEKE) OF SPANISH POTATOES [CONSERVACION DE ALIMENTOS POR IRRADIACION. PARTE 7: INVESTIGACIONES REALIZADAS CON DOS VARIEDADES (ALAVA Y GINEKE) DE PATATAS]
A. Garcia de Mateos Lopez, A. Rivas Garcia, N. Ortin Sune, and M. del Val Cob 1967 28 p refs In SPANISH; ENGLISH summary
(JEN-189-SI/I-18) CFSTI: HC $3.00/MF $0.65

Radiation doses from 5 to 50 Krad have been used and during a twelve months' period the effects of gamma radiation on the weight loss, sprouting and spoilage control, texture, ascorbic acid and total carbohydrate content have been studied. Tests of sprouting in field conditions are described. The dose of 8000 rads provided excellent control of sprouting regardless of variety. Author (ESRO)

N68-36999# Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.

FUNDAMENTAL RELATIONSHIPS BETWEEN LINEAR ENERGY TRANSFER, ABSORBED DOSE, KERMA, AND EXPOSURE. APPLICATION TO CHANGES OF MEDIUMS [RELATIONS FONDAMENTALES ENTRE TRANSFERT LINEIQUE D'ENERGIE DOSE ABSORBEE, KERMA ET EXPOSITION APPLICATION AUX CHANGEMENTS DE MILIEUX]

Henri Joffre and Lucien Pages Feb. 1968 39 p refs In FRENCH; ENGLISH summary

(CEA-R-3424)

After briefly defining the quantities used in dosimetry and presenting them with a view to their simple adaptation to health physics problems, simple mathematical relations were established to express the absorbed dose, kerma, and exposure in the case of electrons and photons, and also relations between these various quantities considered in air. The variations in these quantities at the interface between the air and the soft tissues of the organism and in depth in the tissues were studied. The numerical values of the discontinuities liable to appear at the interface and the values obtained, relative to air, after electronic equilibrium is established in depth in the tissues are given. An example of application to dosimetry is also given in the case of an aluminium-walled ionization chamber. Also the conditions to be fulfilled in order to make a direct measurement of the absorbed dose in the tissues are presented and discussed. Author (NSA)

N68-37111# Institut fur Plasmaphysik G.m.b.H., Garching (West Germany).

A METHOD FOR MEASURING SMALL DIFFERENCES OF THE COMPLEX MICROWAVE DIELECTRIC CONSTANT OF FLUIDS AND ITS APPLICATION TO THE STUDY OF MOLECULAR STRUCTURE OF HEMOGLOBIN [EINE MESSMETHODE FUER KLEINSTE DIFFERENZEN DER KOMPLEXEN GHz-DIELEKTRIZITAETSKONSTANTEN VON FLUESSIGKEITEN ZUR UNTERSUCHUNG VON HAEMOGLOBIN-STRUKTURAENDERUNGEN]

Wolf v. Casimir Jan. 1968 50 p refs In GERMAN; ENGLISH summary

(IPP-3/66) CFSTI: HC $3.00/MF $0.65

The effect of oxygenation on the structure of hemoglobin molecules was investigated by microwave measurements. A measuring method for phase shifts $\leq 0.5°$ (accuracy $\pm 0.01°$) and attenuation differences ≤ 0.1 db (accuracy ± 0.002 db) in high loss fluids was developed using a 3 cm waveguide interferometer with a measuring cell connected to a closed loop circulation system. The resulting differences of the dielectric constant of an aqueous solution of human hemoglobin ($\delta\epsilon' = -0.022 \pm 0.005$ and $\delta\epsilon'' = -0.009 \pm 0.003$) indicate a change in molecular structure due to the oxygenation. Author (ESRO)

N68-37139# Aeronautical Research Council (Gt. Brit.)

FURTHER ANALYSIS OF TSR 2 FLIGHTS THROUGH TURBULENCE

T. B. Saunders 1968 43 p refs Supersedes S&T-Memo-3/67; ARC-29469; See X68-10056

(ARC-CP-997; S&T-Memo-3/67; ARO-29469) CFSTI: HC $3.00/MF $0.65

Human pilot describing functions are derived from records of two flights through turbulence by the TSR 2 based on the assumption of the use of pitch rate cues and normal acceleration cues respectively. No indication can be gained of the validity of these assumptions. Small, low frequency errors in pitch rate introduced during trace readings were magnified by subsequent integration and produced large errors in the time histories of vertical gust velocity at very low frequencies. This prevented the estimation of turbulence power spectra. Author (ESRO)

N68-37204*# Federal Aviation Agency, Washington, D. C. Office of Aviation Medicine.

THE BIOPHYSICAL BASIS AND CLINICAL APPLICATIONS OF RHEOENCEPHALOGRAPHY

John H. Seipel May 1967 64 p refs

(Grant NsG-388)

(NASA-CR-97261; AM-67-11) CFSTI: HC $3.00/MF $0.65 CSCL 06E

A method for screening large populations for asymptomatic but potentially incapacitating cerebrovascular disease has obvious application in aviation medicine. Rheoencephalography (REG), a simple, rapid and innocuous method of studying the cranial circulation, was investigated for this purpose. A standardized, repeatable method involving tracing during brief arterial compressions was developed and is fully described. A 95% predictive accuracy in diagnosis and localization of carotid occlusive disease is demonstrated in patients with cerebrovascular insufficiency. A significant number of asymptomatic, medically certified normal airmen are found to be potential stroke candidates by the same method. Individual extra- and intra-cranial arterial circulatory components are demonstrated for the first time. Previously reported difficulties in REG diagnosis are elucidated. The potential value of REG screening of normal populations for cerebrovascular anomalies and early disease is demonstrated. Author (TAB)

N68-37224# Polytechnic Inst. of Brooklyn, N. Y. Dept. of Electrical Engineering.

OPTIMAL TIME ALLOCATION IN COMPLEX TASKS

Ronald R. Yager Jun. 1968 236 p refs

(Contract AF 49(638)-1402)

(PIBEE68-0008; PIBMRI-68-1388; AFOSR-68-1192; AD-673891)

The thesis studies the problem-solving situation from an input-output point of view, with emphasis on the following two aspects. First, the expected payoff is related to the time spent analyzing the various components of the problem. Second, the optimal allocation of a finite amount of time among m independent problems is derived in terms of the complexities of the problems, and the correlation between each problem and the problem solvers ability and experience. By alluding to the stochastic theory of learning it is shown that, in general, the expected payoff in a problem-solving situation is a concave function of time satisfying four conditions. Justifications are given for the approximation of the payoff by an exponential function of time. The theory of hypothesis testing in the presence of white Gaussian noise is also used to verify these assumptions about the functional form of the expected payoff. Author (TAB)

N68-37225# International Atomic Energy Agency, Vienna (Austria).

SOLID-STATE DOSIMETRY

1967 143 p refs *Its* Bibliographical Series No. 23

(STI/PUB-21/23) Available from Intern. Atomic Energy Agency: $3.00

Seven hundred and fifty-four references are presented on various aspects of solid-state dosimetry. Author and keyword indexes are included. NSA

N68-37285# Joint Publications Research Service, Washington, D. C.

EFFECT OF SUPERHIGH-FREQUENCY ELECTROMAGNETIC FIELDS ON CONDITIONED REFLEX REGULATION OF CARDIAC AND RESPIRATORY ACTIVITY

M. I. Yakovleva 9 Oct. 1968 10 p refs Transl. into ENGLISH from Zh. Vysshei Nervnoi Deyatel'nosti (Moscow), v. 18, no. 3 p 418-423

(JPRS-46632) CFSTI: HC $3.00/MF $0.65

An investigation is presented of the effect of superhigh frequency electromagnetic fields on conditioned reflex regulation of

cardiac and respiratory activity in rabbits. The cardiac and respiratory functions were judged on the basis of frequency of cardiac contractions and on the frequency and type of respiratory movements. It is concluded that a single exposure to SHF with a power flow density of 5 milliwatt/sq. cm. and a wave length of 12.6 cm does not produce changes in cardiac and respiratory reflexes. SHF fields with a power flow density of 14 to 26 milliwatt/sq.cm. in a single exposure produces increased stability of cardiac and respiratory reflexes. Continuing (1 to 3 months) exposure to SHF fields with a power flow density of 5 milliwatt/sq.cm. produces a higher level of conditioned cardiac response and does not change it. Only one rabbit showed a reduction in the stability of conditioned reflexes which then returned to normal during continuing irradiation. C.T.C.

N68-37345# Joint Publications Research Service, Washington, D. C.

EVALUATION OF THE DEGREE OF ACTIVITY INTENSITY UNDER CONDITIONS OF HYPOXIA AND OXYGEN BREATHING UNDER EXCESSIVE PRESSURE

Ye. V. Bondarev, V. A. Yegorov, and V. N. Kuznetsov 14 Oct. 1968 14 p refs Transl. into ENGLISH from Vopr. Psikhologii (Moscow), no. 4, 1968 p 151–155
(JPRS-46656) CFSTI: HC $3.00/MF $0.65

An investigation is reported to determine the effects of the extreme conditions on the quality of the aircraft pilot's activity and the assimilation rate of additional information when simulating flying activity on the TL-1 flight trainer. The experiments were carried out on 11 persons well experienced in the operation of the trainer. Each person was exposed to 15 minutes of hypoxia corresponding to an altitude of 6200 m or to oxygen breathing at a pressure of 350–400 mm of water, and was tested no more often than twice a week. It was determined that the pilot's activity may be maintained at a fairly high level, but at the expense of greater intensity of activity accompanied by considerable diminution of the psychophysiological reserves of the organism determined by the assimilation rate of additional information. The positive training effect of repeated exposure was established. Author

N68-37370*# Midwest Research Inst., Kansas City, Mo.

BIOMEDICAL APPLICATIONS OF AEROSPACE GENERATED TECHNOLOGY Quarterly Report, 1 Jun.–31 Aug. 1968

David Bendersky 31 Aug. 1968 51 p refs
(Contract NSR-26-002-083; MRI Proj. 3217-E(A))
(NASA-CR-97266; QR-1) CFSTI: HC $3.00/MF $0.65 CSCL 06B

Nineteen biomedical applications problems were acted upon, three of which were new and potential solutions were found for 12 of these problems. Five of these potential solutions resulted in successful transfers of technology: (1) a technique for enhancing X ray photographs; (2) a temperature telemetry system for internal organs; (3) an enzyme electrode amplifier and telemetry system; (4) cardiac output measurement; and (5) a learning machine for mentally retarded children. Author

N68-37461 Washington Univ., Seattle.

A STUDY OF PREFERRED LISTENING LEVELS AND THEIR RELATIONSHIP TO LEVELS OF MAXIMUM SPEECH DISCRIMINATION ABILITY

Stanford Harold Lamb (Ph.D. Thesis) 1967 82 p p 82
Available from Univ. Microfilms: HC $4.40/Microfilm $3.00 Order No. 68-3860

Instructions were devised that asked the listener to select the level at which he could understand best everything being said for a sample of connected discourse. The connected discourse material was taped and fed into a commercially available self-testing automatic audiometer which allowed the rate of intensity change and the duration of the listening task to be carefully controlled. The purpose of this study was to describe and evaluate this method with respect to its reliability and validity on both normal hearing and hearing impaired listeners. Ten normal-hearing and 20 sensori-neural hearing loss individuals were tested twice. The Most Intelligible Listening Levels (MILL) administered with an automatic audiometer was highly reliable over short and longer time intervals for both normal and hearing impaired listeners. A very low correlation was found between the MILL and the level of maximum speech discrimination ability for hearing impaired listeners. A high percentage of the hearing impaired listeners experienced a significant decline in their speech discrimination ability at hearing levels above their PB maximum level. This suggests the need for audiologists to measure speech discrimination ability at more than one sensation level. Dissert. Abstr.

N68-37462 Ohio State Univ., Columbus.

SPEECH AUDIOMETRY BASED ON THE SELECTED BAND-PASS FILTERING OF WORDS

Sidney Jordan (Ph.D. Thesis) 1967 p 131
Available from Univ. Microfilms: HC $6.40/Microfilm $3.00 Order No. 68-3004

Responses of listeners to words selected on the basis of their octave band-pass patterns were investigated. Twenty-four normal listeners judged sixty-six disyllabic words by indicating which one of four filtered versions of a word was most like the unfiltered version with respect to the distinctiveness of the phonemes. The pass bands for the four filtered versions were 660 Hz to 1320 Hz, 1320 Hz to 2640 Hz, 2640 Hz to 5280 Hz, and 4080 Hz to 8160 Hz. In a similar manner, a second group of 24 normal listeners judged 114 monosyllabic words and nonsense syllables. Words or nonsense syllables were considered to be low-frequency words or nonsense syllables if the 660 Hz to 1320 Hz band was significantly selected as being most like the unfiltered version of the word or nonsense syllable, medium-frequency if the 1320 Hz to 2640 Hz band was significantly selected, and high-frequency if the total selections for the 2640 Hz to 5280 Hz and 4080 Hz to 8160 Hz bands were significant. The component syllables of disyllabic words do not tend to fall significantly into the same frequency categories as the entire disyllabic word. Monosyllabic words are more suitable as material for speech audiometry based on the frequency of words than are disyllabic words. Dissert. Abstr.

N68-37641 Indiana Univ., Bloomington.

THE INFLUENCE OF UNISENSORY AND BISENSORY PRACTICE UPON AUDITORY DISCRIMINATION

Davis Anthony Scott (Ph.D. Thesis) 1967 74 p
Available from Univ. Microfilms: HC $4.00/Microfilm $3.00 Order No. 68-2359

This study investigated the influence of four kinds of practice condition upon auditory discrimination skills. Subjects included 40 college students with normal hearing. During auditory discrimination tests and whatever auditory training sessions they participated in, subjects were exposed to speech signals distorted by means of a filter with low-pass frequency cut-off at 900 Hz. Ten subjects were assigned to each of four practice conditions. One practice condition involved no training. The other three conditions required participation in a series of ten auditory training sessions. One of these three conditions provided bisensory stimuli during training (both visual and distorted auditory cues); another provided bisensory and unisensory stimuli alternately from session to session; the third provided unisensory stimuli (one distorted auditory cues). Prior to and following training, subjects took auditory discrimination tests. The results demonstrated that residual hearing could be made more functional through auditory training and that more improvement could be expected with unisensory training procedures. Dissert. Abstr.

N68-37698*# Naval Aerospace Medical Inst., Pensacola, Fla.
EFFECT OF DRUGS ON OCULAR COUNTERROLLING
Earl F. Miller, II and Ashton Graybiel 5 Aug. 1968 19 p 16 refs
(NAMI-1046) CFSTI: HC $3.00/MF $0.65 CSCL 06O

To determine the temporal effect of each of several selected drugs and a placebo upon ocular counterrolling, a specific indicator of otolith activity, measurements under controlled conditions were made before and at various times after the oral administration of the drug or placebo. Nine normal subjects participated, and from four to six were used in each experimental trial. Alcohol, 1 cc/lb body weight, had a marked and progressive depressant effect on the amount of eye roll during the intoxication period; complete recovery was recorded six hours after its ingestion. Scopolamine, meclizine, acetylsalicylic acid, meprobamate, chlordiazepoxide hydrochloride, d-amphetamine, and diphenidol, given in twice the usually recommended doses, had little or no effect. Author

N68-37722*# General Technical Services, Inc., Philadelphia, Pa.
A STUDY OF THE GENERAL DYNAMICS OF THE PHYSICAL-CHEMICAL SYSTEMS IN MAMMALS Final Report
Arthur S. Iberall Oct. 1968 31 p 27 refs
(Contract NASw-1066)
(NASA-CR-97316) CFSTI: HC $3.00/MF $0.65 CSCL 06C

Reported are results of studies of dynamic aspects of thermoregulation, cardiovascular system hydrodynamics, dynamic regulation in physiological systems, hormonal regulation, and behavior in mammals. One major idea that was the keynote of these studies was that homeostatic control in the biological system originates from dynamic regulation in which the stability of nonlinear chains of near-relaxation oscillatory types is mediated near the boundary between aperiodic and periodic instability. These studies were undertaken in an attempt to explain temperature regulation starting at the level of the microcirculation where the monitoring of oxygen supplies to tissue and the governing of heat production takes place; overall control and transmission characteristics in the cardiovascular system; hormonal regulation through interactions of the products of the endocrine system with regulated parameters and blood constituents, and in the behavioral system for consistency of orienting physical views of the dynamics of a complex computer control network with psychological and physiological overtones. Although the overall program was concerned with the theoretical treatment of such pertinent biological data as in the literature, an attempt was made to develop new data consonant with a proposed redefinition of life. Experimental work was mainly in the fields of mammalian thermoregulation and on the chemistry of blood constituents which appear to be homokinetically regulated by hormonal and electrical mechanisms. Included is a discussion on the use of concepts in the spectral analyzer approach to the analysis of living systems. S.C.W.

N68-37735*# National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
COMPARISON OF HUMAN RESPONSE MODELING IN THE TIME AND FREQUENCY DOMAINS
Lawrence W. Taylor, Jr. 1967 35 p 8 refs Presented at the USC/NASA Conf. on Manual Control, Los Angeles, 1–3 Mar. 1967 Previously announced as N68-25276
(NASA-TM-X-59750) CFSTI: HC $3.00/MF $0.65 CSCL 05H

Frequency and time domain methods of analyzing human control response while performing compensatory tracking tasks are reviewed. Sample linear model results using these methods are compared and discussed. The inherent requirement of constraining the freedom of the form of the pilot models is also discussed. The constraint in the frequency domain consists of smoothing with respect to frequency; whereas, the constraint for the time domain model is more natural and meaningful in that it consists simply of limiting the memory of the pilot model. The linear models determined by both methods were almost identical. The time domain method of analysis enables the determination of a nonlinear pilot model. The inclusion of a cubic as well as a linear term accounted for only a small additional part of the pilot's remnant and indicated that only a small portion of the total power of the pilot's output is caused by nonlinearities. The power spectral density of an ensemble average of the pilot's output is used to determine the upper limit of the amount of power associated with a deterministic response. The indication is that more than half the remnant is stochastic when a linear model is used. Author

N68-37747# Isomet Corp., Palisades Park, N. J.
A SOLID ELECTROLYTE CARBON DIOXIDE REDUCTION SYSTEM Final Report, Nov. 1965–Aug. 1967
Horace W. Chandler and Lawrence J. Howell Wright-Patterson AFB, Ohio AMRL Jan. 1968 92 p 7 refs
(Contract AF 33(615)-3320)
(AMRL-TR-67-209; AD-672006)

Solid electrolyte cells utilizing a 90 mole percent ZrO_2(-10) mole percent Y_2O_3 electrolyte and platinum electrodes were used for the reduction of carbon dioxide to carbon monoxide and oxygen. Methods of fabricating multicell units were investigated and the performance of these units under a variety of temperature conditions and feed gas compositions was studied. Current efficiencies of these units were found to vary with temperature and current density when pure carbon dioxide was used as a feed. Multicell units were operated continuously for up to 750 hours with no evidence of cell deterioration. Studies on single-cell units were carried out to correlate cell polarization effects with feed gas composition, voltage and current density at a fixed temperature. Author (TAB)

N68-37770# Texas Univ., Austin. Electronics Research Center.
A STUDY OF PROPOSED NEURAL EXCITATION BY INTERACTION OF ULTRASONIC AND ELECTROMAGNETIC ENERGY
James D. Wolfe and Elmer L. Hixson 1 May 1968 124 p refs
(Grant AF-AFOSR-766-67)
(AFOSR-68-0879; TR-48; AD-672002)

A neural stimulation system is proposed exploiting the low frequency response of neurons to an excitation potential. Ultrasonic and electromagnetic energy interact in electrolytic solutions due to conductivity variations caused by the ultrasonic pressure waves in the solution. The potential of largest magnitude resulting from the interaction has a frequency equaling the sum and difference of the ultrasonic and electric field frequencies. The frequency of the applied field is chosen to exceed the response time of the neurons, preventing excitation; the frequency of the induced potential, being the difference of two frequencies, can be constrained to fall within the response time of neurons and produces excitation. The shape and position of the volume containing the excitation potential is controlled by focusing the ultrasonic waves to high intensity in a small volume. The system is modeled both electrically and ultrasonically by a simple salt solution similar to body interstital fluids. The relevant field equations for a conducting solution are applied to the model; the conductivity function contains a small time varying perturbation which is a linear function of the local dynamic pressure due to a focused ultrasonic source. The resultant nonlinear, partial differential equation is solved by an assumed power expansion of the solution in applying perturbation theory. Author (TAB)

N68-37819*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
DISCRIMINATION OF INCREASES IN THE BRIGHTNESS OF A FLASHING BEACON
R. S. Lincoln, S. Seidenstein and C. V. Juliano Washington NASA Oct. 1968 47 p 8 refs
(Contract NAS1-6801)
(NASA-CR-1220) CFSTI: HC $3.00/MF $0.65 CSCL 05E

The effects, on pilot judgments, of four variables were studied: beacon flash rate, beacon on time, beacon intensity, and rate of

vehicle closure. The 25 subjects viewed a point source beacon, represented by a xenon arc lamp, through a lens that provided a virtual image of the beacon at a point near infinity. Flash rate and on time were controlled by motor driven cams, while closure rate was controlled with a servomotor that rotated a circular neutral filter, the density of which increased linearly. Initial brightness was varied with a second circular filter. In a counter-balanced experimental design each subject was exposed to combinations of all four variables, each at five levels. On certain trials, a steady rather than a flashing beacon was employed. The principal measure of performance was the time required to discriminate a change in beacon brightness, measured from the initiation of a trial to its termination by the subject when he was absolutely sure that the brightness of the beacon had increased. The results indicated that the thresholds for brightness increase were positively related to the rate at which the brightness of the beacon increased. Author

N68-37859*# Naval School of Aviation Medicine, Pensacola, Fla.
LABYRINTHINE DEFECTS AS SHOWN BY ATAXIA AND CALORIC TESTS
Alfred R. Fregly and Ashton Graybiel Aug. 1968 19 p 8 refs
(NASA Order R-93)
(NASA-CR-97365; NAMI-994) CFSTI: $3.00/MF $0.65 CSCL 06P

Groups of individuals with various loss or disturbance of labyrinthine function (N=49) and patients who had vertigo as a major symptom or complaint (N=76) were very different from a control group of normals (N=240) in the frequency with which their ataxia test battery performance scores and threshold caloric test responses fell within the lowest 5 per cent of the normative distributions. Generally, caloric test results could be predicted from ataxia test results better than results of ataxia tests from those of caloric tests in the various groups. In those individuals with total or near total loss of labyrinthine function all test findings were in perfect or near perfect agreement in relation to the 5th percentile cut-off criterion employed. Author

N68-37871*# Sandia Corp., Albuquerque, N. Mex.
AN IMPROVED TECHNIQUE FOR MICROBIOLOGICAL SAMPLING OF SURFACES: AGAR SPRAY Research Report, Period Ending 30 Sep. 1968
F. W. Oswald, L. W. Hughes (N. Mex. Univ.), M. E. Morris, and J. W. Beakley (N. Mex. Univ.) Sep. 1968 18 p
(NASA Order R-09-019-040; Proj. 0064010)
(NASA-CR-97349; SC-RR-68-593) CFSTI: HC $3.00/MF $0.65 CSCL 06M

This report describes an improved technique for biological sampling of surfaces. While previous approaches have been limited to the removal of the microorganisms from the surfaces, the technique described herein deletes this often questionable operation and initiates growth and enumeration of the organisms *in situ*, i.e., without removing them from the surface. The method employs spraying molten (53°C) agar media directly onto the surface to be sampled and incubating the microorganisms thereon. A description of the spray apparatus with drawings is provided. Test results and advantages of the technique are presented. Author

N68-37876*# Miami Valley Hospital, Dayton, Ohio. Dept. of Research.
THE BIOCHEMICAL, PHYSIOLOGICAL AND METABOLIC EVALUATION OF HUMAN SUBJECTS DURING A SIMULATED GT-7 MISSION Final Technical Report, 19 Sep.–1 Nov. 1965
Bernard J. Katchman, James P. F. Murphy, Carol A. Linder and Vickie R. Must Wright-Patterson AFB, Ohio AMRL Dec. 1967 60 p 43 refs
(NASA Order R-85; Contract AF 33(657)-11716)
(NASA-CR-97363; AMRL-TR-67-165) CFSTI: HC $3.00/MF $0.65 CSCL 06S

Four human male subjects were confined for six weeks during which time they participated in a simulated Gemini 14-day flight. They ate a diet of bite sized compressed foods for 30 consecutive days; 14 days were spent in a Life Support Systems Evaluator. This diet was organoleptically unacceptable. It was significantly less digestible than the fresh food diet and caused an increase in fecal void frequency and a significant increase in fecal mass. The protein in the diet was sufficient to maintain the subjects in positive balance for nitrogen but the mineral content (except magnesium) was inadequate. The subjects were in negative balance for sodium, potassium, phosphorus, calcium, and chloride but in positive balance for magnesium. Under the conditions of these tests, 1500 m/l/man/day of water were adequate. Water balance data and urinary 17-hydroxycorticoids attest to the low level of activity in the chamber. Blood pressure, oral temperature, pulse rate, respirations, hematology, and blood chemistries were all in the normal range of clinical values. Author

N68-37897# Melpar, Inc., Falls Church, Va.
RESEARCH ON SUBMICRON METAL-FIBER SOLUTIONS Final Report, 1 Mar.–30 Nov. 1967
S. C. Ban, F. D. Ordway and F. E. Swindells 30 Nov. 1967 58 p refs
(Contract AF 33(615)-5431)
(Rept.-6339-F; AD-672004)

The program is a study of possible mechanisms for use in a fast-acting, variable-density filter for high intensity flash protection. Fibers of boehmits, silicon carbide, and snapphire, with and without metal coatings, were dispersed in amyl acetate-toluene mixture, observed in an electro-optical test cell. Absorption spectra and light scattering measurements did not show a strong, specific absorption at a wavelength twice the fiber length. Discussion of theoretical results suggests such absorption is not to be expected. Experiments with electrochromic cells revealed that high-voltage activation is effective mostly through gas generation rather than oxidation of leuco dye. The two processes are almost equally efficient. To develop a workable flash-protection device, the use of a combined gas-bubble/electrochromic cell appears most promising. Author (TAB)

N68-37988# Deutsche Versuchsanstalt fur Luft- und Raumfahrt, Bad Godesberg (West Germany).
INVESTIGATIONS ABOUT THE REACTION OF BLOOD FLOW IN HUMAN SKIN UNDER EXPOSURE TO HIGH AND LOW PRESSURE [UNTERSUCHUNGEN UEBER DAS VERHALTEN DER MENSCHLICHEN HAUTDURCHBLUTUNG-SGROESSBE BEI UEBER- UND UNTERDRUCKEXPOSITION]
K. Held Sep. 1968 79 p Refs In GERMAN; ENGLISH summary
(DLR-FB-68-56; DVL-784) CFSTI: HC $3.00/MF $0.65

This report is aimed at settling the question concerning the reaction of human skin blood flow. For this reason, measurements of cutaneous circulation with thermal-conductance-heads have been performed with male subjects under 1 to 4 atmospheres and in simulated high altitudes of 9.800 to 15.750 ft. The results showed unchanged levels during exposure to high pressure and a significant increase of blood flow in subatmospheric pressure. In a subsequent discussion we try to analyze the causal factors for these reactions. Author

N68-38008# Joint Publications Research Services, Washington, D. C.
SOVIET REPORTS DELIVERED AT UNITED NATIONS SPACE CONFERENCE
9 Oct. 1968 48 p refs Transl. into ENGLISH from Russian Conf. Speeches Presented at the 34th United Nations Conf. on Space Res. and Use for Peaceful Purposes, New York, Jun. 1968
(JPRS-46630) CFSTI: HC $3.00/MF $0.65

CONTENTS:

1. SPACE RESEARCH AND THE BIOLOGICAL SCIENCES O. G. Gazenko p 1–12 refs (See N68-38009 24-04)

2. PROFESSIONAL WORK OF THE COSMONAUT Yu. A. Gagarin p 13–22 refs (See N68-838010 24-05)

3. HUMAN PHYSIOLOGY IN RELATION TO CONQUERING SPACE V. V. Parin p 23–37 refs (See N68-38011 24-04)

N68-38009# Joint Publications Research Services, Washington, D. C.

SPACE RESEARCH AND THE BIOLOGICAL SCIENCES

O. G. Gazenko *In its* Soviet Rept. Delivered at United Nations Space Conf. 9 Oct. 1968 p 1–12 refs (See N68-38008 24-04)

The role that space biology will play in providing information on terrestrial needs is discussed in the context of its interrelationships with space engineering, spacecraft experiments, cosmonautics, and the numerous medical problems related to manned space flights. The important corollaries resulting from the development of cosmonautics are identified as (1) studies of the evolution of living matter in the universe, and experimental investigations of life forms on other planets; (2) creating highly efficient and multicomponent biological systems for space cabins or planetary stations; (3) the ecological approach to evaluating the biological acceptability of an artificial human environment; (4) the applications in clinical practice of data obtained on the physical effects of weightlessness; and (5) the broad implementation of biotelemetric systems. M.G.J.

N68-38010# Joint Publications Research Services, Washington, D. C.

PROFESSIONAL WORK OF THE COSMONAUT

Yu. A. Gagarin *In its* Soviet Rept. Delivered at United Nations Space Conf. 9 Oct. 1968 p 13–22 refs (See N68-38008 24-04)

The importance of man in space exploration is stressed, and the principal factors involved in the selection and training of cosmonauts are discussed. The main requirements are listed as perfect health, profound knowledge in various field of science and technology, skill in conducting research work, pilot experience, and certain necessary psychophysiological qualities. Space flight training is discussed in relation to flight and parachute training; engineering and technical training; flight simulation and survival training; and biomedical training to increase the functional capacities of the body, improve tolerances to space flight stress, and increase work capacity. An overview is presented on cosmonaut performance during the Vostok, Voskhod, and Soyuz flights. M.G.J.

N68-38011# Joint Publications Research Services, Washington, D. C.

HUMAN PHYSIOLOGY IN RELATION TO CONQUERING SPACE

V. V. Parin *In its* Sov. Rept. Delivered at United Nations Space Conf. 9 Oct. 1968 p 23–37 refs (See N68-38008 24-04)

Theoretical principles of space physiology are defined, and the general methodological concepts are characterized. The application of biocybernetics to clinical medicine is examined, and several examples are cited to show the impact of such space-developed techniques. The data show: (1) A diagnostic algorithm can be developed for evaluating the state of the central regulation of blood circulation apparatus solely on the basis of pulse rate. (2) Seismocardiographic investigations established the relationship between intracardiac and extracardiac compensation factors for healthy individuals under space flight conditions and for various cardiac patients. (3) A philosophy of medicine is developing which regards the living organism in its dielectric relationship to the environment as a dynamic system whose reactions, although not determined, are subject to prediction. M.G.J.

N68-38014# Instituto di Richerche Farmacologiche (Mario Negri), Milan (Italy).

PHARMACOLOGICAL AND BIOCHEMICAL CHANGES IN ANIMALS MADE AGGRESSIVE BY ISOLATION Final Technical Report

S. Consolo, S. Garattini, E. Giacalone, and L. Valzelli May 1968 37 p refs

(Contract DAJA-37-67-C-0586)

(AD-674665) CFSTI: HC $3.00/MF $0.65

The decrease of brain serotonin turnover in aggressive animals was confirmed and was found to be proportional to the different conditions of graded isolation experimentally adopted. Other biochemical parameters, as represented by brain noradrenaline turnover and N-acetyl-L-aspartic acid levels, are changed by prolonged isolation. More precisely in aggressive mice brain noradrenaline turnover is increased whereas the levels of N-acetyl-L-aspartic acid are decreased: no evident changes can be found for what is concerning the cholineacetylase activity in brain between normal and aggressive mice. Chlordiazepoxide showed the interesting property of preventing the behavioral effect of isolation, when administered chronically to the animals. Author (TAB)

N68-38051*# National Aeronautics and Space Administration, Washington, D. C.

AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES

Sep. 1968 168 p refs

(NASA-SP-7011(54)) CSCL 06S

Subject coverage concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during the following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Each entry consists of a standard citation accompanied by its abstract. Author

N68-38061# Dynatech Corp., Cambridge, Mass.

A DIELECTROPHORETIC LIQUID OXYGEN CONVERTER FOR OPERATION IN WEIGHTLESS ENVIRONMENTS Final Report, 17 Jan. 1966–22 Dec. 1967

John R. Blutt and Mathew Hurwitz Jul. 1968 199 p refs

(Contract AF 33(615)-3583)

(AMRL-TR-68-21; AD-674616) CFSTI: HC $3.00/MF $0.65

Analyses, experiments, and designs were executed to establish the performance characteristics, optimum weight, and safety of a dielectrophoretic liquid oxygen converter. A theory was developed for electric field gradient stabilization of liquid/vapor systems. Laboratory liquid-liquid experiments and KC-135 zero-g tests corroborated the theoretical performance. Vibration tests demonstrated the structural integrity of typical electrodes and their supports. Also experiments were conducted to determine the electrical breakdown strength of cryogenic oxygen. These tests demonstrate the compatibility and safety of typical electrode and support structures under intense electric fields and even under electrical arcs having orders of magnitude more energy than could be experienced in practice. A computer and analysis was used to determine minimum weight system designs based on experimentally verified performance equations, structure weight formulas, and safety criteria. The total weight of the dielectrophoretic electrodes, supports, power supply, and tank feedthrough to orient the liquid in a 25-liter oxygen converter subject to randomly directed accelerations up to 0.001 g is 7 lbs. The operating voltage is 21 kv. A preliminary design is presented for a 25-liter converter system for orbital flight testing. Author (TAB)

N68-38073# Naval Submarine Medical Center, Groton, Conn. Submarine Medical Research Lab.

AUDITORY FATIGUE FOLLOWING TONE-BURST TRAINS AT 2.2 KC

J. Donald Harris 28 May 1968 13 p refs
(SMRL-529; AD-674500)

Three hundred and two sailors were exposed by phones in groups of 11-20 men to 2.2 kilocycle/sec (kc) pulses (5 msec rise-fall time) of 37-250 msec pulse duration at 105-120 dB sound pressure level, duty cycle (on-time/total time) from 0.1 - 100%, and for 5-120 min/session. Permutations were selected to throw direct light on the four stimulus variables and on their interactions as well. Pulse-tone audiometry by magnetic tape was accomplished 7 times in 6 min at 2.5, 3, 4, 6, and 8 kc, before and immediately after exposure. The concept of a criterion temporary threshold shift (TTS) was developed in which 1 Kryt represents the area of TTS plotted on an audiometric chart from 2-8 kc. Any TTS can then be expressed in terms of the Kryt. Thus, for each of our subjects, for each of seven audiograms taken approximately once per minute, we have seven successive Kryt values. When plotted over recovery time, these values can be compared to the area enclosed on the graph representing 1 Kryt lasting for 2 min; this summation datum is termed the Nox. Mean Nox values for each experimental condition were determined. Within our data (1) each 5 dB SPL adds 0.5 Nox; (2) pulse duration as such is negligible; (3) each log session duration adds 0.65 Nox; and (4) the Nox is a linear function of duty cycle. Subjective and to some extent objective observations lead us to set a damage risk criterion of 2 Nox for pulsed stimulation at 2.2 kc. Graphs are provided by which any combination of stimulus parameters which would yield 2(+) Nox may be predicted. Author (TAB)

N68-38077# Indiana Univ., Bloomington. Dept. of Psychology.
CONDITIONS CONTRIBUTING TO VARIABILITY IN PULSE VOLUME
Yvette Gagnon Aug. 1968 13 p
(Contract Nonr-908(15))
(TR-28; AD-674448)

The purpose of this report is to suggest some conditions which contribute to the variability of pulse volume (and conceivably other autonomic measures as well). Specifically, the influence of recording site (preferred vs. non-preferred hand), arousal conditions (aroused vs. relaxed), and a personality dimension (introversion vs. extraversion) is discussed. The effects of these variables are illustrated by graphs. Author (TAB)

N68-38099# Armed Forces Radiobiology Research Inst., Bethesda, Md.
EFFECT OF PREIRRADIATION AND POST IRRADIATION ERYTHROPOIETIC STIMULATION ON SURVIVAL FOLLOWING EXPOSURE TO HEMATOPOIETICALLY LETHAL X-RAY DOSES Scientific Report
J. P. Okunewick and K. M. Hartley May 1968 24 p refs
(AFRRI-SR68-13; AD-674860) CFSTI: CH HC $3.00/MF $0.65

Experiments were carried out to evaluate the effect of erythropoietic stimulation on postirradiation survival. A/He and Swiss mice were stimulated to produce red cells at a greater than normal rate through the use of a high altitude chamber. The response to stimulation both before irradiation and after irradiation was examined and compared with that shown by simultaneously irradiated but unstimulated control animals. The mice were maintained at a normal atmosphere for about 3 hours after irradiation in the case of the postirradiation stimulation and for 3 days prior to irradiation in the case of the preirradiation stimulation. The effect of postirradiation stimulation was tested at 700 and 775 R. The poststimulated mice demonstrated poorer survival than the unstimulated controls. These doses were 100 percent lethal at 30 days to both groups, however the mean survival time of the irradiated, stimulated mice was shorter than that of irradiated, unstimulated controls, 4.9 days versus 5.9 days respectively at 775 R, and 5.9 days versus 7.4 days at 700 R. In contrast, mice which were previously erythropoietically stimulated by 3 weeks continuous exposure to one-half atmosphere exhibited a markedly better postirradiation survival than did the unstimulated controls. The effect of preirradiation stimulation was tested at 675 R, 725 R and 775 R. Increased 30-day survival of the prestimulated animals over that of the untreated controls was found at all doses. Author (TAB)

N68-38164*# Techtran Corp., Glen Burnie, Md.
THE BEHAVIOR OF LIVE FROG EGGS AND FROG LARVAE IN DISTILLED WATER [UBER DAS VERHALTEN LEBENDER FROSCHEIER UND FROSCHLARVEN IN DESTILLIERTEM WASSER]
Jaroslav Kriezencki Washington NASA Oct. 1968 17 p refs Transl. into ENGLISH from Arch. Entwicklungsmech. Organ. (Berlin), v. 42, 1917 p 604-621
(Contract NASw-1695)
(NASA-TT-F-11962) CFSTI: HC $3.00/MF $0.65 CSCL 06C

The factors in survival and development of frog eggs and larvae in distilled water are analyzed, oxygen in the water and nutrition being found to be decisive factors. Experiments with frog eggs and larvae in distilled and common water are reported. Author

N68-38172# George Washington Univ., Alexandria, Va. Human Resources Research Office.
FROM RESEARCH TO PRACTICE IN ELECTRONICS MAINTENANCE TRAINING
William A. McClelland Jun. 1968 13 p ref Presented at the Army Command School Curriculum, Fort Knox, Ky., Feb. 1967
(Contract DA-44-188-ARO-2)
(PP-21-68; AD-674738) CFSTI: HC $3.00/MF $0.65

The problem of converting research results into training practice in the area of U.S. Army electronics maintenance is discussed. The need for a systematic, generalized procedure for designing, testing, and revalidating training courses is emphasized. Functional context training and a course using new instructional techniques are described. Author (TAB)

N68-38178# Sandia Corp., Albuquerque, N. Mex.
LASER EYE AND SKIN HAZARD EVALUATIONS
W. D. Burnett Mar. 1968 29 p refs
(Contract AT(29-1)-789)
(SC-DC-68-2108; CONF-680503-1) CFSTI: HC $3.00/MF $0.65

A method is presented for the systematic evaluation of laser direct-beam hazards to the eyes and skin. The three parameters required for calculation of the exposure intensity incident on the surface of the eye or skin were laser output, laser beam divergence, and the range. Knowledge of the exposure intensity was not considered to be sufficient for evaluation of laser hazards to the eye since optical transmission characteristics of the eye account for retinal exposure. The hazards from exposure of the eye to uv and infrared wavelengths are also discussed. NSA

N68-38197# Army Aeromedical Research Unit., Fort Rucker, Ala.
USER EVALUATIONS OF TWO AIRCREW PROTECTIVE HELMETS
James A. Bynum Aug. 1968 37 p refs
(USAARU-69-1; AD-674184) CFSTI: HC $3.00/MF $0.65

Two aircrew protective helmets were evaluated by 24 instructor pilots who were divided equally into groups subjected to three ambient noise environments. Pilots rated the Army APH-5 and the SPH-3X (Experimental) on eight categories designed to assess relative comfort, acceptability, and noise attenuation. Ratings were compared, using a Split-Plot Factorial Analysis of Variance. Author (TAB)

N68-38207*# Spacelabs, Inc., Van Nuys, Calif.
APOLLO MEDICAL EXPERIMENTS SYSTEM Final Report

8 Oct. 1968 133 p
(Contract NAS9-5431)
(NASA-CR-92348; SR68-1055) CFSTI: HC$3.00 CSCL 06S

The Medical Experiments Program involves the measurement of various physiological phenomena under conditions imposed by the Apollo flight environment. Design, development, and technical aspects of the Medical Experiments System are described in this report. The system consists of: (1) the phonocardiogram subsystem (PCG) for detecting Korotkow sounds; (2) the electroencephalogram subsystem (EEG) for measuring brain wave activity; (3) the vectorcardiograph subsystem (VCG) for vector representation of the standard electrocardiogram signals; and (4) the thoracic blood flow measurement subsystem (ZCG) for determining thoraic impedance variations. A program chronology, subsystems documentation, and schematic drawings are included. K.W.

N68-38290# *Office of Naval Intelligence, Washington, D. C.*
AIRBORNE SURVEYING OF THE GLOBAL FRAGMENT CONTAMINATION OF TERRITORIES IN THE GAMMA-RAY SPECTRUM [IZMERENIYE S SAMOLETA GLOBAL'NOGO OSKOLOCHNOGO ZAGRYAZNENIYA TERRITORY PO SPEKTRU GAMMA-LUCHEY]
L. I. Boltneva, A. V. Dmitriyev, R. M. Kogan, V. A. Ionov et al 3 Jul. 1968 12 p refs Transl. into ENGLISH from Fiz. Zemli (USSR) no. 2, 1967 p 114–120
(ONI-TRANS-2634; AD-674489) CFSTI: HC$3.00/MF$0.65

The atmosphere, the terrain and the natural water become radioactively contaminated after lengthy, atmospheric, nuclear testing. Radioactive products get into vegetation and living organisms and have a harmful biological effect on them. There is also danger from the external irradiation of organisms, which is occasioned by radioactive contamination of the natural environment. Information on the natural environments contamination is necessary for solving diverse problems of agriculture, medicine and biology. Author (TAB)

N68-38337# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SOME ASPECTS OF PATTERN RECOGNITION WITH THE APPLICATION OF THRESHOLD ELEMENTS [NEKOTORYE METODY RASPOZNAVANIYA OBRAZOV S PRIMENENIEM]
A. B. Shubin 29 Nov. 1967 12 p refs Transl. into ENGLISH from the book "Samoobuchayushchiesya Avtomaticheskie Sistemy" Moscow, Acad. of Sci., 1966 p 94–101
(FTD-HT-23-1044-67; AD-673929)

The general problem of pattern recognition is briefly discussed from a purely theoretical point of view, with attention given to the various interrelated aspects and suppositions involved. It is shown that, technically speaking, the realization of the pattern recognition problem breaks down into two sub-problems which are to some degree independent: (1) the rational selection, or organization of the selection, of the essential (to recognition) coordinates of the pattern; (2) the actual recognition of the pattern according to the coordinates selected. Pattern coordinate selection is discussed on the basis of a generalized block diagram of a recognition device using threshold elements for the segregation and recognition of local attributes in a stage between the picture coordinates and the recognition circuit. The method of scanning the adjustment of the threshold element and the attribute discrimination process (primarily through external configuration coordinates) are discussed in detail. TAB

N68-38354# Illinois Univ., Urbana. Biophysical Research Lab.
UHF ACOUSTIC ATTENUATION AND RESEARCH IN BIOLOGICAL ACOUSTICS Final Report
Floyd Dunn 21 Aug. 1968 20 p refs
(Contract Nonr-1834(29))
(AD-674519) CFSTI: HC$3.00/MF$0.65

The report summarizes research on the following topics: instrumentation for the generation and detection of UHF sound in liquids, ultrasonic absorption spectroscopy in solutions of biological macromolecules, degradation of DNA by intense noncavitating ultrasound, effects of intense noncavitating ultrasound on proteins in solutions, noncavitating ultrasonic effects in biological media, acoustically induced birefringence in liquids, and correlation of naturally occurring infrasonics and selected human behavior. Author (TAB)

N68-38367# California Univ., Livermore. Lawrence Radiation Lab.
SOLUTION OF THE TIME-DEPENDENT EQUATIONS FOR TAUTOMERIC INTERCONVERSION IN THE A-T AND G-C BASE PAIRS OF DNA
Balazs Rozsnyai 10 Apr. 1968 28 p refs
(Contract W-7405-ENG-48)
(UCRL-50412) CFSTI: HC$3.00/MF$0.65

Solutions of a set of four first-order coupled differential equations governing the tautomeric interconversion rate of the DNA base pairs are presented. The method of calculation represents a simplified way of treating the quantum mechanical tunnel effect for the protons forming the hydrogen bonds between the nucleotide base pairs of DNA. Results are presented for the A–T and G–C base pairs for several cases of interest. Author (NSA)

N68-38374# Grumman Aircraft Engineering Corp., Bethpage, N. Y. Research Dept.
STIMULUS RATE DIFFERENCES AND VIGILANCE PERFORMANCE
S. Klier and R. Pain Oct. 1968 11 p refs
(RM-427)

An investigation was conducted of the effectiveness with which monitoring behavior occurs in long term vigils. Identification of the factors affecting this behavior is important in the design of equipment and training procedures aimed at improving a signal detection. During an 80-minute vigil, subjects responded to a difference in the brightness between two successively illuminated lights. In one condition (fast stimulus rate) 2400 pairs of lights were presented, 20 of which were different in brightness. In another condition, 400 pairs were presented, (slow stimulus rate) 20 of which were different. The percentage of signals correctly detected was significantly higher for the slow stimulus rate, although the number of signals presented and the total length or time were the same for both conditions. These results substantiate those in the literature and have implications for explaining monitoring behavior in vigilance situations. Author

N68-38435# Conductron–Missouri, St. Charles.
SYNTHETIC FLIGHT TRAINING SYSTEM DEVICE 2B24 Concept Formulation Report
J. T. Clausen, J. G. Curtin, J. F. Egler et al Orlando, Fla. Naval Training Device Center Jul. 1968 343 p refs
(Contract N61339-68-C-0108)
(NAVTRADEVCEN-68-C-0108-1; AD-673982) CFSTI: HC $3.00/MF$0.65

The concept formulation was developed to determine the technical feasibility, economic and military training considerations related to the development of the Synthetic Flight Training System (SFTS). Trainer performance, operating characteristics and training technology were analyzed to determine SFTS requirements and implementation techniques. Configurations were synthesized and compared in trade-off analysis and the best technical approach was selected to provide common modules for the trainer. Author (TAB)

N68-38436# RAND Corp., Santa Monica, Calif.
INFORMATION AND INDUCTION: A SUBJECTIVISTIC VIEW OF SOME RECENT RESULTS

Dan Jamison Aug. 1968 49 p refs Submitted for publication
(P-3921; AD-674038) CFSTI: HC $3.00/MF $0.65

Four purposes are attributed to the paper: (1) to attempt to provide a definition of semantic information that is adequate from a subjectivist point of view and that is based on the concept of information as change in belief; (2) to suggest a solution to the inductive problem that Suppes points out to lie at the foundations of a subjectivistic theory of decision; (3) to show how Carnaps continuum of inductive methods may be easily interpreted as a special case of the subjectivistic theory of induction to be presented; and (4) to provide a subjectivistic interpretation of Hintikkas two dimensional inductive continuum, and show how this is related to the problem of concept formation. Author (TAB)

N68-38440# Naval Submarine Medical Center, Groton, Conn. Submarine Medical Research Lab.
THE RESPONSE ANALYSIS TESTER (RATER) AND LOGICAL INFERENCE TESTER (LOGIT). II. ADDITIONAL PILOT STUDY DATA Interim Report
James W. Parker May 1968 11 p ref
(SMRL-525; NAVMED-MF022.01.04-9009-1; AD-673996)

This report presents additional, normative data for the Response Analysis Tester (RATER), a performance testing instrument, using geometric forms as stimuli. The results showed that somewhat higher scores were obtained with the geometric form stimuli than had been previously obtained using color stimuli. Examination of RATER scores as related to the Navy Basic Test Battery showed the only significant relationship to be between RATER scores and the CLER portion for men in non-technical rates only. A second part reports the results obtained using the Logical Inference Tester (LOGIT) in a study to determine the effects of flashing light stress on performance. It was found that for two, pre-trained subjects no significant decrements in performance (number of errors) resulted from the addition of the flashing light while performing the test. The additional experience with these two performance measuring instruments has resulted in increased confidence in their usefulness. The data presented add to the cumulative data being collected and will augment base-line data available against which decrement-inducing studies can be compared. Author (TAB)

N68-38453# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ATTENTION—WEIGHTLESSNESS [VNIMANIE—NEVESOMOST]
A. V. Yegorov and G. I. Pavlov 16 Jun. 1967 89 p refs Transl. into ENGLISH from RUSSIAN
(FTD-MT-66-157; AD-674040) CFSTI: HC $3.00/MF $0.65

The article summarizes the information thus far accumulated in regard to weightlessness. The authors begin with a review of gravity, weight, and inertia, and proceed to a description of experiments already performed by astronauts with a variety of reactions. The role of the senses in orientation is reported on the basis of numerous experiments with men and animals. Since all experience up to now has involved only relatively short periods of weightlessness, the true effects on the human system of prolonged space flights is still largely unknown. It is suggested that substituting rotation for gravity will produce a suitable environment for long space journeys. Author (TAB)

N68-38457# Rome Air Development Center, Griffiss AFB, N. Y.
SPECIFICATION OF PRIMARY INTENSITIES FOR SEVEN-COLOR ADDITIVE DISPLAYS
R. J. Christman Jul. 1968 47 p refs
(RADC-TR-68-319; AD-674589)

Five subjects served in a laboratory experiment to determine the effects of luminance degradations in the three prime y color channels of a seven-color film projection additive color display. Positive performance and the incidence of errors were d termined for a control condition and four levels of output reduction (20, 50, 62.5, and 84%) in each of the primary channels. Effects were determined for overall performance as well as ability to read characters in each of the seven resultant colors: red, blue, green, yellow, magenta, cyan, and white. Recommendations are provided concerning tolerances for luminance reduction of the primary channels, colors to be selected for coding purposes, and application of the data to non-projection systems such as CRT phosphors and electro-luminescent displays. Author (TAB)

N68-38460# Los Alamos Scientific Lab., N. Mex.
AN INVESTIGATION OF A BUBBLER TRITIUM SAMPLER
Allen M. Valentine 26 Jul. 1968 11 p refs
(Contract W-7405-ENG-48)
(LA-3916) CFSTI: HC $3.00/MF $0.65

Investigation of a bubbler tritium sampler indicated collection characteristics similar to reported human body uptake rates for tritium gas and tritiated water vapor. The bubble collector consisted of a dry gas wash bottle with a fritted glass tip on the inlet and distilled water as the collecting medium. Tests were made under both laboratory and field conditions, and the effects of varying the flow rate, water volume, and water temperature were determined. A flow through ionization chamber instrument was used to measure the tritium concentrations sampled, and the collected tritium was determined by liquid scintillation counting. The observed collection efficiency for tritiated water vapor was >90% for sampling rates from 8 to 10 lpm, water temperatures from 25 to 35°C, and water volumes from 30 to 50 cc. Tritium gas was collected with an efficiency of <0.01% with the same sampling rates and water volumes but with a water temperature of 18°C. Author (NSA)

N68-38466# Oak Ridge National Lab., Tenn.
MEASUREMENT OF CLINICAL RADIOACTIVITY
D. A. Ross and C. C. Harris Feb. 1968 51 p refs
(Contract W-7405-ENG-26)
(ORNL-4153) CFSTI: HC $3.00/MF $0.65

A discussion is presented that is intended to help doctors and technicians understand what a pulse-height spectrometer is, what it can do, and what it should not be expected to do. It offers the operator: a means of finding out, easily, which γ energies the instrument is counting, and the privilege of adjusting the energy pass band to suit the counting problem at hand; relative freedom from errors due to uncontrolled scattered radiation; an improved signal-to-background ratio, since much of the background is out of sight; improved stability, when the instrument is operated correctly; greater freedom in using two nuclides together, since the instrument can, within limits, pick out the characteristic radiations individually; and a powerful analytical tool that can check the radiochemical purity of supplied material, or establish the identity of an unknown emitter, by revealing the γ-ray spectrum. These advantages become available only at a price. A spectrometer is more expensive than an ordinary threshold scaler, which, in effect, has a window sill but no window top; there are more components in a spectrometer to get out of order, and it requires careful and informed operation. NSA

N68-38474# George Washington Univ., Alexandria, Va. Human Resources Research Office.
COLLECTED PAPERS PREPARED UNDER WORK UNIT LIFT: ARMY AVIATION HELICOPTER PILOT TRAINING
Jun. 1968 28 p refs
(Contract DA-44-188-ARO-2)
(HUMRRO-PP-18-68; AD-673936) CFSTI: HC $3.00/MF $0.65

Results of studies to develop more efficient and more effective methods for Army helicopter pilot training are discussed in this publication. The papers include: The effects on flight proficiency measurement reliability of differences on check pilot standards, by George D. Greer, Jr.; Briefing on Task LIFT, by John O. Duffy and Oran B. Jolley; A quality control program applied to helicopter

training, by John O. Duffy; and Flight training quality control, by John O. Duffy and Edgar N. Anderson. Author (TAB)

N68-38478# *Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.*

MAN AND TECHNOLOGY

V. P. Zinchenko et al Oct. 1967 75 p refs Transl. into ENGLISH from Chelovek i Tekhn. Sistemy Upr. i Inzh. Psikhologiya (Moscow), 1965 p 3-48

(ATD-MT-24-328-67; AD-674696) CFSTI: HC $3.00/MF $0.65

Contents: Problem of the cybernetic century; Human factors and operator activity; Perception -- Decision action, In the language of models. TAB

N68-38486# Hofstra Coll., Hempstead, N. Y.

THE EFFECT OF HIGH INTENSITY INTERMITTENT STIMULI ON HUMAN BEHAVIOR AND PHYSIOLOGY Final Report, 1956-1967

Robert Plutchik Apr. 1968 26 p refs

(Contract Nonr-2252(01))

(AD-673970)

Intermittent tones are judged as unpleasant or painful at lower intensity levels than steady tones and pain thresholds are related primarily to power per pulse rather than total energy in a series of pulses. Skin impedance characteristics varied widely with electrode location and females had significantly higher skin impedance than males. The impedance of the human skin decreased from 130 to 30 kohm as the frequency of the a-c input increased from 1 to 1000 cps. Phase angle also decreased over this frequency range. High intensity intermittent sound had no effect on mean heart, rate, blood pressure of skin temperature, but did produce a decrease in skin impedance which was linearly related to the intensity of stimulation. Using an EEG frequency analyzer, it was found in all subjects that 10 cps pulse rate inputs at auditory pain threshold produced a partial inhibition of the alpha rhythm. Maximum evoked responses to auditory clicks were obtained with monopolar leads over the motor area and the parietal area and evoked responses to flashes of light were quite different from those to auditory pulses. Stimulus intensity and repetition rate affected some characteristics of the evoked response and the simultaneous presentation of clicks and flashes of light changed the pattern of the response. Comparing photic stimulation, audio stimulation, hyperventilation, electric shock and condition, results showed that photic stimulation produced the maximum decrease in percent time alpha, but the effect was mainly an on-off one. Heart rate decreases occurred during photic stimulation and during the weak auditory CS, findings which seem consistent with Laceys concept of environmental intake. Author (TAB)

IAA ENTRIES

A68-43351 *
TWO-TONE INHIBITION IN AUDITORY-NERVE FIBERS.
Murray B. Sachs and Nelson Y. S. Kiang (Massachusetts Eye and Ear Infirmary, Eaton-Peabody Laboratory, Boston, Mass.).
Acoustical Society of America, Journal, vol. 43, May 1968, p. 1120-1128. 12 refs.
Research supported by the Joint Services Electronics Program and NIH; Grants No. NsG-496; No. NsG-22-009-019.

Spike discharges from single fibers in the auditory nerve of anesthetized cats were recorded with microelectrodes. Rates of discharge were measured as functions of the frequencies and levels of either single tones or two tones presented simultaneously. It was found that the presence of a second tone diminishes the responses to the first tone if appropriate stimulus parameters are chosen. All fibers tested showed this two-tone inhibition. Response areas and inhibitory areas were defined from isorate contours. The general characteristics of the inhibitory areas are found to be similar for a population of over 300 fibers. (Author)

A68-43389 *
CORNEAL CALCIFICATION.
Ben S. Fine (U.S. Armed Forces Institute of Pathology, Ophthalmic Pathology Branch; George Washington University, Medical Center, Dept. of Ophthalmology, Washington, D.C.), Joseph W. Berkow (U.S. Armed Forces Institute of Pathology, Ophthalmic Pathology Branch, Washington, D.C.), and Samuel Fine (Northeastern University, Dept. of Biophysics and Bio-Medical Engineering, Boston, Mass.).
Science, vol. 162, Oct. 4, 1968, p. 129, 130. 9 refs.
Contracts No. DA-49-193-MD-2680; No. DA-49-193-MD-2436; No. DA-49-193-MD-2437; Grants No. NB-05575; No. NB-07774; No. 2F11NB1589; No. NGR-22-011-007.

Superficial calcification was produced in the normal rabbit cornea by mild irradiation with a carbon dioxide laser. The calcification was entirely extracellular and closely resembled that observed in human band keratopathy, which was characterized as hydroxyapatite by X-ray diffraction. The electron-microscopic appearance of calcific spherules and conglomerates in early corneal calcification is presented. The calcific spherules arise at the basal plasma membrane surface of the epithelial cells in close relation to their basement membrane. (Author)

A68-43499 *
CHARACTERISTICS OF REM SLEEP FOLLOWING DIFFERENT CONDITIONED RATES OF WAKING EYE MOVEMENT IN THE MONKEY.
Ralph J. Berger (California, University, Space Biology Laboratory and Dept. of Anatomy and Brain Research Institute, Los Angeles, Calif.).
Perceptual and Motor Skills, vol. 27, 1968, p. 99-117. 30 refs.
Contract No. AF 49(638)-1387; Grants No. NsG-502; No. NsG-05-007-011.

Investigation of a generalization of conditioned rates of waking eye movement to rapid eye movement (REM). High and low rates of waking eye movement were conditioned in four monkeys, using schedules of fixed-ratio reinforcement (FR6) and discriminated differential reinforcement of low rate (DRL5), with the electro-oculogram (EOG) as the operant. The results of the investigation cannot be explained by conventional learning mechanisms; but they are consistent with the hypothesis that REM sleep furnishes periodic innervation of the oculomotor system to maintain facilitation of binocularly coordinated eye movement into subsequent wakefulness. P.G.M.

A68-43640
INFLUENCE OF DURATION OF HYPERVENTILATION ON RISE TIME OF P_{CO_2} AFTER STEP REDUCTION OF VENTILATION.
S. D. Ivanov and J. F. Nunn (Leeds University, Dept. of Anaesthesia, Leeds, England).
Respiration Physiology, vol. 5, Sept. 1968, p. 243-249. 8 refs.

The time course of changes of P_{CO_2} was observed in 17 patients following step reduction of ventilation after a previous period of hyperventilation. The rise of P_{CO_2} was exponential in form and was analyzed into two components. The time constant of the first component had a mean value of 29.4 sec and was not influenced by the duration of the previous hyperventilation. The time constant of the second component was influenced by the duration of the previous hyperventilation. Values of 5 min were obtained after periods of hyperventilation lasting 50 min but appeared to increase toward a limiting value of the order of 20 min when the previous hyperventilation was prolonged to 300 min. (Author)

A68-43641 *
PULMONARY MECHANICS WITH A SIMULATED POSTURAL BLOOD REDISTRIBUTION.
R. C. Mains, F. S. Musgrave (Kentucky, University, College of Medicine, Dept. of Physiology and Biophysics, Lexington, Ky.), and F. W. Zechman (Kentucky, University, College of Medicine, Dept. of Physiology and Biophysics, Lexington, Ky.; NASA, Manned Spacecraft Center, Houston, Tex.).
Respiration Physiology, vol. 5, Sept. 1968, p. 288-301. 31 refs.
Contract No. AF 33(615)-67-C-1370.

The study was designed to simulate the postural redistribution of blood in order to study its independent effects on pulmonary mechanics. Subjects in the supine position were exposed to six minutes of 40 mm Hg leg negative pressure (LNP) which shifts 500 to 600 milliliters of blood to the legs. Dynamic pulmonary compliance, total pulmonary resistance, and static elastic pressure-volume and conductance-volume relationships were measured, and no significant changes were found. End-expiratory lung volume increased and end-expiratory intrathoracic pressure decreased. LNP also produced a small decrease in thoracic circumference. Thus, at the equilibrium point of the respiratory system, lung volume is increased and thoracic volume decreased. It is believed that the observed pressure and volume changes result from an increase in the virtual thoracic space caused by the shift of blood from the thorax. (Author)

A68-43718 #
RESPONSE TO LOW-FREQUENCY VIBRATION.
J. C. Guignard (Southampton, University, Institute of Sound and Vibration Research, Southampton, England).
Chartered Mechanical Engineer, vol. 15, Oct. 1968, p. 399-401. 16 refs.

Discussion of the principal frequency-dependent effects of airborne (noise) and structure-borne vibration on man. The effects of audible and nonaudible noise upon efficiency are treated. Safe exposure limits for whole-body vibration in the range from 1 to 90 Hz, tentatively set at 6 dB above the corresponding fatigue-decreased proficiency limits are presented. M.G.

A68-43824 #
EVACUATION FROM SUPERSONIC TRANSPORT TYPE AIRCRAFT.
J. D. Garner (Federal Aviation Administration, Aeromedical Service, Civil Aeromedical Research Institute, Oklahoma City, Okla.).
Air Line Pilots Association, Air Safety Forum, 15th, Seattle, Wash., July 9-11, 1968, Paper. 4 p.

Investigation of passenger evacuation from supersonic transport aircraft through various exists, particularly the double-door utilization. The tests were performed in daylight conditions with no visibility problems. The belly-landing configuration represents only one condition of an emergency, simulating a potential threat of fire. Deployment and use of escape chutes by passengers and other parameters, such as exit location in low visibility, are factors in the total evaluation of an aircraft-evacuation system. The door-opening segment of escape times was only partially simulated to create an aircraft environment with specific segments of the evacuation profile under observation. M.M.

A68-43874 *
BRAIN SEROTONIN CONCENTRATION - ELEVATION FOLLOWING INTRAPERITONEAL ADMINISTRATION OF MELATONIN.
Fernando Anton-Tay, Chuan Chou, Sylvia Anton, and Richard J. Wurtman (Massachusetts Institute of Technology, Dept. of Nutrition and Food Science, Cambridge, Mass.).
Science, vol. 162, Oct. 11, 1968, p. 277, 278. 26 refs.
PHS Grant No. AM-11709; Grant No. NGR-22-009-272.

Experimental investigation of the effect of intraperitoneal administration of melatonin in rats. It was found that the intraperitoneal administration of melatonin to rats caused an increase in brain serotonin concentration, especially in the midbrain. This effect could be demonstrated within 20 minutes of melatonin administration and was not associated with changes in norepinephrine concentration. M.M.

A68-43878 #
DETERMINATION OF THE HEAT ENDURANCE LIMITS IN MAN (SURVEY OF THE LITERATURE) [OPREDELENIE GRANITS PERENOSIMOSTI TEPLOVYKH NAGRUZOK U CHELOVEKA (OBZOR LITERATURY)].
E. I. Kuznets, V. I. Chadov, G. S. Zharikova, L. V. Sadovnikova, B. S. Perepletchikova, V. M. Inshakova, and L. G. Mordovskaia.
Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 11-17. 31 refs. In Russian.

Survey of the literature data regarding the functional possibilities of the human organism under the action of high temperature and air humidity. Numerous studies are discussed which concern the limits of human endurance as a function of the absolute temperature and air humidity, the adaptation of the organism to the heat factor, and the general state of the organism prior to the heat effect. Attention is given to the possibility of using a single physiological parameter as the criterion for estimating the thermal state of the organism. The efficiency of different physiological factors used as this criterion is evaluated, including the pulse rate, body temperature, cardiac contractions, the heat-accumulation index, and other parameters. T.M.

A68-43879 #
CHANGE IN THE CONTENT OF DRY MATTER, SUGARS, AND ASCORBIC ACID IN PLANTS AFTER THE ACTION OF SPACE FLIGHT FACTORS ON THE SEEDS OF THESE PLANTS [IZMENENIE SODERZHANIIA SUKHOGO VESHCHESTVA, SAKHAROV I ASKORBINOVOI KISLOTY V RASTENIIAKH POSLE VOZDEISTVIIA FAKTOROV KOSMICHESKOGO POLETA NA SEMENA ETIKH RASTENII].
I. V. Nikitina, D. F. Gertsuskii, and L. M. Petrenko.
Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 18-20. 13 refs. In Russian.

Study of the effects of combined space-flight factors on lettuce, cabbage, and onion seeds and bulbs carried by the Cosmos 110 satellite on a 22-day flight with an orbital apogee of 904 km. The seeds were subsequently planted under laboratory conditions on the ground together with control seeds which were not subjected to the flight. The test plants differed from the control plants in a lower content of dry matter and a higher content of sugars and ascorbic acid. It is concluded that these differences were caused by the combined effects of space flight on the seeds of the plants. T.M.

A68-43880 #
CHANGE IN THE ENZYME ACTIVITY OF CELLULAR AND SUBCELLULAR STRUCTURES UNDER THE INFLUENCE OF ACCELERATIONS [IZMENENIE AKTIVNOSTI FERMENTOV KLETOCHNYKH I SUBKLETOCHNYKH OBRAZOVANII POD VLIIANIEM USKORENII].
A. S. Barer, I. D. Ertanov, K. I. Murakhovskii, L. A. Rubashkina, and E. M. Semina.
Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 21-25. 25 refs. In Russian.

Experimental study of the influence of accelerations on the activity of several enzymes of cellular and subcellular structures in humans and small animals. Increased aminotransferase activity was observed in the blood of humans exposed to back-to-chest accelerations (at an angle of 80° to the longitudinal axis of the body) of 6 g for 120 sec and 10 g for 20 sec. Experiments on rats exposed to accelerations of 10 and 25 g for 6 min revealed changes in certain liver enzymes. The insoluble glutamate dehydrogenase activity increased in the 10-g experiments while the cathepsin and aryl sulphatase A + B activity increased in the 25-g experiments. The cytochrome oxidase activity remained unchanged in the experiments. It is concluded that the enzyme changes result from a changed permeability of the cellular and subcellular membrane structures. T.M.

A68-43881 #
SIGNIFICANCE OF THE TYPOLOGICAL FEATURES OF THE CENTRAL NERVOUS SYSTEM IN THE SENSITIVITY OF ANIMALS TO ACCELERATIONS [K VOPROSU O ZNACHENII TIPOLOGICHESKIKH OSOBENNOSTEI TSENTRAL'NOI NERVNOI SISTEMY V CHUVSTVITEL'NOSTI ZHIVOTNYKH K USKORENIIAM].
N. N. Uglova.
Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 26-28. 18 refs. In Russian.

Experimental study of the significance of excitatory-inhibitive processes in the sensitivity of white rats to accelerations. The state of the excitatory and inhibitive processes was evaluated by a method proposed by Krushinskii - i.e., response to sound irritation. The reaction of the hypophysial-adrenal system to acoustic excitation was evaluated in some animals. It is shown that the individual sensitivity of the animals to accelerations depends on the excitation-inhibition ratio in the central nervous system and the characteristic reactions of the hypophysial-adrenal system. T.M.

A68-43882 #
INFLUENCE OF TRANSVERSE ACCELERATIONS ON THE SECRETORY ACTIVITY OF THE GASTROINTESTINAL TRACT OF DOGS [VLIIANIE POPERECHNO NAPRAVLENNYKH USKORENII NA SEKRETORNUIU DEIATEL'NOST' ZHELUDOCHNO-KISHECHNOGO TRAKTA SOBAK].
K. V. Smirnov, L. S. Potemkina, L. G. Goland, and A. G. Barakov
Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 29-33. 14 refs. In Russian.

Experimental study of the influence of transverse accelerations (8 g for 3 min) on the secretory activity of the stomach, the activity of pancreatic enzymes in the blood, and the activity of the intestinal enzymes in the feces. The experiments were conducted with five dogs. The observed variations in gastric-juice secretion indicate the influence of the central nervous system in the mechanism of disturbances caused by accelerations. Changes in the activity of pancreatic enzymes in the blood serum and of intestinal enzymes in the feces are associated with significant disorders of the secretory function of the pancreas and small intestine, respectively. T.M.

A68-43883 #
INFLUENCE OF A TWO-WEEK IMMOBILIZATION BY A PLASTER BANDAGE ON THE REACTION OF THE CARDIOVASCULAR SYSTEM IN DOGS DURING ORTHOSTATIC TESTS AND UNDER THE ACTION OF TRANSVERSE ACCELERATIONS [VLIIANIE DVUKHNEDEL'NOGO OBEZDVIZHIVANIIA GIPSOVOI POVIAZKOI NA REAKTSII SERDECHNO-SOSUDISTOI SISTEMY U SOBAK PRI ORTOSTATICHESKIKH PROBAKH I VOZDEISTVII POPERECHNYKH PEREGRUZOK].
B. F. Asiamolov and A. D. Voskresenskii.
Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 33-37. In Russian.

Experimental study of the orthostatic tolerance and resistance to transverse accelerations in female dogs weighing from 6 to 12 kg which were immobilized for a period of 14 days prior to the experiments by means of plaster bandages. Orthostatic tests revealed similar changes in pulse rate and arterial pressure indications. Strong tachycardiac reactions were observed in acceleration testing. After hypodynamia, an inverse relationship between changes in pulse rate and arterial pressure was clearly evident. The significance of the test results is evaluated. T.M.

A68-43884 #
ANIMAL TOLERANCE TO IMPACT ACCELERATIONS AS EVALUATED BY ENZYMATIC BLOOD TESTS [OTSENKA PERENOSIMOSTI ZHIVOTNYMI UDARNYKH PEREGRUZOK PO NEKOTORYM FERMENTATIVNYM PROBAM KROVI].
E. E. Simonov and V. A. Korzhen'iants.

Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 38-41. 9 refs. In Russian.

Results of experiments carried out on three groups of white rats (86 in all) that were exposed to impact accelerations which were known to produce or not to produce certain traumatic effects in order to test the animals' tolerance to such accelerations. After 4, 24, and 72 hr, the test rats were decapitated, their blood serum was evaluated, and their enzyme activity was compared with that of 40 control rats, which were kept intact. There was, in general, an increase in enzyme activity after exposure to impact accelerations, this increase being more pronounced under damaging effects. It is concluded that a study of the changes in the activity of aspartic aminotransferase, alanine aminotransferase, aldolase, and lactate dehydrogenase is of practical value for investigating safety limits of impact accelerations applied to living organisms. P. G. M.

A68-43885 #
GLYCOLYSIS RATE AND LACTIC ACID CONTENT IN THE MYOCARDIUM OF RATS AT VARIOUS STAGES OF ADAPTATION TO HYPOXIA [SKOROST' GLIKOLIZA I SODERZHANIE MOLOCHNOI KISLOTY V SERDECHNOI MYSHTSE KRYS V RAZNYE SROKI TRENIROVKI K GIPOKSII].
I. V. Khavkina.
Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 41-43. 9 refs. In Russian.

Experimental determination of the glycolysis rate and lactic acid content in the myocardium of rats during adaptation to hypoxia induced by simulation of altitudes of 2500 to 7600 m using a pressure chamber. With the adaptation of these rats to hypoxia, their heart muscles showed a gradually increased glycolysis rate. After ten days in the pressure chamber, the average glycolysis activity remained unaltered, while the dispersion value doubled in comparison to that of control rats. This seemed to indicate the beginning of the reconstruction of the tissue by glycolytic metabolism. By the thirtieth day, the glycolysis activity reached a maximum, exceeding the control value by 40%. In the course of adaptation of the rats to hypoxia, no lactic acid was accumulated in their myocardium. P. G. M.

A68-43886 #
COMPARATIVE TOXICOLOGICAL CHARACTERISTICS OF REGENERABLE ABSORBERS OF CARBON DIOXIDE [SRAVNITEL'NAIA TOKSIKOLOGICHESKAIA KHARAKTERISTIKA NEKOTORYKH REGENERIRUEMYKH POGLOTITELEI KISLOTNYKH GAZOV].
K. K. Sidorov, G. M. Gorban', and G. P. Tikhonova.
Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 44-49. 17 refs. In Russian.

Discussion of the toxicological characteristics of some regenerable absorbers of CO_2 belonging to the group of amino alcohols. These include monoethanol amine (MEA), monoethanol ethylene diamine (MEEDA), diethanol amine (DEA), and triethanol amine (TEA). The ability of these amino alcohols to absorb CO_2 was found to reduce MEA to TEA. The level of acute toxicity of the compounds was similar to the level obtained experimentally from different animal species. The mean lethal dose of amino alcohols for rats was 2050 mg/kg of MEA, 3600 mg/kg of MEEDA, 3460 mg/kg of DEA and 8400 mg/kg of TEA. Repeated administration of these compounds produced an opposite effect on the animals. The amino alcohols showed a distinct irritating effect of local nature. P. G. M.

A68-43887 #
USE OF HEAT TREATMENT IN AN INERT-GAS MEDIUM FOR REFINING ELASTIC FOAM POLYURETHANE IN ORDER TO REDUCE TOXIC OUTGASSING [PRIMENENIE TERMOOBRABOTKI V SREDE INERTNOGO GAZA DLIA "OBLAGORAZHIVANIIA" ELASTICHNOGO PENOPOLIURETANA S TSEL'IU SNIZHENIIA VYDELENIIA GAZOOBRAZNYKH TOKSICHESKIKH PRODUKTOV].
V. D. Iablochkin and A. M. Popov.
Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 49-51. 5 refs. In Russian.

Study of the application of heat treatments in an inert-gas atmosphere in order to improve elastic foam polyurethane in the sense of reducing the toxic outgassing of such products as acetone, isobutanol, carbon monoxide, carbon dioxide, ammonia, hydrocarbons, and nitrogen oxides. This treatment is shown to reduce the outgassing of toxic substances released by this construction material by a factor of two to five. Its mechanical properties are found to remain unchanged. P. G. M.

A68-43888 #
CERTAIN SPECIFIC FEATURES OF THERMAL MINERALIZATION OF BIOCOMPLEX WASTES IN CLOSED LIMITED SPACE [O NEKOTORYKH OSOBENNOSTIAKH TERMICHESKOI MINERALIZATSII PRODUKTOV ZHIZNEDEIATEL'NOSTI BIOKOMPLEKSA V ZAMKNUTYKH OGRANICHENNYKH PROSTRANSTVAKH].
B. G. Gusarov, L. B. Zarudnyi, O. R. Ivanov, and S. N. Shorin.
Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 51-56. 5 refs. In Russian.

Description of the technical characteristics of reactors for continuous high-temperature mineralization of biological wastes of closed life-support systems using material conversion cycles. Equations are derived to estimate the energy balance of such reactors as a function of the regeneration heat, reactor thermal losses, enthalpy of materials, temperature of the final products, formation energy of materials and products, and the ambient temperature. Temperature conditions required for obtaining a complete ashing of materials being mineralized in such reactors are given. The degree of particle division is noted as essential for the effective realization of the mineralization process. V. Z.

A68-43889 #
PRINCIPLES OF MEDICAL CONTROL UNDER CONDITIONS OF A LONG SPACE FLIGHT [PRINTSIPY MEDITSINSKOGO KONTROLIA V USLOVIIAKH DLITEL'NOGO KOSMICHESKOGO POLETA].
V. V. Parin, R. M. Baevskii, and Iu. G. Nefedov.
Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 57, 58. In Russian.

Outline of a computer-controlled program for onboard periodic medical checkups of spacecraft crews during extended space flights. General examinations with a maximum number of tests (carried out at least twice a month), tests of essential physiological functions at intervals of 7 to 10 days, and continuous tests during specific operations such as liftoff, touchdown, stay in free space, repair work, and passage through the radiation belts, are visualized. Also treated are examinations of saliva and enzyme activity, and immunological reactions of crew members as well as environmental parameter control. V. Z.

A68-43890 #
CERTAIN NEUROLOGICAL PROBLEMS OF SPACE MEDICINE [NEKOTORYE NEVROLOGICHESKIE PROBLEMY KOSMICHESKOI MEDITSINY].
A. G. Panov and V. S. Lobzin.
Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 59-67. 15 refs. In Russian.

Description of a simulation experiment carried out on a group of four healthy male persons 22 years old who were confined to a strict 72-day bed rest in an attempt to determine a hypokinetic condition which may affect spacecraft crew members during extended space flights. The three stages observed in the gradually developing reactions of the test persons to hypokinesia include a ten day period of adaptation with a diminished pulse, abdominal pains and general weakness, a ten day period of generally improved conditions with increasing calcium content in the blood plasma, increasing electroexcitability of the muscles, increased pulse rates and unstable arterial pressure, and a period of disorders in the higher nervous activity such as restless sleep, unmotivated anxiety, changes of mood, an urge to be moving, tremors, and general hyporeflexia. A decreased tolerance of acceleration is also noted in the subjects. V. Z.

A68-43891 #
SIMILAR TRENDS OF CHANGES IN THE OXYGEN REGIME OF MAN DUE TO BED REST AND CONFINEMENT IN A SEALED CHAMBER [ODNONAPRAVLENNOST' IZMENENII KISLORODNOGO REZHIMA CHELOVEKA, VYZVANNYKH POSTEL'NYM REZHIMOM I PREBYVANIEM V GERMOKAMERE].
L. R. Iseev and B. S. Katkovskii.
Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 67-72. 17 refs. In Russian.

Discussion of the results of two series of space flight hypokinesia simulation experiments in which the oxygen balance was studied in two groups of four healthy male persons 21 to 32 years old, confined (1) to a 20-day bed rest with and without physical exercises, or (2) to a four-month stay in a small sealed chamber

in which they performed prescribed physical exercises. The higher oxygen requirements and the lower efficiency of physical performance established by the tests for the subjects in both series of experiments are discussed. V. Z.

A68-43892 #
DYNAMICS OF THE DISCHARGE OF CERTAIN METABOLIC PRODUCTS IN MEN WEARING INSULATING SUITS [DINAMIKA VYDELENIIA NEKOTORYKH PRODUKTOV METABOLIZMA U CHELOVEKA, NAKHODIASHCHEGOSIA V IZOLIRUIUSHCHEM SNARIAZHENII].
S. M. Gorodinskii, A. D. Seriapin, A. N. Mazin, A. V. Sedov, G. A. Gaziev, A. P. Kleptsova, and L. I. Zhukova.
Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 72-76. 13 refs. In Russian.

Study of the discharge rates of metabolic products in a group of 17 healthy male subjects 27 to 47 years old, confined in a pressure chamber and wearing specially designed airtight rubber suits and gas masks. Measured amounts of oxygen (8 to 15 liters) were admitted into the previously evacuated suits, and CO_2, CO, hydrocarbons, acetone, phenol, NH_3, amines, H_2S, aldehydes, and oxidizable compounds were determined in the exhaled air, in the air of the suit, and in the condensates after experiments. Higher rates of discharge of these metabolic products were established when the subjects were exposed to physical stresses. V. Z.

A68-43893 #
SYSTEMS FOR PROCESSING PHYSIOLOGICAL DATA IN SPACE STUDIES [SISTEMY OBRABOTKI FIZIOLOGICHESKOI INFORMATSII V KOSMICHESKIKH ISSLEDOVANIIAKH].
A. P. Kalinovskii.
Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 76-82. 7 refs. In Russian.

Outline of a general scheme for automatic computer processing of physiological data in space flights, providing for the separation of these data from the bulk of information received, for their conversion into numbers, and for the transformation of these numbers into analyzable form. The capability of various computer types to perform this task is assessed, and suggestions are made concerning the choice of appropriate computers and computer programs. Also given are several specialized versions of this general scheme to be applied in specific physiological data-processing assignments, such as continuous, periodic, and sporadic onboard medical checkups with variable volumes of stored data. V.Z.

A68-43894 #
DAILY DYNAMICS OF CERTAIN PHYSIOLOGICAL FUNCTIONS AND PERFORMANCE OF MAN UNDER CONDITIONS OF ISOLATION [SUTOCHNAIA DINAMIKA NEKOTORYKH FIZIOLOGICHESKIKH FUNKTSII I RABOTOSPOSOBNOSTI CHELOVEKA V USLOVIIAKH IZOLIATSII].
A. N. Litsov.
Kosmicheskaia Biologiia i Meditsina, vol. 2, July-Aug. 1968, p. 83-86. 15 refs. In Russian.

Study of the EEG, heart beat and respiration rates, body temperature during wakefulness, motor activity during sleep, and physical and mental efficiency of a group of eight male subjects 25 to 38 years old performing assigned physical and mental tasks during a 10 to 12-day confinement in an anechoic chamber. Lower efficiency during the morning and evening hours than during the midday hours was established in the subjects, but no irregularities in the physiological functions were noted. V. Z.

A68-44023 #
STUDY OF UNICELLULAR ALGAE AS A POSSIBLE SOURCE OF FOOD [ISSLEDOVANIE ODNOKLETOCHNYKH VODOROSLEI KAK VOZMOZHNOGO ISTOCHNIKA PITANIIA].
V. P. Bychkov, Iu. I. Kondrat'ev, and A. S. Ushakov.
IN: PROBLEMS OF CREATING CLOSED ECOLOGICAL SYSTEMS [PROBLEMY SOZDANIIA ZAMKNUTYKH EKOLOGICHESKIKH SISTEM].
Edited by A. A. Nichiprovich and G. M. Lisovskii.
Moscow, Izdatel'stvo Nauka, 1967, p. 52-55. In Russian.

Description of the physiological effects of diets with additions of a dry biomass of Chlorella/Scenedesmus on a group of healthy male subjects. The development of various minor disorders, and other more persistent ones, such as nausea, heartburn, depressed appetite, itching, and toe cyanosis in test subjects is indicated. V. Z.

A68-44035 #
INFLUENCE OF THE COMBINED EFFECTS OF GAMMA RADIATION AND SPACE FLIGHT FACTORS ON BARLEY SEEDS IN DIFFERENT PHYSIOLOGICAL STATES [VLIIANIE KOMBINIROVANNOGO VOZDEISTVIIA GAMMA-OBLUCHENIIA I FAKTOROV KOSMICHESKOGO POLETA NA SEMENA IACHMENIA, NAKHODIASHCHIESIA V RAZLICHNOM FIZIOLOGICHESKOM SOSTOIANII].
I. I. Nuzhdin and R. L. Lozortseva.
IN: EXPERIMENTAL STUDIES ON THE EFFECTS OF IONIZING RADIATION ON THE ORGANISM [EKSPERIMENTAL'NYE RABOTY PO VLIIANIIU IONIZIRUIUSHCHIKH IZLUCHENII NA ORGANIZM].
Edited by N. I. Nuzhdin.
Moscow, Izdatel'stvo Nauka, 1967, p. 3-29. 46 refs. In Russian.

Description and results of experimental studies carried out on board the space ship Voskhod I, to investigate the influence of the combined effect of gamma radiation and space flight factors (SFF) on air-dried seeds of the barley Wintering Moscow in different physiological states. This form of barley is stable and enters a state of organic dormancy after maturation. Both nonirradiated seeds and seeds irradiated by gamma rays were sent into orbit. Two control groups were kept on earth. The germination characteristics of all the seeds were determined. It was found that gamma radiation without SFF did not raise the germination threshold; but that SFF stimulated the germination of seeds which were preradiated. Other cytological effects of gamma radiation and SFF were determined. P.G.M.

A68-44051 *
ANXIETY, ATTENTIVENESS-ALERTNESS - A PHENOMENOLOGICAL STUDY OF THE CNV.
Morton D. Low, Alfred C. Coats, Gayle M. Rettig, and Joseph W. McSherry (Baylor University, College of Medicine, Dept. of Physiology and Methodist Hospital, Dept. of Clinical Neurophysiology, Houston, Tex.).
Neuropsychologia, vol. 5, 1967, p. 379-384. 9 refs.
NIH Grant No. MH-05204; Grants No. NsG-390; No. NsG-44-003-001.

Study of the concept of the "contingent negative variation" (CNV) of Walter (1964), a slow, surface-negative potential which appears maximally in frontal regions of the brain of man during psychophysiological states of "preparation set." CNV is shown, in a nonpatient population (1) to have no consistent relation to subject scores on an objective measure of manifest anxiety (IPAT Self-Analysis Form) in a nonstressful experimental situation, and (2) to increase in amplitude and decrease in variability with heightened attentiveness-alertness. F. R. L.

A68-44052
OXYGEN POISONING IN VARIOUS MAMMALIAN SPECIES AND THE POSSIBLE ROLE OF GAMMA-AMINOBUTYRIC ACID METABOLISM.
J. D. Wood, W. J. Watson, and A. J. Ducker (Defence Research Establishment, Toronto, Canada).
Journal of Neurochemistry, vol. 14, 1967, p. 1067-1074. 28 refs.

Quantitative study of the susceptibility to high-pressure oxygen (OHP) seizures of the mouse, rat, hamster, guinea pig, and rabbit, and comparison with the respective levels of gamma-aminobutyric acid (GABA) and the activities of glutamic acid decarboxylase (GAD) and aminobutyrate transaminase (GABA-T) in the brain. The effect of OHP on these levels and activities was also determined. Susceptibility to OHP-induced seizures, in decreasing order of susceptibility, was observed in the mouse, hamster, rabbit, rat, and guinea pig. GAD is very sensitive to OHP but GABA-T is relatively unaffected. F. R. L.

A68-44053 *
SOME MORPHOLOGIC AND BIOCHEMICAL OBSERVATIONS OF SEMEN IN NEMESTRINA MONKEYS DESTINED FOR SPACE FLIGHT.

R. C. Reznichek, J. D. Roussel, N. L. Mangelson, R. T. Kado, and A. T. K. Cockett (Harbor General Hospital, Dept. of Surgery/Urology, Torrance; California, University, Brain Research Institute, Space Biology Laboratory, Los Angeles, Calif.).
(American Fertility Society, Annual Meeting, 15th, Scottsdale, Ariz., Sept. 28-Oct. 1, 1967.)
Fertility and Sterility, vol. 19, May-June 1968, p. 376-381. 7 refs.
Contract No. NAS 2-2151; Grants No. NsG-237-62; No. NsG-05-007-003.

Preliminary report of some base-line observations of semen in a male Macaca nemestrina monkey (weighing 15 lb) which was being studied for a possible 30-day primate orbital space flight. Determination of the percentage of live spermatozoa, the results of which were often at variance with those of the mobility studies, would seem to be a useful addition to the standard morphologic examination. Fructose, lactic acid, and citric acid levels were determined. Consistent lower fructose and higher lactic acid values were observed in liquefied coagulum. M. G.

A68-44056 *
EFFECT OF TEMPERATURE ON METABOLIC RATES OF LIVER AND BROWN FAT HOMOGENATES.
Jane C. Roberts and Robert E. Smith (California, University, School of Medicine, Dept. of Physiology, Los Angeles; California, University, School of Veterinary Medicine, Dept. of Physiological Sciences, Davis, Calif.).
Canadian Journal of Biochemistry, vol. 45, 1967, p. 1763-1771. 39 refs.
PHS Grant No. HD-01826; Grants No. NsG-721; No. NGR-05-004-035.

Investigation of the effects of temperature in vitro on metabolic rates of homogenates of brown fat and liver from control and cold-acclimated rats over the range from 10 to 37°C. At all temperatures, brown adipose tissue exhibits a higher rate of oxygen consumption (Q_{O_2}) than does liver, α-ketoglutarate being used as substrate. At 10°C, brown adipose tissue retains a larger percentage (36 to 38%) of its 37°C metabolic rate than does liver (22 to 24%). Q_{10} values and energies of activation have been determined and compared with other data reported for these tissues. In view of previously reported cold-induced increases in mass, vascularity, and Q_{O_2} of brown fat, the decreased temperature sensitivity in the cold-acclimated rats appears wholly consonant with the adaptive behavior of brown fat in its role as a thermogenic effector. M. M.

A68-44060 *
EFFECTS OF GRAVITATIONAL CHANGES ON RNA OF CEREBRAL NEURONS AND GLIA. I - RNA CHANGES OF DEITERS' CELLS AND GLIA.
R. G. Grenell, H. Hazama, M. Nakazawa, and E. Einberg (Maryland, University, School of Medicine, Psychiatric Institute, Section of Neurobiology, Bethesda, Md.).
Brain Research, vol. 9, 1968, p. 115-125. 12 refs.
Grants No. NsG-566; No. NsG-21-002-026.

Discussion of experiments in which rats were exposed to altered gravitational fields in a specially constructed centrifuge for periods of 1, 4, 8, and 12 hr and for 1, 7, and 30 days. The total RNA content of the large Deiters' cells of the lateral vestibular nucleus was analyzed after each period of exposure, as well as 1 and 2 weeks after the experiments. The RNA content of glia associated with the Deiters' cells was measured in some cases, and the bases in control Deiters' cells were analyzed, together with those from animals exposed to 1.65 g for 1 day. The observed changes in total RNA content indicate a period of stimulation during the first 12 hr of exposure (as shown by an increase); after 1, 7, and 30 days, there is a marked decline RNA content, which appears greatest after 1 day of exposure. During the two-week period following the termination of the experiment, the animals exposed for 1 day show a return toward normal; the cells of the 7- to 30-day animals, however, contain a higher than normal RNA content after 1 week, which declines again by the end of the second week. The changes in RNA content of the glia follow those of the neurons with increasing similarity. Thus, the experimental conditions have a pronounced effect on the RNA levels and synthesis in Deiters' cells and associated glia. Certain further experiments designed to clarify some of the many still unresolved areas are discussed. V. P.

A68-44067 #
PROTECTION FROM RADIATION IN SPACE FLIGHTS [ZASHCHITA OT RADIATSII PRI KOSMICHESKIKH POLETAKH].
E. E. Kovalev.
IN: PROBLEMS OF DOSIMETRY AND RADIATION PROTECTION [VOPROSY DOZIMETRII I ZASHCHITY OT IZLUCHENII].
Edited by L. R. Kimel'.
Moscow, Atomizdat (Moskovskii Ordena Trudovogo Krasnogo Znamei Inzhenerno-Fizicheskii Institut, No. 7), 1967, p. 24-32. 8 refs. In Russian.

Review and summary of the results from Soviet and U. S. studies on space radiation conditions, criteria concerning radiation danger for various kinds of space flights, the expected dose reduction by the use of shielding, and optimal shielding of spacecraft. Known values are given for galactic space radiation, which varies with stages of solar activity and with stages of the radiation belt created by the geomagnetic field. Solar corpuscular irradiation is evaluated. The determination of radiation criteria is considered. With respect to duration, 1 to 2 months at a dose of 15 rem are considered admissible. Danger is assumed at 50 rem, and radiobiological effects are expected in the range from 150 to 200 rem. M. G.

A68-44072 #
CHARACTERISTICS OF COSMONAUT WORK ACTIVITIES DURING PROLONGED SPACE FLIGHTS [NEKOTORYE OSOBENNOSTI TRUDOVOI DEIATEL'NOSTI KOSMONAVTOV V DLITEL'NOM KOSMICHESKOM POLETE].
N. N. Gurovskii.
IN: STUDIES ON THE PSYCHOPHYSIOLOGY OF THE WORK OF COSMONAUTS [OCHERKI PSIKHOFIZIOLOGII TRUDA KOSMONAVTOV].
Edited by N. N. Gurovskii.
Moscow, Izdatel'stvo Meditsina, 1967, p. 5-13. In Russian.

The article deals with the problem of composing a work schedule for cosmonauts. The task is complicated by the facts that there are no experiences that can be taken for a basis and that the psychological and physiological condition of a cosmonaut during a prolonged spaceflight (under the effects of weightlessness, confinement, monotony, and the feeling of being cut off from the earth) would be different from that in any laboratory experiment. A rational organization of rest time should compensate for the lack of movement and strain of constant attentiveness during the shift at the control panel. (ATD/LC)

A68-44073 #
PHYSIOLOGICAL BASIS OF HUMAN ADAPTATION TO SPECIFIC WORK CONDITIONS [FIZIOLOGICHESKOE OBOSNOVANIE PRISPOSOBLENIIA CHELOVEKA K SPETSIFICHESKIM USLOVIIAM DEIATEL'NOSTI].
S. A. Kosilov and B. A. Dushkov.
IN: STUDIES OF THE PSYCHOPHYSIOLOGY OF THE WORK OF COSMONAUTS [OCHERKI PSIKHOFIZIOLOGII TRUDA KOSMONAVTOV].
Edited by N. N. Gurovskii.
Moscow, Izdatel'stvo Meditsina, 1967, p. 14-32. 38 refs. In Russian.

Discussion of fatigue encountered by cosmonauts and the urgent need for a scientifically based fatigue-prevention program. An effective method of preventing fatigue is a rational work and rest schedule. Physical and mental fatigue, adaptation to altered circadian rhythms, and mechanisms of such adaptation are treated in detail. The complicating effects of weightlessness and emotional tension on fatigue and biorhythms are considered, and the use of hypnosis, electrosleep, and drugs is suggested as a means of facilitating adaptation to the working conditions prevailing during prolonged space flights. I. P.

A68-44074 #
RATIONAL ESTABLISHMENT OF COSMONAUT WORK SCHEDULES [O RATSIONAL'NOM POSTROENII REZHIMA TRUDA KOSMONAVTOV].
F. P. Kosmolinskii and B. A. Dushkov.

IN: STUDIES ON THE PSYCHOPHYSIOLOGY OF THE WORK OF COSMONAUTS [OCHERKI PSIKHOFIZIOLOGII TRUDA KOSMONAVTOV].
Edited by N. N. Gurovskii.
Moscow, Izdatel'stvo Meditsina, 1967, p. 32-39. 13 refs. In Russian.

Review of known data on work-rest schedules in relation to fatigue and environmental factors of cosmonauts. Studied are the effects of various space-flight factors such as hypodynamia, sensory deprivation, eye fatigue, crew size, and mission duration, which have to be taken into account with the development of proper work-rest schedules for specific mission profiles. I.P.

A68-44075 #
SENSORY DEPRIVATION DURING SPACE FLIGHT [SENSORNAIA DEPRIVATSIIA V KOSMICHESKOM POLETE].
F. P. Kosmokinskii and Z. D. Shcherbina.
IN: STUDIES ON THE PSYCHOPHYSIOLOGY OF THE WORK OF COSMONAUTS [OCHERKI PSIKHOFIZIOLOGII TRUDA KOSMONAVTOV].
Edited by N. N. Gurovskii.
Moscow, Izdatel'stvo Meditsina, 1967, p. 39-58. 54 refs. In Russian.

Effects of sensory deprivation expressed as emotional, sympathetic, and brain-function changes are discussed, and their mechanisms are described. Experiments of Western scientists are criticized as irrelevant to the situations actually possible in a spacecraft. The difference of the psychological state of an experimental subject and a cosmonaut fulfilling his mission is also regarded as very important. Construction of a spacecraft satisfying individual needs of the cosmonauts, physical excercise, use of drugs, careful choice of psychologically compatible crew members, and their instruction concerning the possible symptoms of sensory deprivation are suggested as preventive measures. (ATD/LC)

A68-44076 #
EFFECT OF CHANGED AFFERENTATION ON THE HUMAN BODY [VLIIANIE NA ORGANIZM CHELOVEKA IZMENENNOI AFFERENTATSII].
F. P. Kosmolinskii.
IN: STUDIES ON THE PSYCHOPHYSIOLOGY OF THE WORK OF COSMONAUTS [OCHERKI PSIKHOFIZIOLOGII TRUDA KOSMONAVTOV].
Edited by N. N. Gurovskii.
Moscow, Izdatel'stvo Meditsina, 1967, p. 59-68. 30 refs. In Russian.

The author examines sensory deprivation as a sum of insufficient external and internal afferentation (the latter due to weightlessness and hypodynamia) and points out the stress occurring when excess afferentation suddenly replaces sensory deprivation, as may happen during special work assignments or emergency situations. He recommends physical exercise as a means of maintaining physiological tonus, work capacity, and psychic stability. He also suggests a pleasant interior arrangement of the cabin, use of drugs, and special self-control training, and speculates on the possibility of compensating for the functional atrophy of the muscular analysor by intensified functioning of the visual and auditory analysors. (ATD/LC)

A68-44077 #
PRINCIPLES AND RESEARCH METHODS OF THE SPACE DAY PROBLEM [PRINTSIPY I PUTI ISSLEDOVANIIA PROBLEMY KOSMICHESKIKH SUTOK].
B. S. Aliakrinskii.
IN: STUDIES ON THE PSYCHOPHYSIOLOGY OF THE WORK OF COSMONAUTS [OCHERKI PSIKHOFIZIOLOGII TRUDA KOSMONAVTOV].
Edited by N. N. Gurovskii.
Moscow, Izdatel'stvo Meditsina, 1967, p. 68-76. 14 refs. In Russian.

The author discusses factors determining the work/rest regime for cosmonauts, including the characteristics and aftereffects of the work at control panels, artificial light, characteristics of muscular activity, and number of crew members and their individual adaptability. He also reviews the results of experiments and observations on adaptability to changed circadian rhythms, offers a variety of day lengths and emphasizes the importance of experiments in which only one factor is changed at a time. As an object of further research programs he recommends such factors influencing adaptation as drugs, afferentation changes, psychological training, and the creation of methods for determining individual adaptability. (ATD/LC)

A68-44078 #
EFFECTS OF VARIOUS WORK AND REST SCHEDULES ON THE FUNCTIONAL CONDITION OF MAN DURING PROLONGED CONFINEMENT IN HERMETICALLY SEALED CABINS [VLIIANIE RAZLICHNYKH REZHIMOV TRUDA I OTDYKHA NA FUNKTSIONAL'NOE SOSTOIANIE CHELOVEKA PRI DLITEL'NOM PREBYVANII V GERMOKAMERE].
A. A. Veselova, N. N. Gurovskii, B. A. Dushkov, V. V. Zhuravlev, S. N. Zaloguev, P. R. Iseev, Z. M. Karelina, M. I. Kozar', F. P. Kosmolinskii, E. M. Krutova, G. M. Manovtsev, Iu. G. Nefedov, and V. M. Shilov.
IN: STUDIES ON THE PSYCHOPHYSIOLOGY OF THE WORK OF COSMONAUTS [OCHERKI PSIKHOFIZIOLOGII TRUDA KOSMONAVTOV].
Edited by N. N. Gurovskii.
Moscow, Izdatel'stvo Meditsina, 1967, p. 76-106. 10 refs. In Russian.

Experiments with 24- and 18-hr-day schedules in hermetically sealed cabins have shown a general decrease in mental and physical capability. Concentration diminished; the subjects needed more time to memorize assigned tasks and forgot them more easily; and the thinking processes became slower and less effective. Body temperature, weight, and respiration showed slight deviations, while arterial pressure, pulse rate, muscular force and tonus motor coordination, erythrocyte resistance, and natural immunity showed considerable unfavorable changes. In the 24-hr-day experiment, functional changes were more pronounced in subjects whose rest periods were scheduled during the astronomical day, while the most significant deviations were observed in the 18-hr-day experiment. (ATD/LC)

A68-44079 #
EFFECT OF ALTERED DAILY ACTIVITY SCHEDULE ON THE HUMAN ORGANISM DURING CONFINEMENT [VLIIANIE IZMENENIIA REZHIMA SUTOCHNOI DEIATEL'NOSTI NA ORGANIZM CHELOVEKA V USLOVIIAKH IZOLIATSII].
V. I. Miasnikov.
IN: STUDIES ON THE PSYCHOPHYSIOLOGY OF THE WORK OF COSMONAUTS [OCHERKI PSIKHOFIZIOLOGII TRUDA KOSMONAVTOV].
Edited by N. N. Gurovskii.
Moscow, Izdatel'stvo Meditsina, 1967, p. 107-125. 27 refs. In Russian.

The author underlines the importance of a carefully organized work and rest schedule for cosmonauts and points out the difficulty of the task. He then describes a series of confinement experiments with different work and rest schedules and discusses the physiological and neuropsychological effects. Changes in physiological functions producing fatigue, poor sleep, reduction of working capacity, slowness of reaction, dozing during work time and hallucinations, could seriously impair the fulfillment of a mission. In order to make any given schedule effective, means should be found to keep the duration and depth of sleep under control. (ATD/LC)

A68-44080 #
WORKING CAPACITY AND HIGHER NERVOUS ACTIVITY OF MAN FOLLOWING VARIOUS WORK AND REST SCHEDULES [RABOTOSPOSOBNOST' I SOSTOIANIE VYSSHEI NERVNOI DEIATEL'NOSTI PRI RAZLICHNYKH REZHIMAKH ZHIZNI LIUDEI].
M. A. Gerd.
IN: STUDIES ON THE PSYCHOPHYSIOLOGY OF THE WORK OF COSMONAUTS [OCHERKI PSIKHOFIZIOLOGII TRUDA KOSMONAVTOV].
Edited by N. N. Gurovskii.
Moscow, Izdatel'stvo Meditsina, 1967, p. 126-136. 5 refs. In Russian.

The paper is based on experiments performed in conditions imitating certain features of a spacecraft with a three-man crew. The working capacity of the subjects was controlled during the experiment, and the condition of higher nervous activity was tested before and after the experiment. Reactions of the subjects whose sleep was scheduled during daytime slowed down considerably in the beginning of the experiment, normalized as the subjects adjusted to the new situation, and slowed down toward the end of the experiment as a result of fatigue. The EEG tests showed a predomination of stimulatory processes which developed and then disappeared rapidly. The inhibition processes were also weakened. (ATD/LC)

A68-44081 #
SIGNIFICANCE OF MUSCULAR ACTIVITY FOR CONSERVING THE STABILITY OF THE MOTOR FUNCTION OF A COSMONAUT [ZNACHENIE MYSHECHNOI AKTIVNOSTI DLIA SOKHRANENIIA USTOICHIVOSTI DVIGATEL'NOI FUNKTSII KOSMONAVTA].
A. V. Korobkov and B. A. Dushkov.
IN: STUDIES ON THE PSYCHOPHYSIOLOGY OF THE WORK OF COSMONAUTS [OCHERKI PSIKHOFIZIOLOGII TRUDA KOSMONAVTOV].
Edited by N. N. Gurovskii.
Moscow, Izdatel'stvo Meditsina, 1967, p. 148-159. 17 refs. In Russian.

The authors point out the role of stability of motor function in the development of several mental, physiological, and biochemical processes and the importance of physical training for better adaptation to environmental changes (altered gas mixture, temperature, radiation) and for compensation of the injurious effects of space-flight factors. Muscular weakness and even atrophy caused by weightlessness, and decrease of motor coordination and general resistance caused by hypodynamia, should be prevented by adequate physical exercises. The exercises should also improve emotional condition and adaptation to prescribed work and rest schedules. The selection and organization of the exercises should be based on the characteristics of cosmonaut's activities, and on the space-flight-conditioned changes of physiological mechanisms. The physical exercises should be divided in several short periods and performed during work and rest periods. Various types of exercises (inertial, isometric, relaxational, and exercises with an expander, weights, and veloergometer) applied during prolonged hypodynamia and altered daily rhythm experiments caused increase of muscular force and maintained work capacity at a high level. (ATD/LC)

A68-44082 #
INVESTIGATION OF THE HUMAN MOTOR FUNCTION UNDER THE CONDITIONS OF AN ALTERED DAILY RHYTHM [ISSLEDOVANIE DVIGATEL'NOI FUNKTSII CHELOVEKA V USLOVIIAKH IZMENENNOGO SUTOCHNOGO REZHIMA].
V. M. Devishvili, B. A. Dushkov, A. V. Korobkov, M. M. Mirskii, G. G. Ratishvili, and I. P. Ratov.
IN: STUDIES ON THE PSYCHOPHYSIOLOGY OF THE WORK OF COSMONAUTS [OCHERKI PSIKHOFIZIOLOGII TRUDA KOSMONAVTOV].
Edited by N. N. Gurovskii.
Moscow, Izdatel'stvo Meditsina, 1967, p. 159-167. In Russian.

Study of the effects of an altered daily rhythm on muscular functions based on experiments with an 18-hr daily rhythm in hermetically sealed cabins. The ability to perform the correct muscular expenditure and appreciation of time in seconds were also observed. Special attention was given to the capacity of intentionally straining and relaxing the skeletal muscles, and the latent time of these actions was recorded. The considerable variations observed in the parameters of muscular strength, muscular endurance, sensation of muscular articulation, and time appreciation are due to individual differences in adaptability to the altered daily rhythm. The fact that the altered daily rhythm did not induce significant changes in the strength and endurance of the basic muscular groups indicates that the organization of motion activities of the subjects during the experiment was appropriate. (ATD/LC)

A68-44083 #
CHANGES IN THE INDICES OF EXTERNAL RESPIRATION, GAS EXCHANGE, AND ENERGY EXPENDITURE DURING WEIGHTLESSNESS [IZMENENIE POKAZATELEI VNESHNEGO DYKHANIIA, GAZOOBMENA I ENERGOTRAT V USLOVIIAKH NEVESOMOSTI].
I. I. Kas'ian, G. F. Makarov, and B. V. Blinov (Akademiia Nauk SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 18th, Belgrade, Yugoslavia, Sept. 24-30, 1967, Paper. 15 p. 18 refs. In Russian.

Discussion of the functional state of external respiration, gas exchange, and energy expenditure based on data concerning the effects of brief weightlessness produced during parabolic flights. During the brief period of weightlessness, a higher level of gas exchange was observed in all cases in comparison to the initial values and to the values measured during acceleration. Oxygen consumption increased by 75 to 215 ml/min, energy expenditure increased by 0.36 to 1.0 kcal/min, and in six cases, per-minute respiration volume increased by 0.4 to 4.2 ℓ/min. Pulmonary vital capacity and the structure of the respiratory cycle were also found to increase. It is shown that wearing a space suit caused even greater shifts in the indices under study. Measurements were performed both during quiet and work periods. M.G.

A68-44084 #
CHANGES IN HUMAN TOLERANCE TO TRANSVERSE ACCELERATIONS FOLLOWING HYPODYNAMIA OF VARYING DURATION [IZMENENIE PERENOSIMOSTI CHELOVEKOM POPERECHNYKH PEREGRUZOK POSLE GIPODINAMII RAZLICHNOI PRODOLZHITEL'NOSTI].
A. R. Kotovskaia, R. A. Vartbaronov, and S. F. Simpura (Akademiia Nauk SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 18th, Belgrade, Yugoslavia, Sept. 24-30, 1967, Paper. 18 p. 28 refs. In Russian.

Investigation of human tolerance to transverse accelerations after hypodynamia as a factor useful for predicting the physiological effects of reentry. The results indicate that 3-day hypodynamia has no noticeable effects on human tolerance to acceleration stress, while 15 to 20-day hypodynamia reduces to tolerance by 2.4 g. A 60-day hypodynamia, however, did not involve any further reduction in tolerance. All subjects regained their initial tolerance levels after 15 to 50 days following the termination of two-month hypodynamia. This applies also to the reactions of the cardiovascular and respiratory systems to acceleration after hypodynamia. V.P.

A68-44085 #
PECULIARITIES OF THE AUDITORY ANALYSOR FUNCTION DURING PROLONGED EXPOSURE OF MAN TO AN ALTERED GAS MEDIUM [OSOBENNOSTI FUNKTSII SLUKHOVOGO ANALIZATORA PRI DLITEL'NOM PREBYVANII CHELOVEKA V USLOVIIAKH IZMENENNOI GAZOVOI SREDY].
E. M. Iuganov, Iu. V. Krylov, and V. S. Kuznetsov (Akademiia Nauk SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 18th, Belgrade, Yugoslavia, Sept. 24-30, 1967, Paper. 9 p. 10 refs. In Russian.

Investigation of the human auditory analysor function at barometric pressures on the order of 380 mm Hg and normal oxygen partial pressure. The effects of atmospheres containing up to 2% CO_2 and of breathing helium-oxygen mixtures are also studied. Dynamic audiometry and investigations of the inverse adaptation time revealed no deviations in excess of the normal physiological fluctuations. The human auditory analysor is found to be highly stable during prolonged exposures to artificial atmospheres. V.P.

A68-44086 #
INVESTIGATION OF VISUAL CAPACITY DURING SPACE FLIGHT [ISSLEDOVANIE ZRITEL'NOI RABOTOSPOSOBNOSTI V KOSMICHESKOM POLETE].

E. A. Ivanov, V. A. Popov, and L. S. Khachatur'iants (Akademiia Nauk SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 18th, Belgrade, Yugoslavia, Sept. 24-30, 1967, Paper.
9 p. In Russian.

Analysis of the effects of space-flight factors on human visual performance. The results of aircraft parabolic-flight experiments are discussed in terms of the effects of short-term weightlessness on vision. The Voskhod program involved tests of the resolution of the visual analysor of astronauts under conditions of weightlessness, and the results indicated that the visual resolution was almost unchanged. Visual capacity was also studied and shown to deteriorate during flight. Objective perception of color was examined and the largest recognition errors were reported with purple, azure, and green. Minimum errors occurred with red. The functional capacity of the visual analysor undergoes definite changes in flight. The exact nature of the effects requires further study.
T. M.

A68-44087 #
INVESTIGATION OF THE LONG-TERM EFFECT OF A LOW-PRESSURE OXYGEN ATMOSPHERE ON ANIMALS AND HUMAN BEINGS [ISSLEDOVANIE DLITEL'NOGO VOZDEISTVIIA NA ZHIVOTNYKH I CHELOVEKA KISLORODNOI ATMOSFERY S PONIZHENNYM DAVLENIEM].
A. M. Genin, S. G. Zharov, E. Ia. Kaplan, V. V. Ogleznev, and V. I. Solov'ev (Akademiia Nauk SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 18th, Belgrade, Yugoslavia, Sept. 24-30, 1967, Paper.
14 p. 8 refs. In Russian.

Discussion of experiments aimed at studying the effect of 90 to 94% oxygen atmospheres at pressures corresponding to 7000 to 10,000 m on human beings, mice, rabbits, and rats. The exposure times were 2 and 30 days. The results of physiological and biochemical investigations indicate that the environmental conditions studied did not create any adaptive difficulties for the organism. Changes in the physiological and biochemical indices are attributable to the activity (exercises) of the subjects and to the duration of the experiments to a much greater degree than to atmospheric pressure or oxygen partial pressure.
V. P.

A68-44088 #
CURRENT STATE AND PROSPECTS OF STUDYING THE HUMAN CARDIOVASCULAR SYSTEM IN SPACE FLIGHTS [SOVREMENNOE SOSTOIANIE I PERSPEKTIVY ISSLEDOVANIIA SERDECHNO-SOSUDISTOI SISTEMY CHELOVEKA V KOSMICHESKIKH POLETAKH]
I. T. Akulinichev, V. A. Degtiarev, and D. G. Maksimov (Akademiia Nauk SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 18th, Belgrade, Yugoslavia, Sept. 24-30, 1967, Paper.
10 p. 15 refs. In Russian.

Evaluation of various methods for studying the human cardiovascular system during space flight, and analysis of the problems which must be solved to determine the effects of space-flight factors on the functioning of the system. The general condition of the heart in flight can be determined by electrocardiogram, phonocardiogram, and seismocardiogram measurements. The determination of the duration of different phases of the cardiac cycle, the relationship between the electrical and mechanical systoles, and the amplitude of the cardiac tone may be used to study endocardial hemodynamics. Additional measurements should include the arterial blood pressure, the circulatory volume, and the blood flow rate. The use of an onboard computer to process data is discussed.
T. M.

A68-44089 #
BIOENGINEERING PROBLEMS ASSOCIATED WITH THE HABITABILITY OF SPACECRAFT AND PLANETARY STATIONS [BIOLOGO-TEKHNICHESKIE VOPROSY OBITAEMOSTI KOSMICHESKIKH KORABLEI I PLANETNYKH STANTSII].
B. A. Adamovich and Iu. G. Nefedov (Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 18th, Belgrade, Yugoslavia, Sept. 24-30, 1967, Paper.
9 p. In Russian.

Discussion of the major problems associated with life-support systems and spacecraft habitability. Major biomedical problems, such as developing efficient training methods for cosmonauts, determining the physiological reactions of individuals to space-flight factors, establishing permissible limits of cabin environments, and ensuring conditions under which crew members could perform adequately for long periods of time are examined. The functions of a life-support system are reviewed in terms of such requirements as providing cosmonauts with food, water, oxygen, removing carbon dioxide and other harmful substances, processing metabolic wastes, maintaining proper temperature and biochemical monitoring, and protecting against cosmic radiation. The types of life-support system required for missions of different length are reviewed, and the need for minimizing their weight is emphasized. The various methods of providing cosmonauts with oxygen, food, and water are noted, and the problem of regeneration is examined.
V. P.

A68-44090 #
SPACECRAFT ENVIRONMENT AND TOLERANCE TO HYPOXIA [USLOVIIA OBITANIIA V GERMOKABINAKH I PERENOSIMOST' GIPOKSII].
N. A. Agadzhanian, I. N. Zakhorova, L. V. Kaliuzhnyi, and A. V. Sergienko (Ministerstvo Zdravookhraneniia SSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 18th, Belgrade, Yugoslavia, Sept. 24-30, 1967, Paper.
13 p. In Russian.

Study of the effects of various rates of decompression on living objects. The experimental investigation combines the study of conditioned reflex activity with changes in EEG in unrestrained animals subjected to hypoxia, with the purpose of establishing a correlation between changes in the bioelectrical activity of the brain and conditioned reflex activity under hypoxic conditions. It is shown that as the six test rabbits were "elevated" in a pressure chamber at a rate of 25 m/sec, at least two qualitative stages of changes in their behavior were reflected in the conditioned reflex and the EEG - the first at 3000 m where a diminution of conditioned reflexes takes place and the second at 6000 m where feeding reflexes disappear but defensive reflexes are retained. It is found that the energy (amplitude) of the delta waves drops by 25 to 50% from initial levels upon "elevation," indicating that at those altitudes a stimulation of brain structures takes place which correlates with changes of higher activity noted earlier. At 5000 and 7000 m the second qualitative increase takes place, related to the dominance of the function of the adrenergic system of the brain (particularly of the reticular formation of the brainstem and the hypothalamus). Other tests showed that in both humans and animals a minimum of 26 to 28 days is necessary for full alpine acclimatization, and that high-altitude tolerance depends not only on the cabin environment but also on the time of day and on seasonal changes. It is concluded that it is necessary to formulate optimum conditions in spacecraft cabin environments and to organize a satisfactory work-rest schedule.
I. P.

A68-44091 #
EFFECT OF 62-DAY HYPODYNAMIA ON THE HUMAN ORGANISM [VLIIANIE 62-SUTOCHNOI GIPOKINEZII NA ORGANIZM CHELOVEKA].
T. V. Benevolenskaia, M. M. Korotaev, T. N. Krupina, I. A. Maslov, G. P. Mikhailovskii, T. A. Petrova, K. V. Smirnov, and I. Ia. Iakovleva (Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 18th, Belgrade, Yugoslavia, Sept. 24-30, 1967, Paper.
8 p. In Russian.

Results of a hypodynamia experiment in which the central nervous system, the cardiovascular system (and the eyes, ears, nose, throat, and kidneys), and gastric secretion, morphological composition of the blood, and immunological reactivity were studied in a group of six healthy men 23 to 36 years old, confined to 62 days' bed rest. The disorders which developed in the subjects successively during the experiment are described as physical discomfort observed between the third and sixth day, adaptation to the environ-

mental conditions between the seventh and twentieth day, development of asthenia between the twentieth and thirty-fifth day, and asthenia progress during the rest of the period. The diastolic pressure in the central artery of the retina gradually increased, reaching a peak between the thirty-second and the forty-second days, while - on the other hand - atrioventricular conduction decreased during the experiment, especially in the three of the subjects who performed physical exercises. Decreased gastric secretion, increased diuresis and a sharp reduction in general organic reactivity with the progress of the experiment are also noted.

V. Z.

A68-44099 #

TYPES OF VEGETATIVE SHIFTS IN MAN INDUCED BY EMOTIONAL STRESS [TIPY VEGETATIVNYKH SDVIGOV U CHELOVEKA PRI EMOTSIONAL'NOM NAPRIAZHENII].

L. P. Grimak and V. A. Ponomarenko.

Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 17, May-June 1967, p. 408-412. 10 refs. In Russian.

Study of cardiovascular and respiratory reactions to stress situations in parachutists and pilots. Plethysmograms, oscillograms, and electrocardiograms were recorded continuously during a simulated jump (using hypnosis). Experienced pilots were also studied under actual flying conditions with automatic controls failing to operate on landing. Three distinct types of vegetative shifts in response to stress stimuli are revealed. It is found that the type of reaction to a stress stimulus does not directly reflect the quality of performance but rather the typical features of higher nervous activity and the degree of experience. Individual functional variations can help test reactions under critical conditions and evaluate reliability of automatic control operators. I. P.

A68-44102 #

INCREASING MAN'S STATOKINETIC STABILITY [O POVYSHENII STATOKINETICHESKOI USTOICHIVOSTI CHELOVEKA].

V. I. Kopanev, V. Ia. Lopukhin, and V. G. Strelets.

Voenno-Meditsinskii Zhurnal, no. 3, 1968, p. 58-61. In Russian.

Study of the role of physical exercises and sports activities in increasing the statokinetic stability in space travelers. Tests were conducted with 237 athletes and 22 control subjects exposed to an accelerated Coriolis force in a Barany chair for up to 5 min at 15 rpm with eyes open, head inclined, and torso forward. Evaluations were made from subjective and objective symptoms. The data indicate that athletes, as a rule, had higher statokinetic stability than nonathletes, with highest ranking shown by divers, figure skaters, swimmers, gymnasts, and basketball players. Symptoms appeared later in athletes than in the control group, with the exception of trackmen, oarsmen, and pole vaulters. The effect of swimming on statokinetic stability was tested on two groups: one with ordinary strokes, the other with movements revolving around the longitudinal axis of the body ("corkscrew crawl"). The increase in stability achieved by training in regular strokes was lost in 3 months, but only reduced by the end of 6 months in the "corkscrew" group. The physiological mechanism is due to a change in afferentation, enabling the central nervous system to act against a new, changed functional background. Swimming and the "corkscrew" crawl, in particular, are recommended for increasing statokinetic stability. I. P.

A68-44105 #

METHODS OF CHEMICAL ANALYSIS IN THE STUDY OF MASS TRANSFER IN LIFE-SUPPORT SYSTEMS BASED ON BIOLOGICAL CYCLES [KHIMIKO-ANALITICHESKIE METODY ISSLEDOVANIIA MASSOOBMENA V SISTEMAKH ZHIZNEOBESPECHENIIA, OSNOVANNYKH NA KRUGOVOROTE VESHCHESTV].

I. M. Zhuravlev, V. I. Karpov, Iu. V. Pepeliaev, E. I. Pokrovskaia, L. I. Riazaeva, and A. P. Tereshchenko.

IN: PROBLEMS OF CREATING CLOSED ECOLOGICAL SYSTEMS [PROBLEMY SOZDANIIA ZAMKNUTYKH EKOLOGICHESKIKH SISTEM].

Edited by A. A. Nichiporovich and G. M. Lisovskii.

Moscow, Izdatel'stvo Nauka, 1967, p. 175-178. 12 refs. In Russian.

Outline of the main features of a possible scheme for mass-scale chemical analysis of solid, liquid, and gaseous phases in the study of the migration of matter in the biological cycles of life-support systems. This scheme provides for the determination of C, H, N, S, P, Na, K, Mg, Ca, Fe, and Cl (and also Zn, Co, Ni, Cu, Cd, Pb, Mn, Cr, Mo, V, Al, Ti, B, and Si in some samples) in solid and liquid samples from various cycle stages, and for the chromatographic determination of N, O, CO_2, and H_2O in gaseous form. The chemical tests used to determine the various elements are described, and the accuracy of the methods employed is briefly assessed. P. G. M.

A68-44106 #

MOISTURE-CONTAINING HUMAN WASTES AS A MATERIAL FOR OBTAINING BASIC NUTRIENTS FOR AUTOTROPHIC PLANTS [VLAGUSODERZHASHCHIE OTKHODY CHELOVEKA KAK PRODUKT DLIA POLUCHENIIA OSNOVNYKH ELEMENTOV PITANIIA AVTOTROFOV].

G. I. Kozyrevskaia, Iu. S. Koloskova, N. N. Sitnikova, and V. I. Iazdovskii.

IN: PROBLEMS OF CREATING CLOSED ECOLOGICAL SYSTEMS [PROBLEMY SOZDANIIA ZAMKNUTYKH EKOLOGICHESKIKH SISTEM].

Edited by A. A. Nichiporovich and G. M. Lisovskii.

Moscow, Izdatel'stvo Nauka, 1967, p. 166-170. 5 refs. In Russian.

Investigation of the amounts and properties of the feces and urine discharged from the bodies of an unspecified group of randomly chosen individuals, aimed at obtaining data concerning biological mineralization of human wastes in a life-support cycle. The weight and moisture content, the proportion of soluble and insoluble fractions (with the total content of organic matter in each fraction), the total nitrogen, the nitrate and nitrite nitrogen, and the composition of mineral salts were determined for the urine. It was found that the daily discharge of feces equaled 43 ± 14 g, with the soluble and insoluble portions equaling 26 ± 8 and 17 ± 5 g, respectively. The amount of absorbed bichromate oxygen varied between 50,000 and 108,000 mg/liter in the daily discharges of feces, from 10,800 to 17,200 mg/liter in their soluble fractions, and from 13,000 to 36,000 mg/liter in the individual urine specimens. Large quantitative and qualitative fluctuations in the intestinal flora were observed. V. P.

A68-44111 #

POSSIBLE MAGNITUDE OF ARTIFICIAL GRAVITY BASED ON ELECTRICAL ACTIVITY OF THE SKELETAL MUSCLES [O VOZMOZHNOI VELICHINE ISKUSSTVENNOI VESOMOSTI, OPREDELIAEMOI PO SOSTOIANIIU ELEKTROAKTIVNOSTI SKELETNYKH MYSHCHTS].

E. M. Iuganov and G. I. Pavlov.

IN: MEDICO-BIOLOGICAL STUDIES OF WEIGHTLESSNESS [MEDIKO-BIOLOGICHESKIE ISSLEDOVANIIA V NEVESOMOSTI].

Edited by V. V. Parin and I. I. Kas'ian.

Moscow, Izdatel'stvo Meditsina, 1968, p. 398-402. 14 refs. In Russian.

Investigation aimed at a determination of the minimal effective magnitude of artificial gravity according to data on the bioelectrical activity of skeletal muscles and a consideration of cardiac and respiratory activity. Dogs (6 to 8 kg) were placed in a recumbent position on a centrifuge on board an aircraft which attained weightlessness. The accelerations acted in a back-to-chest direction. Pulse rate and respiration showed no reliable relationship in their changes and were not used to evaluate the effectiveness of the artificial gravity. Bioelectrical muscular activity dropped to half the normal value, increasing when the artificial gravity reached 0.15 g. The biopotentials increased parallel with the transverse acceleration from 0.15 to 0.28 g, and reached normal values between 0.28 and 0.37 g. Further increase of artificial gravity (up to 0.7 g) did not affect the biopotentials. Therefore the artificial gravity resulting from an acceleration of 0.28 to 0.37 g can be regarded as the minimum effective magnitude which normalizes the electrical activity of skeletal muscles in weightlessness. These results agree with the data obtained from a motor activity study. I. P.

A68-44112 #
PHYSIOLOGICAL AND BIOCHEMICAL ASPECTS OF THE WEIGHTLESSNESS PROBLEM [FIZIOLOGO-BIOKHIMICHESKIE ASPEKTY PROBLEMY NEVESOMOSTI].
P. A. Korzhuev.
IN: MEDICO-BIOLOGICAL STUDIES OF WEIGHTLESSNESS [MEDIKO-BIOLOGICHESKIE ISSLEDOVANIIA V NEVESOMOSTI]. Edited by V. V. Parin and I. I. Kas'ian.
Moscow, Izdatel'stvo Meditsina, 1968, p. 89-93. In Russian.

Discussion of the effect of weightlessness on organisms. It is noted that there are some grounds to assume that prolonged weightlessness is as dangerous as space radiation. The initial premise in a study of the weightlessness problem should be that all living organisms on earth exist under gravitational-field conditions and that the entire living process of the organisms is adapted to this field. The effects of gravitational change have been disclosed by means of studies in the comparative physiology and biochemistry of various groups of vertebrates, showing that an increase of skeletal weight in land vertebrates was basically determined by the bone marrow which first appeared in tailed amphibians. In space flight the bone marrow, no longer stimulated by gravitational forces, must become less active, and then undergo degeneration. Studies of marine mammals are outlined, and it is concluded that gravitation has a significant effect on the organism and produces changes in vital structures. I.P.

A68-44116 #
URINARY CREATININE-BASED RATIOS IN RELATION TO SEASON.
Henry B. Hale, James P. Ellis, and Edgar W. Williams (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiology Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 39, Oct. 1968, p. 1048-1051. 18 refs.

A group of 12 healthy men was studied over an entire year for the purpose of establishing seasonal baselines for each of a number of urinary variables which are currently being used for assessing flight stress, reasoning that seasonal changes, if any, might predispose toward flight stress or obscure flight effects. One overnight urine specimen per man per week was analyzed for norepinephrine, epinephrine, 17-hydroxycorticosteroids, phosphorus, potassium, sodium, uric acid, urea, and creatinine. As is done in flight-stress studies, creatinine was used as the base to which the other urinary constituents were referred. The seasonal trends for the sodium/potassium and the norepinephrine/epinephrine ratios were investigated also. On the basis of either monthly or seasonal mean values, the creatinine-based ratios all showed long-term cyclic shifting, as did the two special ratios; however, there was no common pattern of change. The minimal values for the individual creatinine-based ratios came in various months, as did the maximum values. Flight-stress studies must take into full account such background shifting. (Author)

A68-44117 *
RADIOISOTOPIC COLOR SCANNING OF PULMONARY AEROEMBOLI IN EXPERIMENTAL DECOMPRESSION SICKNESS - DYSBARISM.
A. T. K. Cockett, N. L. Mangelson, R. T. Kado, R. M. Nakamura, D. B. Rhodes, and L. Swanson (Harbor General Hospital, Dept. of Surgery, Urology and Pathology; California, University, Brain Research Institute, Space Biology Laboratory, Los Angeles, Calif.).
Aerospace Medicine, vol. 39, Oct. 1968, p. 1052-1054.
Contract No. N 00014-66-C-0295; Grant No. NsG-237-62.

A lethal overcompression-decompression model for dogs is presented. A modified diagnostic technique-radioisotopic color scanning of the lungs is described. Examples of color scans from three groups are presented. The pathologic physiology is discussed briefly. Complete recovery in the treated groups is seen if dextran infusion is not delayed or withheld beyond 3 to 4 hr after decompression. (Author)

A68-44118
LIMITATIONS IN THE TREATMENT OF DIVING AND AVIATION BENDS BY INCREASED AMBIENT PRESSURE.
Robert C. Bornmann (U.S. Naval Material Command, Chevy Chase, Md.).
Aerospace Medicine, vol. 39, Oct. 1968, p. 1070-1076. 13 refs.

Outline of the general principles of pressure therapy as applied to decompression sickness and air embolism. The underlying physiological mechanism of gas-pressure changes in the tissue due to environmental pressure changes are explained, and the resulting effects are discussed. Recompression is suggested as the main therapy. Therapeutical techniques such as application of pressure, varying gas mixtures, and varying times of application are described. The most frequent errors related to such treatment are tabulated. Treatment at great depths or extremely high pressures and some adjuncts to recompression are also discussed. R.M.

A68-44119
MANAGEMENT OF BENDS ARISING DURING SPACE FLIGHT.
Robert G. McIver (USAF, Systems Command, Aerospace Medical Div., Aeromedical Research Laboratory, Holloman AFB, N. Mex.).
Aerospace Medicine, vol. 39, Oct. 1968, p. 1084-1086. 19 refs.

Discussion of measures which could be utilized to minimize the morbidity from decompression sickness. Experiments with human volunteers are described, where the subjects were decompressed to 35,000 ft equivalent (3.5 psia) in altitude chambers after a period of 1-1/2 hr denitrogenation using 100% O_2 at ground level. It was found that most of the symptoms, such as bend pains, etc., disappeared after recompression to 9.5 psia in a pure-oxygen atmosphere. Procedures for managing the consequences of decompression sickness in different stages of space-flight activities are recommended. R.M.

A68-44120
CONCEPTS FOR ADVANCES IN THE THERAPY OF BENDS IN UNDERSEA AND AEROSPACE ACTIVITY.
C. J. Lambertsen (Pennsylvania, University, Undersea-Aerospace Environmental Research Laboratory, Philadelphia, Pa.).
Aerospace Medicine, vol. 39, Oct. 1968, p. 1086-1093. 22 refs.

Discussion of modern trends in the therapy of bends. It is stated that the fundamental premise which should guide investigation toward further improvement in the therapy of bends is that most of the factors and principles which provide the ultimate in the treatment of bends are the same ones which are involved in the ultimate methods for bends prevention and the facilitation of normal decompression after diving. After describing the nature of the problem and the aims of the therapy, the circulatory aspects of bends therapy at sites of physiological and pharmacological attack are considered, and steps toward further improvement in bends therapy are examined. Z.W.

A68-44121
RELIABILITY OF QUANTITATIVE TILT TABLE DATA.
Esar Shvartz (Negev Institute for Arid Zone Research, Beersheba, Israel).
Aerospace Medicine, vol. 39, Oct. 1968, p. 1094-1097. 35 refs.

Eighteen normal male subjects were used to determine the reliability of heart rate and blood pressure data recorded in a tilt-table test. Subjects were tested twice, seven days apart, under the same conditions each time. A bicycle seat-type tilt table was used, and subjects were tilted to 70° from the horizontal for 20 min. Test retest reliability coefficients were computed using the Spearman Rank method. The analyses pertained to heart rate and blood pressure data recorded in a horizontal position, to differences between horizontal and vertical, and to data obtained in orthostasis. Mean values and the most adverse values were analyzed. The results indicated that the most reliable measures were systolic blood pressure data obtained in orthostasis ($r = .851$ for lowest value, and $r = .844$ for mean value). Diastolic blood pressure and pulse pressure values obtained in orthostasis were slightly lower. Blood pressure changes from recumbency to vertical displayed low reliability. Heart rate data were less reliable than blood pressure data. (Author)

A68-44122
BURN PRODUCTION AND PREVENTION IN CONVECTIVE AND RADIANT HEAT TRANSFER.

A. M. Stoll and M. A. Chianta (U.S. Naval Material Command, Naval Air Development Center, Aerospace Medical Research Dept., Johnsville, Pa.).
Aerospace Medicine, vol. 39, Oct. 1968, p. 1097-1100. 8 refs.

White burns in anesthetized rats are used to correlate the heat flux and exposure time measured during convective heating with that of radiant heating. These parameters are seen to be the same for both types of heating and are further correlated with temperature rise measured in an inert material (skin simulant) to provide an assessment of the protection afforded humans by clothing. This protection may be expressed in terms of permissible exposure time with given materials or insulation required for prevention of burns from thermal exposures of given duration and intensity. (Author)

A68-44123 *
PHYSIOLOGICAL FACTORS ASSOCIATED WITH SWEATING DURING EXERCISE.
J. A. J. Stolwijk, B. Saltin, and A. P. Gagge.
Aerospace Medicine, vol. 39, Oct. 1968, p. 1101-1105. 15 refs.
Contract No. NAS 9-7140; NIH Grant No. UI-00426.

The present observations were made on four healthy male subjects clothed in shorts, while exercising at 50 rpm on a bicycle ergometer at 4, 7, and 10 times the sitting metabolic rate and at three temperature levels, 10, 20, and 30°C ambient. The data, reported for 72 experiments, represent conditions at about 45 min after the start of exercise. Skin sweating during steady state exercis may be described by a linear function of a metabolic rate and ambient air temperature or b rectal and skin temperature. Rectal temperature is essentially a linear function of metabolism and independent of ambient air temperature. Average skin temperature is essentially a linear function of the ambient air and is not significantly dependent on metabolic rate. Above a threshold skin conductance of 15 kcal/m^2-hr-°C as much as 1.5% of the volume of the extra skin blood flow caused by exercise is lost in skin sweating. Since exercise principally affects rectal or internal body temperature rather than skin temperature, moderate exercise at even cool temperatures causes sweating. The suppression of skin sweating during light to moderate exercise by lowering skin temperature is difficult and perhaps impossible without causing unacceptable discomfort. (Author)

A68-44124
STUDY OF FLASH BLINDNESS EFFECTS USING NAVAL AVIATORS.
Roland A. Bosee (U.S. Naval Air Systems Command, Crew Systems Div., Washington, D.C.), James F. Parker, Jr. (BioTechnology, Inc., Arlington, Va.), and Gloria T. Chisum (U.S. Naval Material Command, Naval Air Development Center, Johnsville, Pa.).
Aerospace Medicine, vol. 39, Oct. 1968, p. 1105-1108. 6 refs.

The flash blindness problem was investigated as it might exist with operational aviation personnel. Thirty-one naval aviators, flying attack and fighter aircraft, served as subjects. A xenon gas discharge source, delivering 6.378×10^5 milliliters/sec of visible energy, was used to simulate the light from a nuclear burst. Results show, as in prior laboratory investigations, that there is a consistent decrease in the flash blindness recovery period as cockpit illumination is increased. However, when this light exceeds 50 foot-candles, little additional benefit is seen. Measures from an instrumented control stick show for some subjects an abrupt pitch-up movement at the moment of flash. This is interpreted as an adaptive attempt to gain altitude rather than as a reflexive startle reaction. No similar action was noted in the roll axis. The excellent protective benefits gained from the gold visor were reaffirmed with operational personnel. (Author)

A68-44125
CORONARY HEART DISEASE - A PREDICTIVE STUDY INVOLVING THE AEROSPACE MANUFACTURING INDUSTRY.
C. I. Barron (Lockheed Aircraft Corp., Lockheed-California Co., Burbank, Calif.) and R. H. Rosenman (Harold Brunn Institute, Mount Zion Hospital and Medical Center, San Francisco, Calif.).
Aerospace Medicine, vol. 39, Oct. 1968, p. 1109-1115. 5 refs.

In 1960, 1013 Lockheed-California and the Missile and Space Co. salaried employees between the ages of 39 and 59 joined 2511 employees from nine other California-based companies in a long-range prospective study on coronary heart disease (CHD). The findings of the first four and one-half years are presented. During this period, 133 new cases of CHD occurred, including 43 Lockheed subjects. The findings indicate that the Lockheed subjects experienced an incidence rate identical to that of the entire study group and that variances in critical parameters were comparable to the other groups. The latter included abnormalities in lipoprotein patterns, hypertension, positive familial history of CHD, and the exhibition of a specific overt behavior pattern (type A). There was no evidence that specific work assignments or responsibilities peculiar to the aerospace industry influenced the incidence of CHD. To the contrary, all the evidence indicates that CHD is a product of our way of life and that measures taken to reduce the morbidity must relate to the total environment of the person. (Author)

A68-44126
ALLERGIC PROBLEMS IN SCREWWORM FLY ERADICATION PROGRAM PERSONNEL.
J. Robert Dille, Harry L. Gibbons (Federal Aviation Administration, Aeromedical Service, Civil Aeromedical Research Institute, Oklahoma City, Okla.), and George A. Spikes (Federal Aviation Administration, Aeromedical Service, Civil Aeromedical Research Institute, Douglas, Ariz.).
Aerospace Medicine, vol. 39, Oct. 1968, p. 1116-1119. 6 refs.

Study of the incidence of allergic symptoms in personnel engaged in the screwworm-fly eradication program in the southwestern U.S. and northern Mexico. A questionnaire revealed that 68% of the present flight-crew members reported having allergy symptoms (seven of them severe), and 71% had a reaction to the flies on skin testing. Hyposensitization was tried for two with severe symptoms; one returned to full flying duties without symptoms. Some decreased pulmonary function was noted and was of concern. Three case reports are described. Recommendations are made on screening newly hired personnel, periodic pulmonary function testing, use of respirators in flight, hyposensitazion, and further tests to identify antibodies and determine antibody levels. M. M.

A68-44127
FLIGHT DECK VISION AND THE AGING EYE.
C. R. Harper (United Air Lines, Inc., Denver, Colo.) and G. J. Kidera (United Air Lines, Inc., Chicago, Ill.).
(International Congress on Aviation and Space Medicine, 17th, Oslo, Norway, Aug. 5, 1968.)
Aerospace Medicine, vol. 39, Oct. 1968, p. 1119-1122.

The ability of the senior pilot with minimal accommodation to accurately visualize his flight instruments is reviewed. This growing number of pilots who command the commercial jet fleet require individual evaluation and education regarding the special spherical prescriptions required in the cockpit. A device that allows the examiner to quickly test in a realistic setting the pilot's visual ability is presented. The educational aspect of the device is discussed. Special lens arrangements are presented and discussed as recommended solutions to solving the problem of the aging eye in the cockpit. Industry-wide emphasis is urged. (Author)

A68-44152 *
INFLUENCE OF THE AMBIENT ACCELERATIVE FORCE UPON MATURE BODY SIZE.
Arthur H. Smith and Russell R. Burton (California, University, Dept. of Animal Physiology, Davis, Calif.).
Growth, vol. 31, 1967, p. 317-329. 32 refs.
Grant No. NGR-05-004-008.

Animals raised under acceleration fields stronger than earth gravity have a reduced mature body size, and the reduction is rectilinearly related to field strength. This smaller body size is closely regulated, and appears to be a physiological adaptation to the hyperdynamic environment. This acceleration-limitation on body mass is not permanent, and upon return to earth gravity an essentially normal size is regained. Since these variations are rapidly established in skeletally mature animals, they appear to reflect changes in the soft tissues. (Author)

A68-44174 #
DIURNAL RHYTHM OF SYMPATHETIC FUNCTIONS DURING SPACE FLIGHT [SUTOCHNAIA RITMIKA VEGETATIVNYKH FUNKTSII V KOSMICHESKOM POLETE].
G. V. Altukhov, P. V. Vasil'ev, P. V. Belai, and A. D. Egorov.
IN: MEDICO-BIOLOGICAL STUDIES OF WEIGHTLESSNESS [MEDIKO-BIOLOGICHESKIE ISSLEDOVANIIA V NEVESOMOSTI].
Edited by V. V. Parin and I. I. Kas'ian.
Moscow, Izdatel'stvo Meditsina, 1968, p. 201-205. 10 refs. In Russian.

A study was made of the heart rate and systaltic index of cosmonauts Nikolaev, Popovich, Bykovskii, and Tereshkova during their group flight. It was considered that the heart rate represents the integral response of the organism to the effect of various factors in the external environment and that the systaltic index reflects the functional state of the myocardium. The recorded data were statistically processed and are presented in graphic form. Unfortunately, the effects of space flight on these cosmonauts did not produce any uniform changes in the indices under study, and no definite conclusion could be drawn regarding the effects of weightlessness or other space-flight factors on cardiac function. It was found, however, that the average heart rate tended to be slightly lower during flight. It was concluded that irregular changes in diurnal rhythms of sympathetic functions do occur during prolonged exposure to weightlessness and that the mechanism of these changes, while complex, is related to the effects of weightlessness and of nervous and emotional tension. (ATD/LC)

A68-44175 #
AN EXPERIMENTAL STUDY OF THE QUALITY OF SPEECH RECEPTION AND TRANSMISSION UNDER WEIGHTLESSNESS CONDITIONS [OPYT IZUCHENIIA KACHESTVA PRIEMA I PEREDACHI RECHI V USLOVIIAKH NEVESOMOSTI].
I. Ia. Borshchevskii, G. M. Beliakov, N. N. Gurovskii, and V. S. Kuznetsov.
IN: MEDICO-BIOLOGICAL STUDIES OF WEIGHTLESSNESS [MEDIKO-BIOLOGICHESKIE ISSLEDOVANIIA V NEVESOMOSTI].
Edited by V. V. Parin and I. I. Kas'ian.
Moscow, Izdatel'stvo Meditsina, 1968, p. 440-442. In Russian.

Study of the quality of speech received and transmitted under weightlessness conditions. Four pilots during 23 flights are examined in communication experiments during 30 to 40 sec of weightlessness in an aircraft. A comparative analysis of speech transmission and reception in flight is made before, during, and after exposure to weightlessness. It is found that weightlessness does not have a significant effect on reception of speech signals transmitted from the ground. In a state of weightlessness, the quality of a pilot's speech is somewhat different from that under ordinary flight conditions - namely, the speech is rather forced and an increase in the intensity of vowel sounds is noted. The frequency spectrum of the pilot's speech during weightlessness is comparable to the spectrum under ordinary flight conditions. It is concluded that changes in speech quality during weightlessness are not substantial and do not exclude the possibility of maintaining good communication. Z. W.

A68-44176 #
STUDY OF THE COORDINATION OF MOTION DURING WRITING UNDER SPACE-FLIGHT CONDITIONS [ISSLEDOVANIE KOORDINATSII DVIZHENII PRI PIS'ME V USLOVIIAKH KOSMICHESKOGO POLETA].
A. I. Mantsvetova, I. P. Neumyvakin, V. F. Orlova, V. A. Trubnikova, and I. M. Freidberg.
IN: MEDICO-BIOLOGICAL STUDIES OF WEIGHTLESSNESS [MEDIKO-BIOLOGICHESKIE ISSLEDOVANIIA V NEVESOMOSTI].
Edited by V. V. Parin and I. I. Kas'ian.
Moscow, Izdatel'stvo Meditsina, 1968, p. 384-397. 13 refs. In Russian.

Analysis of handwriting specimens obtained under space-flight conditions, and comparison of these specimens with the handwriting of the same subjects on earth under normal conditions. It is found that motion coordination during space flight decreases. This decrease is most marked at the beginning of the flight, but as the flight progresses, all cosmonauts improve their motion coordination. However, the degree of improvement varies with each cosmonaut. Marked alterations of handwriting, which could indicate a functional disruption of the central nervous system, are not observed. A comparison of the writing indicates that coordination of motion while writing depends on the duration of flight. Deviations in handwriting under space-flight conditions are ascribed not to a disruption of the functioning of the central nervous system, but to the unusual conditions under which the writing is performed. Z. W.

A68-44177 #
VESTIBULAR ANALYZER AND ARTIFICIAL GRAVITATION OF ANIMALS [VESTIBULIARNYI ANALIZATOR I ISKUSSTVENNAIA VESOMOST' ZHIVOTNYKH].
E. M. Iuganov, P. K. Isakov, I. I. Kas'ian, D. V. Afanas'ev, and G. I. Pavlov.
IN: MEDICO-BIOLOGICAL STUDIES OF WEIGHTLESSNESS [MEDIKO-BIOLOGICHESKIE ISSLEDOVANIIA V NEVESOMOSTI].
Edited by V. V. Parin and I. I. Kas'ian.
Moscow, Izdatel'stvo Meditsina, 1968, p. 289-297. 5 refs.
In Russian.

Experimental investigation aimed at determining the minimum effective magnitude of artificial gravitation required to maintain the body in a normal position and to maintain motion coordination. The tests were performed with white rats and mice by centrifuging them on board an aircraft flying parabolic curves. It was found that normal motor performance was reestablished at loads between 0.28 and 0.30 g. Delabyrinthectomized animals required as little as 0.1 g to exhibit normal motor activity. The results indicate that the vestibular analysor impedes rather than facilitates the normalization of motor behavior during weightlessness. Disorder of the motor function of intact animals during weightlessness apparently results from a disturbance of the functional interaction of the analysor systems. V. P.

A68-44201
THE WAVELENGTH DEPENDENCE OF SOME EFFECTS OF ULTRAVIOLET RADIATION ON IN VITRO DNA OF PHAGE α.
M. Cremonese (Istituto Superiore di Sanità, Rome, Italy).
Biophysical Journal, vol. 8, no. 2, 1968, p. 153-163. 25 refs.

The wavelength dependence of some of the effects of UV radiation on the physicochemical properties of DNA of phage α irradiated in vitro are discussed. An analytical ultracentrifuge and a spectrophotometer were used to study (1) the breaking of individual polynucleotide strands; (2) the local denaturation; (3) the presence of a fraction of molecules resistant to denaturation; and (4) the increase in the buoyant density of irradiated DNA. All the curves show a slight variation of the radiation efficiency in the range 2600 to 2800 Å, and a well defined peak at 2880 Å. (Author)

A68-44219
AN IMPLANTABLE BIOINSTRUMENTATION SYSTEM.
J. J. Konikoff.
International Astronautical Federation, Congress, 19th, New York, N. Y., Oct. 13-19, 1968, Paper B 36. 6 p. 9 refs.
New York, American Institute of Aeronautics and Astronautics, $1.00.

Using power derived from a pair of dissimilar metallic electrodes, a telemetered biopotential (EKG) has been transmitted on an AM rf band using a specially designed amplifier/transmitter also completely implanted within an experimental animal. The power electrodes produce electricity by means of the galvanic reaction. Electrode life and output are reliably predictable from the results of experimental studies that will be presented. The transmitter is a very low drain amplifier and transmitter combination with a high input impedance whose output is a pulsed carrier. It operates on a fixed power input of 50 μA at 0.8 V derived from the implanted power electrodes. The pulse repetition frequency is modulated by the EKG input signal. (Author)

A68-44220
THIRTY DAY PERFORMANCE AND RELIABILITY TEST OF A REGENERATIVE LIFE SUPPORT SYSTEM.
Thomas M. Olcott and Warren J. Conner (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Sunnyvale, Calif.).

International Astronautical Federation, Congress, 19th, New York, N. Y., Oct. 13-19, 1968, Paper B 43. 9 p.
New York, American Institute of Aeronautics and Astronautics, $1.00.

Description of a two-gas regenerative life support system developed to provide a flexible test bed for the investigation of problems associated with regenerative life support subsystems and their integration into a complete system. This system was successfully operated during a manned test maintaining a habitable environment for a four-man crew. A thirty-day unmanned reliability test was then conducted to establish failure modes, failure rates, and maintenance requirements. All metabolic and system loads were simulated. Performance and reliability results of this test are presented. The development tests conducted hitherto have demonstrated the feasilibity of the two-gas regenerative life support system concepts, their integration, and the soundness of the basic design. P. v. T.

A68-44224 *
ADVANCED TWO-GAS SENSOR TECHNOLOGY RESEARCH.
Walton L. Jones (NASA, Office of Advanced Research and Technology, Washington, D. C.) and Joseph N. Pecoraro (NASA, Office of Advanced Research and Technology, Biotechnology Branch, Washington, D. C.).
International Astronautical Federation, Congress, 19th, New York, N. Y., Oct. 13-19, 1968, Paper B 136. 8 p. 5 refs.
New York, American Institute of Aeronautics and Astronautics, $1.00.
Contracts No. NAS 1-6387; No. NASw-1612.

A sizable effort begun in 1965 has resulted in the design and fabrication of a reliable mass spectrometer system for sensing and controlling a two-gas spacecraft atmosphere. The unit is lightweight (6-1/2 lb), has output voltages compatible with existing telemetry and control devices, and is remarkably reliable. Its reliability was tested and proven in a 60-day, four-man simulated run in which an oxygen-nitrogen atmosphere was used. The system continuously monitored the partial pressures of water vapor, nitrogen, oxygen, and carbon dioxide, and controlled the oxygen and nitrogen concentrations with desired accuracy. (Author)

A68-44226
THE SENSITIVITY OF THE NEURORETINA IN CONDITIONS OF HIGH ALTITUDE HYPOXIA.
M. P. Popescu (Medicalpharmaceutical Institute, Bucharest, Rumania), M. Stefan, and I. Pintilie (Medical Aviation Centre, Bucharest, Rumania).
International Astronautical Federation, Congress, 19th, New York, N. Y., Oct. 13-19, 1968, Paper B 60. 3 p. 9 refs.
New York, American Institute of Aeronautics and Astronautics, $1.00.

Slight ocular changes occurring during hypoxia of various degree may be detected by means of one of the most sensitive sensorial tests for the function of the neuroretina - adaptometry. The sense of light under sham high-altitude conditions was studied. The functional changes revealed by the adaptogram after the hypoxia test were assessed with the aid of the light sense value. The statistical processing of the findings revealed a statistically very significant decrease in hypoxia in comparison with resting values. In the type of hypoxia investigated, a decrease in retinal sensitivity was noted, the luminous sense being reduced by the influence of hypoxia on the retinal synaptic system. (Author)

A68-44229
PHOTOGRAPHIC OBSERVATIONS OF THE HUMAN FUNDUS OCULI DURING +Gz BLACKOUT ON THE USAF SCHOOL OF AEROSPACE MEDICINE CENTRIFUGE.
S. D. Leverett, Jr. and W. A. Newsom (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Biodynamics Branch, Brooks AFB, Tex.).
International Astronautical Federation, Congress, 19th, New York, N. Y., Oct. 13-19, 1968, Paper B 139. 3 p.
New York, American Institute of Aeronautics and Astronautics, $1.00.

Exposition of the retinal hypoxia theory as the genesis of aviator's blackout during $+G_z$ acceleration. Approximately 200 $+G_z$ runs are conducted on 15 subjects photographing still (every 0.6 sec) and cine (30 fps) changes in retinal circulation during blackout. Using the fluorescence angiography technique, the course of retinal circulation during the blackout episode is observed. It is found that (1) both the central retinal arteries and veins collapse at subjective blackout but only in the optic disk region, (2) blanching of the nerve head and apparent retrograde arterial flow occurs at blackout, and this persists for the exact period of blackout, (3) a slight delay between shutdown of retinal circulation and macula area circulation is apparent, and (4) reactive hyperemia persists for about 30 sec after the exposure. It is suggested that the etiology of blackout during $+G_z$ acceleration is caused by the above sequence of events, and a return of vision during the same plateau level is due to a reversal of the sequence. Z. W.

A68-44230
BIORADIOTELEMETRIC EQUIPMENT FOR CARDIOVASCULAR STUDIES IN VARIOUS CONDITIONS.
Gr. Benetato, R. Vrînceanu, and Val. Ionescu (Academía Română, Institutul de Fiziologie Normală şi Patologică, Bucharest, Rumania).
International Astronautical Federation, Congress, 19th, New York, N. Y., Oct. 13-19, 1968, Paper B 141. 15 p.
New York, American Institute of Aeronautics and Astronautics, $1.00.

Description of the operation and circuit diagrams of a biotelemetry system capable of measuring, storing, and transmitting five different physiological parameters. The system consists of three different equipment packages involving (1) portable equipment for the test subject; (2) portable equipment for receiving, storing, and checking data; and (3) stationary equipment for decoding and processing data. This arrangement is dictated by the limited transmitter power. Techniques of modulation are described, along with frequency, sensitivity, stability, and power specifications. T. M.

A68-44231 *
FEEDING STUDIES WITH HYDROGEN BACTERIA.
A. D. Mandel and J. Shapira (NASA, Ames Research Center, Moffett Field, Calif.).
International Astronautical Federation, Congress, 19th, New York, N. Y., Oct. 13-19, 1968, Paper B 178. 4 p. 6 refs.
New York, American Institute of Aeronautics and Astronautics, $1.00.

Hydrogenomonas eutropha, a bacterium which can utilize carbon dioxide as a carbon source, urea as a nitrogen source, and hydrogen as an energy source, and which has potential as a regenerated food for long duration space missions, has been incorporated into a variety of diets which were fed to weanling rats for prolonged periods. In the range of 13 to 54% of the diet, whole H. eutropha cells grown under heterotrophic conditions and killed by heat were well tolerated and resulted in growth at least as good as that of animals fed casein at a level equivalent to the amount of protein in the bacteria. A further breeding study showed that diets containing 27% by weight of H. eutropha killed either by heat or by treatment with acetone could successfully maintain rats through three generations without impairment of the ability of the females to conceive, deliver, and nurse their litters. (Author)

A68-44233
PHYSIOLOGICAL INFLUENCES OF HIGH OXYGEN RESPIRATION IN CLOSE ENVIRONMENTAL SYSTEMS.
Hisashi Saiki (Jikei University, School of Medicine, Space Medicine Laboratory, Tokyo, Japan).
International Astronautical Federation, Congress, 19th, New York, N. Y., Oct. 13-19, 1968, Paper B 183. 20 p. 19 refs.
New York, American Institute of Aeronautics and Astronautics, $1.00.

Study of the effect that pure-oxygen respiration has on behavior of mice, guinea pigs, and rabbits - for prolonged exposure under normal atmospheric pressure. The fatal effect of oxygen respiration on small animals is confirmed. It is found that the changes that occur can be observed not only in the respiratory organs but even in organs that have no direct contact with the oxygen gas. The changes of respiratory and cardiovascular system functions follow a wave-like process. The respiratory gas metabolism is mea-

sured during the entire oxygen exposure until death. It is noticed that the dynamic process in the metabolic functions of the subjects is similar to the adaptation process under stress. Z. W.

A68-44234
SPACE IONIZING RADIATION AS A PROBLEM IN SPACE MISSION.
Carl-Johan Clemedson (Swedish Armed Forces, Stockholm, Sweden).
International Astronautical Federation, Congress, 19th, New York, N.Y., Oct. 13-19, 1968, Paper B 184. 13 p. 91 refs.
New York, American Institute of Aeronautics and Astronautics, $1.00.

Discussion of ionizing radiation encountered during long space flights. The main types of ionizing radiation of interest in space - namely, galactic cosmic particle radiation, geomagnetically trapped radiation consisting mainly of naturally occurring protons and electrons, solar flare particles, and secondary radiations, are reviewed, particularly with respect to the characteristics of the radiation environment in space. Some data on expected dose rates and dose contributions from the various kinds of radiation are presented. It is pointed out that in the relatively low-altitude orbits of the manned space flights performed so far, the doses actually received by the astronauts and cosmonauts have been very small and far below any objectionable level even when measured by our present standards for radiation protection. The possibility of creating a solar flare prediction and warning system is discussed. P.v.T.

A68-44242
LATEST DEVELOPMENTS FOR EVA SPACE OPERATIONS.
Peter N. Van Schaik (USAF, Systems Command, Research and Technology Div., Aero Propulsion Laboratory, Space Technology Branch, Wright-Patterson AFB, Ohio).
International Astronautical Federation, Congress, 19th, New York, N.Y., Oct. 13-19, 1968, Paper B 106. 11 p. 8 refs.
New York, American Institute of Aeronautics and Astronautics, $1.00.

Summary of the latest developments in extravehicular space activity, particularly the equipment and techniques to be used. Described and illustrated are portable space welders including annular and linear tools, astronaut attachment systems including electro-adhesive pads and a tether system, a dual purpose maneuvering unit, a low-cost simulator floor, and EVA assembly techniques. It is noted that the items discussed have been tested in a 1-g environment and that the next big step is to test in space. I.P.

A68-44343
PLANETARY LANDER RE-CONTAMINATION HAZARDS AND SPACECRAFT-PARTICLE INTERACTION PHYSICS.
J. Friedrich Vandrey (Martin Marietta Corp., Aerospace Group, Research Institute for Advanced Studies, Baltimore, Md.).
Journal of the Astronautical Sciences, vol. 15, July-Aug. 1968, p. 177-182. 10 refs.

Spores and contaminated dust particles can become separated from a spacecraft during an interplanetary flight; they would then have a very small but in realistic cases not yet negligible geometric probability to recontaminate an attached lander by penetrating through meteorite punctures in its biobarrier. It is shown that further progress can be made by analyzing the spacecraft-particle interaction physics. Using as an example a somewhat "streamlined" Voyager configuration in its normal flight attitude - the lander in the shadow of the solar panels - adequately reliable estimates for the strengths of the physical fields around the lander are obtainable from space experiments and general physical theory. It is found for all particle sizes of concern that their dissipative interactions with electrostatic and thermal radiation fields are considerably stronger than opposing ones with the spacecraft gravity and the solar wind, often by several orders of magnitude. This gives the result that particle dynamics and obvious geometric restraints on biobarrier puncture directions will normally prohibit a penetration, with exceptions demonstrably too rare for concern. (Author)

A68-44425 *
SPECIES DIFFERENCES IN INDUCIBILITY OF PHENYLETHANOLAMINE-N-METHYL TRANSFERASE.
Richard J. Wurtman, Julius Axelrod, Elliot S. Vesell, and Griff T. Ross (Massachusetts Institute of Technology, Dept. of Nutrition and Food Science, Cambridge, Mass.; U.S. Public Health Service, National Institute of Mental Health; National Institutes of Health, National Heart Institute and National Cancer Institute, Bethesda, Md.).
Endocrinology, vol. 82, Mar. 1968, p. 584-590. 21 refs.
PHS Grant No. AM-11237; Contract No. NGR-22-009-272.

Comparison of the role of the epinephrine-forming enzyme, phenylethanolamine-N-methyl transferase (PNMT), in the frog and the rat. Studies were undertaken to characterize PNMT in frogs, and to examine its dependence on pituitary-adrenocortical function. The studies show that PNMT activity can be demonstrated in all of the organs which contain epinephrine, but that the frog enzyme differs from the mammalian enzyme in its physical properties and in the failure of its activity to decline following hypophysectomy. M. F. J.

A68-44426 *
DIURNAL CHANGES IN BRAIN NORADRENALIN.
Donald J. Reis and Richard J. Wurtman (Cornell University, Medical College, Dept. of Neurology, Ithaca, N.Y.; Massachusetts Institute of Technology, Dept. of Nutrition and Food Science, Cambridge, Mass.).
Life Sciences, vol. 7, no. 1, 1968, p. 91-98. 22 refs.
NIH Grants No. NB-06911; No. AM-11709; No. AM-11237; Grant No. NGR-22-009-272.

Description of experiments performed to determine whether cyclic fluctuations occur in the concentrations of noradrenalin in various regions of the cat brain and spinal cord. It was found that the noradrenalin concentrations in parts of the cat hypothalamus and cervical spinal cord vary diurnally. They are higher at 1900 than at 0700. No such variation occurs elsewhere in the brain. The diurnal changes in brain noradrenalin content probably occur within the axon terminals of noradrenalin-containing neurons. M. F. J.

A68-44427 *
RHYTHM OF DETACHED AND DISSECTED BEAN LEAF.
K. Yokoyama, W. H. Jones (NASA, Ames Research Center, Moffett Field, Calif.), and T. Hoshizaki (California, University, Brain Research Institute, Space Biology Laboratory, Los Angeles, Calif.).
Life Sciences, vol. 7, no. 14, 1968, p. 705-711. 6 refs.

Study of the effect of space environment on leaf rhythms, using the bean plant because of the distinct rhythmic movements of its leaves. The leaves were detached and dissected to find whether or not they would maintain their rhythm under such treatments. The rhythm of detached leaves was approximately that found in leaves of intact plants, and found to be endogenous. Petiole-pulvinus-midrib parts exhibited a rhythm ranging from 10 to 20° amplitude which approximated that of the angles of detached leaves. Detached leaves and dissected petiole-pulvinus-midrib parts show that the pulvinus area exhibits a continuous undulating movement of the extremities, without the rest of the plant and the latter also without the whole blade. M. F. J.

A68-44428 *
A MINIATURE, SKULL-MOUNTED, MULTIPLE CONNECTOR FOR SMALL ANIMALS.
Zoltan Annau and Stephen A. Weinstein (Johns Hopkins University, Baltimore, Md.).
Journal of the Experimental Analysis of Behavior, vol. 11, Mar. 1968, p. 197, 198.
NIH Grant No. HE-10342-01; Grant No. NGR-21-001-035; Contract No. DA-49-193-MD-2726.

Description of a small six-contact connector for small animals, that can be readily made in a small machine shop. The connector described has the following characteristics: (1) it is easy to connect and disconnect from the animal; (2) the experimenter can determine the desired number of connections (from two to six); (3) there is no

need to solder close to the animal's head; (4) the connectors are reusable after removal; and (5) the animal cannot disconnect itself accidentally. M. F. J.

A68-44429 *
CHROMOSOMES IN BACILLUS SUBTILIS SPORES AND THEIR SEGREGATION DURING GERMINATION.
Hiroshi Yoshikawa (California, University, Space Sciences Laboratory, Berkeley, Calif.).
Journal of Bacteriology, vol. 95, June 1968, p. 2282-2292. 17 refs.
Grants No. NsG-479; No. NsG-05-003-020.

Measurement of the numbers of conserved units in B. subtilis spores by uniformly labeling with ^{3}H-thymidine and then following segregation of the label in progeny cells during germination. Autoradiographs of microcolonies clearly showed four conserved units in one spore. The four conserved units were fairly stable during cell divisions. It was calculated that one detectable fragmentation of each conserved unit occurred every 6.0 generations. From the data presented it is concluded that each B. subtilis spore contains four conserved units of DNA, each representing a complete single strand of a chromosome. The principal alternative interpretation of the data would hold that the four segregating radioactive units resulted from fragmentation of two units due to crossing over between sister chromosomes. M. F. J.

A68-44430 *
INDUCTION OF HEPATIC TRYPTOPHAN PYRROLASE AND TYROSINE TRANSAMINASE BY HISTONES AND OTHER POLYPEPTIDES.
Jeanie M. Caffery, Leona Whichard, and J. Logan Irvin (North Carolina, University, School of Medicine, Dept. of Biochemistry, Chapel Hill, N.C.).
Biochimica et Biophysica Acta, vol. 157, 1968, p. 616-626. 24 refs.
American Cancer Society Grant No. E-24H; NIH Grant No. GM-08318-06; NSF Grant No. GB-4577; Grants No. NsG(T)-63; No. NsG(T)-34-003-001.

Description of experiments showing that intraperitoneal injection of histones, poly L-Lys, poly L-Ala, or poly L-Tyr into adrenalectomized mice results in increases in hepatic tyrosine-α-ketoglutarate transaminase and tryptophan pyrrolase which reach peak activities in 5 to 6 hr. The kinetic data indicate that the "induction" of tryptophan pyrrolase by poly L-Lys and histones results from a decreased rate of enzyme degradation rather than an increased rate of enzyme synthesis. M. F. J.

A68-44432 *
ULTRASTRUCTURAL CHANGES IN THE STRATUM CORNEUM AFTER PROFUSE SWABBING OF THE SKIN WITH DIMETHYL SULFOXIDE.
L. F. Montes, J. L. Day, Charlotte J. Wand, and L. Kennedy (Alabama, University, Medical Center, Dept. of Dermatology, Birmingham, Ala.; Baylor University, College of Medicine, Dept. of Dermatology, Houston, Tex.).
Experientia, vol. 23, no. 616, 1967, p. 1-3. 7 refs.
Grant No. NGR-44-003-018.

Observation that the profuse swabbing of guinea-pig skin with an aqueous solution of the controversial penetrating solvent dimethyl sulfoxide (DMSO) produced striking changes in the basal layers of the stratum corneum. Specimens obtained half an hour after treatment, showed enlargement of the basal cornified cells and a disappearance of the normal keratin pattern. There was also frequent detachment of the basal horny cells from the underlying granular layer with formation of a subcorneal cleft. These findings seem to support an earlier finding that the increased cutaneous permeability induced by dimethyl sulfoxide results from modification, perhaps a dissolution, of the keratin content of the cells rather than changes in their membranes. M. F. J.

A68-44433 *
FRACTIONATED HEAVY ION IRRADIATION OF CULTURED HUMAN CELLS.
Paul Todd (California, University, Lawrence Radiation Laboratory, Donner Laboratory of Medical Physics and Biophysics, Berkeley, Calif.).
Radiation Research, vol. 34, May 1968, p. 378-389. 28 refs.
NASA Contracts No. R-104(2); No. R-09-019-900.

Analysis showing that exponential inactivation of cultured human kidney T1 cells, when it occurs, is due to single irreparable lethal events and not to a fortuitous summation of survivals of sigmoidally inactivated populations. The reparability of injuries accumulated following radiation doses delivered at low LET to asynchronous human cell populations is demonstrated. Exponential inactivation by heavy ions is correlated with the absence of recovery between two doses separated in time. M. F. J.

A68-44439 *
INHIBITION OF THE METABOLISM OF H^3-MELATONIN BY PHENOTHIAZINES.
Richard J. Wurtman, Julius Axelrod (U.S. Public Health Service, National Institute of Mental Health, Laboratory of Clinical Science, Bethesda, Md.; Massachusetts Institute of Technology, Dept. of Nutrition and Food Science, Cambridge, Mass.), and Fernando Anton-Tay.
Journal of Pharmacology and Experimental Therapeutics, vol. 161, no. 2, 1968, p. 367-372. 23 refs.
PHS Grant No. AM-11709; Grant No. NGR-22-009-272.

Description of the temporal and dose-response relations of the effects on melatonin metabolism produced by chlorpromazine and related drugs. Evidence is presented that chlorpromazine acts by inhibiting the metabolism of melatonin in the liver. M. F. J.

A68-44440 *
CENTRAL CONTROL OF THE PINEAL GLAND - VISUAL PATHWAYS.
Robert Y. Moore, Alfred Heller, Ranbir K. Bhatnager (Chicago, University, Dept. of Pediatrics and Dept. of Anatomy and Dept. of Medicine and Dept. of Pharmacology, Chicago, Ill.), Richard J. Wurtman (Massachusetts Institute of Technology, Dept. of Nutrition and Food Science, Cambridge, Mass.), and Julius Axelrod (U.S. Public Health Service, National Institute of Mental Health, Laboratory of Clinical Science, Bethesda, Md.).
Archives of Neurology, vol. 18, Feb. 1968, p. 208-218. 39 refs.
National Institute of Neurological Diseases and Blindness Grant No. NB-05002-04; National Institute of Arthritis and Metabolism Grants No. AM-11709; No. AM-11237; NIH Grant No. MH-04954-05; Grant No. NGR-22-009-272.

Description of experiments in which female, albino rats were exposed to continuous environmental illumination. It was found that there is a decrease in the pineal content of norepinephrine and the melatonin forming enzyme, hydroxyindole-O-methyl transferase, and an increase in the percent of animals showing vaginal estrus when compared with animals kept in constant darkness. Blinding by bilateral orbital enucleation abolishes these responses to light. Similarly, bilateral transection of the inferior accessory optic tracts, sparing the primary retinal projections, eliminates the pineal and gonadal responses to environmental light whereas bilateral ablation of the primary optic tracts alone has no effect on these responses. These findings establish a separate function for the inferior accessory optic tract components of the central visual projections in the maintenance of light-mediated neuroendocrine responses. M. F. J.

A68-44441 *
ROLE OF 5S RIBOSOMAL RNA IN POLYPEPTIDE SYNTHESIS. II.
M. A. Q. Siddiqui and Keiichi Hosokawa (California, University, Space Sciences Laboratory, Berkeley, Calif.).
Biochemical and Biophysical Research Communications, vol. 32, no. 1, 1968, p. 1-8. 23 refs.
NIH Grant No. GM-12932; Grants No. NsG-479; No. NsG-05-003-020.

Description of an experiment in which 50S ribosomes obtained from E. coli were dissociated into 5S rRNA and 44S particles in which at least one of the protein components was missing. Dissociation was produced by dialysis vs 0.5 M NH_4Cl in Mg^{++}-free medium and the resulting 44S particles were isolated by centrifuga-

tion through Mg^{++}-free sucrose solution. A pronounced sensitivity of the 44S particles to RNase was noted, suggesting that the particles had a partially uncoiled structure. M. F. J.

A68-44443 *

THE CONSUMPTION OF A SACCHARIN-GLUCOSE SOLUTION BY SATIATED AND FOOD-DEPRIVED IMMATURE RATS.

Jan W. Kakolewski, Verne C. Cox, and Elliot S. Valenstein (Fels Research Institute, Yellow Springs, Ohio).

Psychonomic Science, vol. 2, no. 9, 1968, p. 317, 318. 8 refs.
NIH Grant No. M-4529; Grants No. NsG-437; No. NsG-36-005-001.

Results of experiments to determine whether immature rats would consume even more saccharin-glucose solution relative to body weight than do adult animals. It was found that immature rats consumed a combined saccharin-glucose solution in large quantities comparable to that consumed by adult animals. However, during periods of food deprivation, immature animals consumed relatively more of this solution than mature animals. These results are related to the development of antidiuretic activity. M. F. J.

A68-44445 *

THE EFFECTS OF CARBON DIOXIDE ON HYPOTHALAMIC SELF-STIMULATION DURING HYPOXIA.

Stephen A. Weinstein and Zoltan Annau (Johns Hopkins University, Dept. of Environmental Medicine and Dept. of Psychiatry, Laboratory of Behavioral Physiology, Baltimore, Md.).

Communications in Behavioral Biology, vol. 1, Apr. 1968, p. 223-229. 10 refs.
PHS Grants No. HE-01929; No. TG-HTS-5453; No. HE-06945; Grant No. NGR-21-001-035; Contract No. DA-49-193-MD-2726.

Investigation of the effects of carbon dioxide on self-stimulation in hypoxia in order to establish in a quantitative manner the physiological role that carbon dioxide plays in the maintenance of a functional neuronal population. This is discussed in the light of the circulatory, respiratory and acid-base effects of carbon dioxide alterations. Experimental data obtained with rats clearly demonstrate that the addition of carbon dioxide to hypoxic gas mixtures produces significant protection against the deleterious effects of diminished inspired oxygen. The amount of protection is a function of the carbon dioxide concentration, with greater protection being afforded by increasing carbon dioxide levels. M. F. J.

A68-44525

EXPERIMENTAL GENETIC INVESTIGATIONS OF LYSOGENIC BACTERIA DURING FLIGHT OF THE AES "KOSMOS-110."

N. N. Zhukov-Verezhnikov, M. N. Volkov, I. N. Maiskii, M. A. Guberniev, N. I. Rybakov, V. V. Antipov, V. A. Kozlov, P. P. Saksonov, G. P. Parfenov, A. V. Kolobov, K. D. Rybakova, and E. D. Aniskin.

(Kosmicheskie Issledovaniia, vol. 6, Jan.-Feb. 1968, p. 144-149.)
Cosmic Research, vol. 6, Jan.-Feb. 1968, p. 121-125. 6 refs.
Translation.

A68-44568 #

AIR REGENERATION BY HIGHER PLANTS [REGENERATSIIA VOZDUKHA VYSSHIMI RASTENIIAMI].

N. T. Nilovskaia and M. M. Bokovaia.

IN: PROBLEMS OF CREATING CLOSED ECOLOGICAL SYSTEMS [PROBLEMY SOZDANIIA ZAMKNUTYKH EKOLOGICHESKIKH SISTEM].
Edited by A. A. Nichiporovich and G. M. Lisovskii.
Moscow, Izdatel'stvo Nauka, 1967, p. 108-114. 5 refs. In Russian.

Description of an experiment in which plants of three species of cabbage, two species each of sugar beets and beans, and one species each of radish, peas, soybeans, carrots, potatoes, chinese sweet potatoes, and colocasia were grown for periods ranging from 1 to 2 months on keramsite with a well-balanced nutritive solution of macroelements to full development of foliage. The plants were then exposed daily to 18 hr of light from incandescent lamps at 50 to 300 ± 10 W/m^2, in an airtight chamber. Oxygen was drawn through the chamber to maintain a content of 20 to 22%, and an IR URAS gas analyzer continuously recorded the CO_2 concentration and maintained it at 0.15 to 0.35%. A formula is derived which is used to measure the intensity of the gas exchange. The daily balance between CO_2 assimilated and released was highest in sugar beets, carrots, and soybeans (88.18 to 144.73 grams of CO_2 per square meter of planted area), lowest in beans and sweet potatoes (23.64 and 23.59, respectively), and between 38.16 (peas) and 66.41 (radish) in the rest of the plants. Substantially lower values were obtained when the CO_2 concentration was reduced to 0.04 to 0.06% or the light intensity was kept lower. M. G.

A68-44604

CONTRIBUTION TO STUDIES OF HIGH-ALTITUDE ACCLIMATIZATION [CONTRIBUTION A L'ETUDE DE L'ACCLIMATEMENT A L'ALTITUDE].

Pierre-Louis Biget (Ministère des Armées, Service de Santé de l'Air, Paris; Ecole d'Application de Médecine Aéronautique, France).

France, Ministère de l'Air, Publications Scientifiques et Techniques, no. 439, Aug. 1968. 153 p. 326 refs. In French.

Study of certain problems arising in theoretical physiology in connection with high-altitude acclimatization. After a review of previous research done in this field, the mechanism of CO_2 stimulation of the respiratory centers is discussed, experimental conditions for physiological experiments are evaluated, and experiments involving animal test subjects such as white rats are described. It is shown that in human physiology a rise in the excitation level of the respiratory centers at high altitude can be observed and that this rise is maintained after regression to normal conditions provided that a somewhat diminished sensitivity existed previously. R. M.

A68-44860 #

HEMODYNAMIC CHANGES IN HUMANS IN FLIGHT [IZMENENIIA GEMODINAMIKI U CHELOVEKA V POLETE].

A. Z. Kotenko and L. A. Fel'dman.

Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 65, no. 4, 1968, p. 20-23. 5 refs. In Russian.

Investigation of the changes in arterial blood pressure of humans during flight. A total of 69 tests were made with six pilots (ages 29 to 40) under simulated flight conditions in a pressurized chamber. *Pulse rate and arterial pressure were taken at different intervals* before and during ascent, before and after the accomplishment of the critical part of the mission, during descent, and upon landing. A rising acceleration of the pulse rate and a minute volume rise before completion of the critical part of the mission were observed, with a subsequent drop after completion. The pulse acceleration rate during flight is achieved, apparently, due to emotional factors rather than to energy requirements. The intensification of circulation with rising energy requirements is due, apparently, to a decrease in the systolic volume. I. P.

A68-44863 *

STIMULUS DURATION AND THE HUMAN HEART RATE RESPONSE

David B. D. Smith and Phyllis J. Strawbridge (NASA, Ames Research Center, Moffett Field, Calif.).

Psychonomic Science, vol. 10, no. 2, 1968, p. 71, 72. 8 refs.

The adult heart rate response was studied following two durations and two intensities of an auditory stimulus. A 1-sec tone evoked a predominately acceleratory response and no decrement with repetition. Initially, a 15-sec tone evoked a response characterized by a prolonged deceleration phase. With repetition this changed to an acceleration similar to the 1-sec tone and then showed no decrement with further repetition. Intensity (40 and 85 dB) did not influence the form of the heart rate response. (Author)

A68-44892 *

FREE RADICALS FORMED IN CYTOSINE-5-^{3}H BY DECAY OF THE CONSTITUENT TRITIUM ATOM.

Brent Benson and Wallace Snipes (Pennsylvania State University, Dept. of Biophysics, University Park, Pa.).

Journal of Chemical Physics, vol. 49, Aug. 1, 1968, p. 1435, 1436. 5 refs.
AEC Contract No. AT (30-1)-3799; Grant No. NsG-324.

Description of the use of ESR techniques to show that free radicals are produced by decay of a constituent tritium atom in pyrimidines. The products of tritium decay were studied at the 5 position of cytosine. The first-derivative spectrum for cytosine-5-^{3}H is shown, together with a plot of the number of spins vs the number of decays. Control experiments using ^{60}Co radiation of similar and higher doses did not produce any radicals, confirming that the radicals are produced at the site of the tritium decay.
M. M.

A68-44906
TRANSIENT HEAT TRANSFER IN HUMAN SKIN.
P. D. Richardson (Brown University, Div. of Engineering, Providence, R.I.) and J. H. Whitelaw (London, University, Imperial College of Science and Technology, Dept. of Mechanical Engineering, London, England).
Franklin Institute, Journal, vol. 286, Sept. 1968, p. 169-181. 11 refs.

Discussion of experiments which assess the influence of sudden, localized changes of thermal load on the conductance of human skin; the conductance is expected to change due to the thermal regulatory role of skin. The changes are produced by placing local areas of skin in contact with passive probes which are preheated or precooled. It is found that the change in conductance is effectively independent of the surface temperature (and of the surface heat flux) to which the skin is exposed at the beginning of each test, for elapsed times exceeding 1 min. (Author)

A68-44934 *#
EXTRATERRESTRIAL BIOLOGY - PROSPECTS AND PROBLEMS IN THE EARLY 1970'S.
Richard D. Johnson and Harold P. Klein (NASA, Ames Research Center, Moffett Field, Calif.).
American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 5th, Philadelphia, Pa., Oct. 21-24, 1968, Paper 68-1122. 7 p. 17 refs.
Members, $1.00; nonmembers, $1.50.

The scientific rationale and experimental strategy for the biological exploration of Mars are discussed in terms of the chemical and biological experiments planned for these missions in the early 1970's. The experimental concepts and hardware development are treated in conjunction with the various mission constraints. Specifically, the chemical experiments are discussed in terms of the specificity of the analysis as applied to extraterrestrial samples, the experimental complexity with respect to sample processing, and the various types of analysis with respect to the detectors. The biological experiments are discussed in terms of growth and reproduction, metabolism, enzyme activity, and microscope scanning. Problems associated with growth media, water availability, and interference from soil are treated in terms of the experiment design. (Author)

A68-44944 *#
LIFE SUPPORT FOR LARGE SPACE STATIONS.
A. L. Ingelfinger (NASA, Office of Advanced Research and Technology, Washington, D.C.) and T. C. Secord (McDonnell Douglas Corp., McDonnell Douglas Astronautics Co., Advance Biotechnology and Power Dept., Santa Monica, Calif.).
American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 5th, Philadelphia, Pa., Oct. 21-24, 1968, Paper 68-1032. 13 p. 8 refs.
Members, $1.00; nonmembers, $1.50.

Large space stations will require maintainable regenerative life support systems to achieve the required capability for operation over extended periods of time with minimum penalty in terms of expendables, power and fixed weight. To achieve these goals, life support system research has advanced from a period of building nonmission-oriented "bench top" components to the construction of integrated systems followed by manned tests in space cabin simulators. Plans are now being made to advance the development cycle by conducting orbital tests of systems technology closely oriented to vehicle applications. Specific equipment is discussed. Promising new concepts are shown in a baseline system which may be the life support system for large space stations in the next decade.
(Author)

A68-44982 *#
CREW FUNCTIONS AND TRAINING.
Donald K. Slayton (NASA, Manned Spacecraft Center, Houston, Tex.).
American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 5th, Philadelphia, Pa., Oct. 21-24, 1968, Paper 68-1009. 7 p.
Members, $1.00; nonmembers, $1.50.

Description of a continuing program of astronaut training activities. The objectives of this program are to provide crew members prepared to operate a spacecraft in the best possible manner throughout both the normal flight phases and in emergency situations, and to provide crew members capable of competently accomplishing the scientific objectives of the flight. The discussion is divided into the areas of academic, operational, contingency, and specific flight training. F. R. L.

A68-45052
RADIO FREQUENCY RADIATION FOR ASTRONAUTS DURING EXTRA VEHICULAR ACTIVITY.
Harry E. Heskett (Martin Marietta Corp., Aerospace Group, Denver Div., Denver, Colo.).
Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 7-11, 1968, Paper 680681. 10 p. 10 refs.
Members, $0.75; nonmembers, $1.00.

Evaluation of hazards from rf radiation during extra vehicular activity (EVA) of an astronaut in space. To evaluate the rf environment, the study assumes that: (1) the cluster transmitting antennas are operated in the switching configuration that radiates maximum power; (2) the astronaut is in the main beam of each antenna; (3) no allowance is made for the rf attenuation of the suit; (4) no allowance is made for the metallic reflection from the cluster; and (5) no correction is made for the shielding effect of the cluster. Under these assumptions the maximum rf field that the astronaut can encounter during EVA is 0.175 W/m^2. Laboratory tests made on a sample of material from the EVA suit shows an attenuation in the range of 29 to 40 dB in the neighborhood of 2.0 Gc. This implies that the rf attenuation of the EVA suit is appreciable. Reflection effects because of the metallic surfaces of the cluster appear, at most, to be no larger than a factor of 4. The biological limit that a man can withstand for unlimited time is now generally established to be 100 W/m^2. These data establish that a factor of safety of approximately 570, or 27.5 dB, exists for the hazard from rf radiation for the EVA that is now defined. P. v. T.

A68-45086
MAINTAINABILITY AND RELIABILITY OF ENVIRONMENTAL CONTROL/LIFE SUPPORT SYSTEMS.
Hugh A. Jennings (Boeing Co., Aerospace Group, Space Div., Seattle, Wash.).
Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 7-11, 1968, Paper 680745. 10 p.
Members, $0.75; nonmembers, $1.00.

Discussion of the reliability and maintainability analyses conducted during two different long-duration mission studies with relation to the impact on the Environmental Control/Life Support (EC/LS) systems. Brief descriptions of the mission and EC/LS systems are presented. The two computerized analysis techniques used are described. The results presented include redundancy and spares weight required to achieve a specific probability of mission success, and redundancy identified for the EC/LS systems. Some problems associated with incorporating redundancy in the design, expected spares usage for different resupply intervals, and the impact of scheduled and unscheduled maintenance on the EC/LS systems are also discussed. It is noted that the data presented are based on results obtained from analyses of the EC/LS system configurations and data which were used in other studies. I. P.

A68-45087
RELIABILITY AND MAINTAINABILITY PROBLEMS CONFRONTING ENVIRONMENTAL CONTROL/LIFE SUPPORT SYSTEMS FOR LONG DURATION SPACE FLIGHT.

J. R. Burnett and C. D. King (General Dynamics Corp., Convair Div., San Diego, Calif.).
Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 7-11, 1968, Paper 680744. 14 p. 13 refs.
Members, $0.75; nonmembers, $1.00.

Discussion illustrating some of the most pressing problems confronting the designer in his quest for progress in the development of reliable and maintainable environmental control/life support system designs. Some of the realities of current experience with respect to these parameters are reviewed, and some of the apparent inconsistencies in concepts concerning the nature of failure and effective in-flight maintenance as a means of augmenting reliability are examined. Two of several analytical and design approaches which promise to be of value in resolving some of the reliability and maintainability problems are illustrated. I. P.

A68-45088 *
LOW-GRAVITY CAPABILITIES OF LIFE SUPPORT SYSTEM COMPONENTS AND PROCESSES.
J. C. Ballinger and G. B. Wood (General Dynamics Corp., Convair Div., San Diego, Calif.).
Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 7-11, 1968, Paper 680742. 16 p.
Members, $0.75; nonmembers, $1.00.
Contract No. NAS 1-6939.

Evaluation of the low-gravity capabilities of life support components and processes of the Langley Research Center Integrated Life Support System (ILSS). Experiments included gravity-sensitive aspects of liquid droplet release, heat exchanger passage plugging, and liquid film stability. The investigation of experimental methods included a detailed review of low gravity and gravity related test techniques and an evaluation of the application of the methods to the test candidates. The utility of analytical techniques in assessing gravity effects on performance became apparent in screening studies. Consequently, the development of these techniques was expanded beyond the immediate needs of the ILSS into generalized analytical approaches applicable to basic processes which may be common to most foreseeable life support systems. Processes considered in this phase of the study included heat transfer between fluids and solids; liquid behavior control by gas flow, capillarity, and centrifugation; solids control by gas flow; fluid mixing; mechanical device operation; and flame propagation. (Author)

A68-45089 *
EVALUATION OF A CLOSED-CYCLE LIFE-SUPPORT SYSTEM DURING A 60-DAY MANNED TEST.
J. K. Jackson, M. S. Bonura, and D. F. Putnam (McDonnell Douglas Corp., McDonnell Douglas Astronautics Co., Huntington Beach, Calif.).
Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 7-11, 1968, Paper 680741. 20 p. 9 refs.
Members, $0.75; nonmembers, $1.00.
Research supported by the McDonnell Douglas Corp.; Contract No. NASw-1612.

A 60-day manned test of a closed-cycle life-support system was completed in a space cabin simulator. Life-support equipment was installed within the chamber and was operated, maintained, and repaired by a four-man crew. Major objectives of the test included demonstrations of the recovery of potable water from urine and humidity condensate, and the recovery of oxygen from carbon dioxide. Other life-support equipment included a thermal-control subsystem, a two-gas atmosphere control, a trace-contaminant removal subsystem, and a fecal-waste collector that featured vacuum dehydration. (Author)

A68-45098
EVALUATION OF AN AIR CONDITIONING SYSTEM FOR A 1970 SHORT HAUL COMMERCIAL JET AIRCRAFT.
David T. Feldman (Fairchild Hiller Corp., Aircraft Div., Hagerstown, Md.).
Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 7-11, 1968, Paper 680725. 8 p.
Members, $0.75; nonmembers, $1.00.

Description of design criteria used in the development of an air conditioning system for a 50- to 70-passenger jet aircraft for the short-haul market. Because the aircraft's mission requires high speed over short-stage lengths, special problems result. A short-haul aircraft is described and related to the environmental system. Concepts for air conditioning that were considered, as well as the one recommended, are discussed. Final air conditioning design is reviewed relative to performance, operation, safety, reliability, and maintainability. The result is a package with larger-than-average cooling performance per passenger, and design features not found in any other aircraft environmental system. M. M.

A68-45099
DESIGN AND DEVELOPMENT OF THE LOCKHEED C-5A ENVIRONMENTAL CONTROL SYSTEM.
R. C. Bready (Lockheed Aircraft Corp., Lockheed-Georgia Co., Marietta, Ga.).
Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 7-11, 1968, Paper 680722. 14 p.
Members, $0.75; nonmembers, $1.00.

Description of the bleed-air control, air conditioning, temperature control, and fuselage-pressurization systems of the C-5A, an air vehicle designed to transport personnel and cargo, as well as military vehicles and equipment. Peculiar design problems of this mammoth cargo transport are discussed with respect to the effect on system configurations and equipment design. Development test programs conducted by the subsystem contractor and the air-vehicle manufacturer are briefly reviewed. M. M.

A68-45100
CARBON DIOXIDE REDUCTION AND WATER-VAPOR ELECTROLYSIS SYSTEM.
B. C. Kim and J. E. Clifford (Battelle Memorial Institute, Columbus, Ohio).
Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 7-11, 1968, Paper 680719. 9 p.
Members, $0.75; nonmembers, $1.00.
Contract No. AF 33(615)-3444.

Experimental research on an integrated Bosch reactor and water-vapor electrolysis unit for oxygen recovery from carbon dioxide is described. A principal feature of the integration is the use of regenerable solid absorbent for periodic water-vapor transfer in a gravity-independent manner to avoid gas-liquid separation problems. The carbon dioxide reduction subsystem was based on batchwise operation of two Bosch reactors to permit periodic shutdown for carbon removal. Experimental results are presented on operation of the Bosch reactor which include catalyst activation, recycle rate, recycle gas composition, reactor temperature, catalyst consumption, packing density of carbon and life of reactor materials during extended operation. Experimental data are presented on the solid-absorbent unit with silica gel and synthetic zeolites for removal of water vapor from the Bosch reaction and for water-vapor feed to an electrolysis unit. The feasibility of the subsystem integration was demonstrated for the laboratory model operating at the 1/2 to 1-man rate in a 50-hr run. (Author)

A68-45101 *
ON-BOARD AIRCRAFT OXYGEN GENERATING SYSTEM.
R. J. Kiraly, A. D. Babinsky (TRW, Inc., Mechanical Products Div., Cleveland, Ohio), and P. D. Quattrone (NASA, Ames Research Center, Moffett Field, Calif.).
Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 7-11, 1968, Paper 680716. 9 p. 7 refs.
Members, $0.75; nonmembers, $1.00.
Contract No. NAS 2-4444.

TRW, under NASA sponsorship, is developing an on-board aircraft oxygen generation system. Oxygen is generated by water electrolysis and carbon dioxide is removed from the rebreather loop by an electrochemical carbon dioxide concentrator. The design objectives are to develop a safe, reliable, compact system which would replace the present LOX system, thereby minimizing the need for ground support facilities and reduce time and effort required for servicing. The only periodic servicing required is to refill a water reservoir between flights. The system, with the rebreather loop, requires only the generation of oxygen at a rate equal to approximately 1.5 times that metabolically consumed by the user. This system is also applicable for use in closed environments such as spacecraft and submarines. The paper describes the oxygen system and its design. Projected sizes and weights for a fully developed prototype are presented. Other applications are discussed. (Author)

A68-45211 *
AVERAGE EVOKED POTENTIALS AND UNCERTAINTY RESOLUTION.
Emanuel Donchin (NASA, Ames Research Center, Moffett Field, Calif.).
Psychonomic Science, vol. 12, no. 3, 1968, p. 103. 5 refs.
NSF Grant No. GB-1844; Grant No. NsG-623.

Study of human average evoked potentials to near-threshold optical stimuli. Two subjects were presented with a series of near-threshold flashes of light and instructed to report for each flash in which of eight different positions it appeared, and the degree to which they were certain about this judgment. Average evoked potentials to the flashes were also recorded from the occiput. A positive-going wave with latency to the peak of 250 msec appeared when the subject was certain about his judgment, whether or not he was correct. F.R.L.

A68-45281 #
HUMAN RESPONSES AND CONTROLLABILITY LIMITS AS MEASURED FROM FIXED BASE FLIGHT SIMULATOR TESTS.
Tetsuo Ema and Tsuruo Tsukahara (Defense Academy, Dept. of Aeronautical Engineering, Yokosuka, Japan).
Japan, Defense Academy, Memoirs, vol. 7, Mar. 1968. 18 p. 8 refs.

Results of experimental studies, accompanied by fundamental human response ability tests using a type of fixed-base flight simulator, to determine the limit of controllability by stick control for an unstable second-order system. The human pilots sampled in the test were undergraduates of the Japan Defense Academy who had no piloting experience. By analysis of the results of the pilot's controllability limit as derived from the tests, it was possible to evaluate some effects of parameters considered to be of importance in controlling an unstable element. F.R.L.

A68-45345 *
PHASE RELATIONS BETWEEN CIRCADIAN PERIODS OF ACTIVITY AND HUMAN DEEP-BODY TEMPERATURE [PHASENBEZIEHUNGEN ZWISCHEN DEN CIRCADIANEN PERIODEN DER AKTIVITÄT UND DER KERNTEMPERATUR BEIM MENSCHEN].
Jürgen Aschoff, Ursula Gerecke, and Rütger Wever (Max-Planck-Institut für Verhaltensphysiologie, Seewiesen-über-Starnberg and Erling-Andechs, West Germany).
Pflügers Archiv für die gesamte Physiologie des Menschen und der Tiere, vol. 295, 1967, p. 173-183. 26 refs. In German.
Research supported by the Bundesministerium für Wissenschaftliche Forschung; Grants No. NsG-259-62; No. NsG-52-015-001.

Investigation of the relation between periods of activity and rest in humans and their body temperature. For this purpose, rectal temperatures were taken on normally active or on resting subjects under the following conditions: (1) in an underground bunker at room temperature with constant illumination and exclusion of all known time indicators; (2) in the same bunker with a 12:12-hr light-dark cycle as the time indicator; and (3) in a climatic chamber with constant temperature, with the time of day known to the subjects and illumination at choice. The results suggest that the activity cycle and the temperature cycle be considered as two coupled oscillators, whose phase-angle difference changes considerably when, after the exclusion of external time indicators, they start to oscillate with a spontaneous circadian frequency. P.v.T.

A68-45386 *
EFFECT OF ALTERATIONS IN PROTEIN INTAKE ON LIVER XANTHINE DEHYDROGENASE IN THE CHICK.
R. W. Scholz and W. R. Featherston (Purdue University, Dept. of Animal Sciences, Lafayette, Ind.).
Journal of Nutrition, vol. 95, June 1968, p. 271-277. 20 refs.
PHS Grant No. AM-11487-01; Grant No. NsG(T)-27.

Experimental investigation of the influence of alterations in protein intake on body weight, liver weight, liver nitrogen, and liver xanthine dehydrogenase (XDH) activity in chicks. After a 10-day period in which all chicks were fed a diet containing 25% isolated soybean protein, one-half of the chicks were changed to a diet containing 75% isolated soybean protein and one-half were continued with the 25% diet. The results of the investigations showed no significant difference in body or liver weights at 20 days between birds fed the 25 and 75% isolated soybean protein diets. Fasting for 24 hr resulted in a similar decrease in body and liver weights for birds fed the two protein levels, but the decrease in liver N was greater for birds fed the high-protein diet. Feeding a protein-free diet for 24 hr resulted in larger livers and lower total liver N as compared with control values. M.M.

A68-45393 *
DAILY RHYTHMS IN THE CONCENTRATIONS OF VARIOUS AMINO ACIDS IN HUMAN PLASMA.
Richard J. Wurtman, Christopher M. Rose, Chuan Chou, and Frances F. Larin (Massachusetts Institute of Technology, Dept. of Nutrition and Food Science, Cambridge, Mass.).
New England Journal of Medicine, vol. 279, July 25, 1968, p. 171-175. 16 refs.
PHS Grants No. AM-11237; No. AM-11709; No. AM-06274; No. FR 88; Grant No. NGR-22-009-272; Contract No. AF 41(609)-3151.

Blood was collected at intervals during a 24-hr period from 23 healthy male volunteers on diets containing various amounts of protein; the plasma was assayed for 16 amino acids. Among subjects receiving 0.71 or 1.5 g of protein per kilogram of body weight, the concentrations of tyrosine, phenylalanine, and tryptophan tended to be lowest at 2:00 and highest at or after 10:30 a.m. Volunteers given a diet containing less than 0.04 g of protein per kilogram showed similar fluctuations in the concentrations of the above amino acids and methionine, but peak plasma levels were observed somewhat earlier in the morning. All the amino acids studied showed some tendency to vary with time of day. (Author)

A68-45394 *
HISTOCHEMICAL STUDIES ON THE DISTRIBUTION OF SOME ENZYMES OF THE GLYCOLYTIC PATHWAYS IN THE OLFACTORY BULB OF THE SQUIRREL MONKEY (SAIMIRI SCIUREUS).
T. R. Shantha, G. H. Bourne (Emory University, Yerkes Regional Primate Research Center, Atlanta, Ga.), and K. Iijima.
Histochemie, vol. 10, 1967, p. 224-229. 24 refs.
NIH Grant No. FR-00165; Grant No. NGR-11-001-016.

Evaluation of detailed histochemical studies on the distribution of glycolytic enzymes in the olfactory bulb of the Squirrel Monkey. The olfactory glomeruli, mitral cells, tufted cells, glial cells, and nerve fibers are well equipped with the enzymes of the glycolytic pathways. Granule cells do not have the ability to synthesize or to break down glycogen, but they use the Embden-Meyerhof-Parnas pathway and the Warburg-Dickens pathway. The synapses of the olfactory glomeruli may have the ability to break down glycogen for an energy source. Small glial cells found in the olfactory glomeruli may be a special type of oligodendrocyte. Glial cells found abundantly in and around the olfactory glomeruli may be energy donators to the synapses of the olfactory glomeruli. It is suggested that oligodendrocytes and astrocytes of the olfactory bulb may have different branching enzymes. P.v.T.

A68-45395 *
FORCE FEEDING ON THE RESPONSE OF JAPANESE QUAIL TO OXYGEN TOXICITY.

Harold S. Weiss and Ronald A. Wright (Ohio State University, College of Medicine, Dept. of Physiology, Environmental Physiology Laboratory, Columbus, Ohio).
Comparative Biochemistry and Physiology, vol. 25, 1968, p. 95-106. 19 refs.
NIH Grant No. HE-09026; Grants No. NsG-295-62; No. NsG-36-008-004.

Experimental study of the physical resistance of Japanese quail (Cotrunix japonica) to oxygen toxicity. It is found that the quail is more resistant to 1 atm O_2 than most small animals, with more than half surviving beyond 12 days. Oxygen depresses body weight and food and water intake of the quail - more severely and persistently in those that succumb, reversibly in those that survive. Force feeding helps maintain body weight without altering mortality rate; and apparently, digestive processes can proceed normally in O_2 toxicity and food and water intake have little effect on survival. P.v.T.

A68-45396
AUDITORY HAZARD FROM SONIC BOOMS?
C. G. Rice (Southampton, University, Institute of Sound and Vibration Research, Audiology Group, Southampton, England) and R. R. A. Coles (Southampton, University, Institute of Sound and Vibration Research, Audiology Group, Southampton; Royal Naval Medical School, Audiology Dept., Alverstoke, Hants., England).
International Audiology, vol. 7, Mar. 1968, p. 85-91. 10 refs.

Experimental evidence has been obtained on whether the sonic boom produced by supersonic aircraft is likely to create an auditory hazard. In order to obtain quantitative evidence, 12 subjects of known impulsive-noise sensitivity were exposed to simulated sonic booms and Friedlander pressure waveforms produced by specially developed line charges of explosive. The degrees of temporary threshold shift (T.T.S.) resulting suggested that exposure to a sonic boom type of N-wave of 17 psf (152 dB) would not constitute an auditory hazard and that exposures considerably in excess of this can be tolerated. It was therefore concluded that the sonic boom can be disregarded as a source of auditory hazard. (Author)

A68-45397 *
COULD LIFE ORIGINATE NOW?
S. W. Fox and R. J. McCauley.
American Museum of Natural History, Journal, vol. 77, Aug.-Sept. 1968, p. 26-30.
Grants No. NsG-689; No. NsG-10-007-008.

Discussion of abiogenesis - i.e., the spontaneous generation of life, from the viewpoint of chemical systems that assemble themselves and have many of the properties of contemporary life. The conversion of five basic elements - namely, carbon, nitrogen, hydrogen, oxygen, and sometimes sulfur into simple amino acids, which in turn form simple organic compounds, is examined. Arguments are presented as to whether life could arise spontaneously in the present era. M.G.

A68-45398 *#
HISTOCHEMICAL STUDIES ON THE DISTRIBUTION OF ESTERASES, MONOAMINE OXIDASE AND DEPHOSPHORYLATING ENZYMES IN THE AREA POSTREMA OF THE SQUIRREL MONKEY.
G. H. Bourne (Emory University, Yerkes Regional Primate Research Center, Atlanta, Ga.) and K. Iijima.
Acta Histochemica, vol. 29, 1968, p. 349-362. 46 refs.
NIH Grant No. FR-00165; Grant No. NGR-11-001-016.

Results of detailed histochemical studies made on the distribution of cholinesterases, simple esterase, monoamine oxidase, and dephosphorylating enzymes in various components of the area postrema of the squirrel monkey. These components include the neurons, glialoid cells, astrocytes and oligodendrocytes, the neuropil, sinusoids, ependymal cells, and the boundary layer. Specific cholinesterase and nonspecific cholinesterase were tested by the Coupland and Holmes (1957) methods, simple esterase by the Burstone (1962) method, monoamine oxidase by the Glenner et al. (1957) method, adenosine triphosphatase by the Wachstein and Meisel (1957) method, and alkaline phosphatase and acid phosphatase by Burstone's (1962) method. P.G.M.

A68-45399 *
IN VITRO NEOPLASTIC TRANSFORMATION OF HAMSTER PINEAL CELLS BY THREE ONCOGENIC DNA VIRUSES.
S. Kirby Orme, Alan S. Rabson (National Institutes of Health, National Cancer Institute, Surgery Branch and Pathologic Anatomy Branch, Bethesda, Md.), Samuel A. Wells (Duke University, Medical Center, Durham, N.C.), and Richard J. Wurtman (Massachusetts Institute of Technology, Dept. of Nutrition and Food Science, Cambridge, Mass.).
Cancer, vol. 21, Mar. 1968, p. 477-482. 10 refs.
PHS Grant No. AM-11709; Grant No. NGR-22-009-272.

Results of the transformation of hamster pineal cells by polyoma virus, including a description of tumors produced by polyoma-transformed pineal cells and comparison of these with tumors produced by cells transformed by simean virus 40 and the LLE46 strain of adenovirus 7. Three histologically distinct tumors were produced by subcutaneous injections of transformed cells into adult irradiated hamsters. Although the tumors differed histologically, hydroxyindole-O-methyl transferase (HIOMT), an enzyme found exclusively in the pineal gland, was present in all tumors produced by the injected cells and in the cultures of the transformed cells. P.G.M.

A68-45400 *
EFFECTS OF HORMONES SUPPLIED IN THE DIET ON CHICK GROWTH AND BONE MINERALIZATION.
L. C. Norris and F. H. Kratzer (California, University, Dept. of Poultry Husbandry, Davis, Calif.).
Journal of Nutrition, vol. 95, Aug. 1968, p. 639-646. 14 refs.
Grant No. NGR-05-004-014.

Results of studies of the effects of hormones, supplied in a purified diet moderately deficient in calcium, on growth and bone mineralization of chicks. Hydrocortisone at all levels was found, in general, to increase the percentage of bone mineral, calcium, and phosphorus. Growth at higher hormone levels, however, was markedly retarded. Cortisone was much less effective than hydrocortisone, and gonadal hormones in the amounts used failed to influence bone mineralization. It was found that chicks receiving hydrocortisone had bones which were smaller but better mineralized than those receiving the other hormones. P.G.M.

A68-45401 *
MEMBRANE AND INTRACELLULAR MECHANISM GOVERNING ENDOGENOUS ACTIVITY IN NEURONS.
F. Strumwasser (California Institute of Technology, Div. of Biology, Pasadena, Calif.).
IN: PHYSIOLOGICAL AND BIOCHEMICAL ASPECTS OF NERVOUS INTEGRATION.
Edited by F. D. Carlson.
Englewood Cliffs, N.J., Prentice-Hall, Inc., 1968, p. 329-341.
PHS Grant No. NB-07071; Grant No. NGR-05-002-031.

Study of the mechanisms which give rise to patterned endogenous activity in a particular single neuron (parabolic burster) of the sea hare (Aplysia californica). This neuron produces groups of impulses separated by quiet periods of relative membrane hyperpolarization (POBH). The POBH which terminates a burst of impulses appears to be triggered by K^+ ions accumulating on the outside, rather than Na^+ ions on the inside, of the cell membrane. The POBH itself appears to be due to an electrogenic Na^+-pump coupled to, or dependent on, Cl^-. The parabolic burster also displays a circadian rhythm of impulse activity in the isolated ganglion that can be entrained by photoperiod in the intact specimen. F.R.L.

A68-45405 *
METABOLIC ADAPTATIONS IN MYOCARDIAL TISSUE DURING REPEATED EXERCISE.
James L. Poland and Don H. Blount (West Virginia University, Dept. of Physiology, Morgantown, W. Va.).
West Virginia Academy of Science, Proceedings, vol. 39, 1967, p. 287-293. 14 refs.
PHS Grant No. HE-06747; Grants No. NsG(T)-21; No. NsG(T)-49-001-002.

Populations of trained Sprague-Dawley rats were produced by daily running on a treadmill. Mildly trained rats compared with

controls exhibited greater myocardial glycogenesis during a 24-hr fast and greater myocardial glycogenolysis during 15 min of running. This increased activity observed in the trained animals was not due to an increase in enzyme concentration within the tissue since training tended to depress both aerobic activity (as measured by oxygen uptake in heart homogenates) and anaerobic activity (as measured by lactate production in heart homogenates in a nitrogen atmosphere). (Author)

A68-45407
DUAL VERSUS SOLO PILOT NAVIGATION IN HELICOPTERS AT LOW LEVEL.
R. E. F. Lewis, W. D. de la Riviere, and D. M. Sweeney (Defence Research Establishment, Toronto, Canada).
Ergonomics, vol. 11, no. 2, 1968, p. 145-155. 6 refs.

Discussion of the question whether navigation accuracy is improved when the task is shared by two helicopter pilots forming a pilot and navigator team, instead of a single pilot, on low-level military missions. Six pilots participated in a comparison of solo and dual performance, in which 358 short tracks were flown in the course of 36 sorties. No difference was found between dual and solo performance in terms of the numbers of endpoints reached (entering a circle of 1/8 mile radius at the endpoints). Advantages of a secondary nature, however, were shown for the dual teams - e.g., smaller errors in landings beyond the criterion circle, fewer initial heading errors and enroute "sit downs." Conclusions and recommendations are presented. P.v.T.

A68-45414 #
DISTINGUISHING LOCAL FEATURES OF INTERSECTING AND BRANCHING TYPE IN AN IMAGE WITH THE AID OF LAYER NETWORKS [WYDZIELANIE Z OBRAZU CECH LOKALNYCH TYPU SKRZYŻOWAŃ I ROZGAŁĘZIEŃ ZA POMOCĄ SIECI WARSTWOWYCH].
Ryszard Dulewicz.
Polska Akademia Nauk, Instytut Automatyki, Prace, no. 51, 1967, p. 37-53. 7 refs. In Polish.

Description of a simple method for synthesizing a system for detecting the information points (local features) of an image. Physiological data indicate that the optical systems of living organisms contain neuron networks arranged in layers and connected by local effects. The proposed method of detection is based on lateral inhibition and excitation in neuron-like layer networks. T.M.

A68-45415 *
CHANGES IN LIVER XANTHINE DEHYDROGENASE AND URIC ACID EXCRETION IN CHICKS DURING ADAPTATION TO A HIGH PROTEIN DIET.
W. R. Featherston and R. W. Scholz (Purdue University, Dept. of Animal Sciences, Lafayette, Ind.).
Journal of Nutrition, vol. 95, July 1968, p. 393-398. 12 refs.
PHS Grant No. AM-11487-01; Grant No. NsG(T)-27.

Examination of the relationship between changes in liver xanthine dehydrogenase with those in uric acid excretion during a 10-day adaptation period in chicks fed diets containing 25 or 75% isolated soybean protein. The relationship between liver xanthine dehyrogenase levels and uric acid formation, and the influence of dietary protein level on weight gain, feed consumption, liver weight, and liver nitrogen during the 10-day adaptation period is presented. A direct correlation between the elevated activity of hepatic xanthine dehydrogenase measured in vitro and the uric acid excretion was observed. P.G.M.

A68-45573
ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI].
Edited by A. I. Oparin (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR).
Moscow, Izdatel'stvo Nauka, 1968. 215 p. In Russian.

CONTENTS:

V EVOLIUTSII FOSFORNOGO OBMENA]. I. S. Kulaev (Moskovskii Gosudarstvennyi Universitet; Akademiia Nauk SSSR, Moscow, USSR), p. 97-102. 20 refs. [See A68-45587 24-04]

EVOLUTION OF THE BIOGEOCHEMICAL FUNCTIONS OF THE BIOSPHERE [OB EVOLIUTSII BIOGEOKHIMICHESKIKH FUNKTSII BIOSFERY]. E. A. Boichenko (Akademiia Nauk SSSR, Moscow, USSR), p. 103-108. 18 refs. [See A68-45588 24-04]

EVOLUTION OF THE PHOTOSYNTHETIC ASSIMILATION OF CARBON [OB EVOLIUTSII FOTOSINTETICHESKOI ASSIMILIATSII UGLERODA]. N. G. Doman (Akademiia Nauk SSSR, Moscow, USSR), p. 109-113. 12 refs. [See A68-45589 24-04]

RESPIRATORY SYSTEM OF BACTERIA IN THE LIGHT OF EVOLUTION [DYKHATEL'NYI APPARAT BAKTERII V SVETE EVOLIUTSII]. N. S. Gel'man (Akademiia Nauk SSSR, Moscow, USSR), p. 114-118.

ULTRAVIOLET RAYS AND ONE-CELLED ORGANISMS [UL'TRAFIOLETOVYE LUCHI I ODNOKLETOCHNYE ORGANIZMY]. M. M. Kamshilov (Akademiia Nauk SSSR, Borok, USSR), p. 119-121. 7 refs. [See A68-45590 24-04]

STUDY OF THE COMPONENTS OF FOSSIL ORGANIC MATTER [ISSLEDOVANIE KOMPONENTOV ISKOPAEMOGO ORGANICHESKOGO VESHCHESTVA]. T. V. Drozdova (Akademiia Nauk SSSR, Moscow, USSR), p. 122-129. 19 refs. [See A68-45591 24-04]

THE EARLIEST FORMS OF LIFE IN NORTHERN EURASIA [O DREVNEISHIKH FORMAKH ZHIZNI SEVERNOI EVRAZII]. A. G. Vologdin (Akademiia Nauk SSSR, Moscow, USSR), p. 130-136. [See A68-45592 24-04]

CARBOHYDRATE METABOLISM IN INVERTEBRATES - TRENDS IN ITS EVOLUTION [OBMEN UGLEVODOV U BESPOZVONOCHNYKH I PUTI EGO EVOLIUTSII]. F. F. Soprunov (Ministerstvo Zdravookhraneniia, Moscow, USSR), p. 137-145.

ROLE OF MEDIATORS IN INDIVIDUAL DEVELOPMENT AND CHANGES IN THEIR FUNCTIONS IN THE PROCESS OF EVOLUTION [ROL' MEDIATOROV V INDIVIDUAL'NOM RAZVITII I SMENA IKH FUNKTSII V PROTSESSE EVOLIUTSII]. G. A. Buznikov and I. V. Chudakova (Akademiia Nauk SSSR, Moscow, USSR), p. 146-153.

EVOLUTION OF THE CHOLINERGIC MEDIATORY PROCESS IN MOLLUSKS [EVOLIUTSIIA KHOLINERGICHESKOGO MEDIATORNOGO PROTSESSA U MOLLIUSKOV]. D. A. Sakharov and T. M. Turpaev (Akademiia Nauk SSSR, Moscow, USSR), p. 154-158.

CERTAIN LAWS OF CHANGES IN BRAIN PROTEINS DURING PHYLOGENY AND ONTOGENY [O NEKOTORYKH ZAKONOMERNOSTIAKH IZMENENII BELKOV MOZGA V FILO-I ONTOGENEZE]. Z. D. Pigareva, L. M. Gershtein, E. L. Dovedova, and A. S. Kamysheva (Akademiia Meditsinskikh Nauk, Moscow, USSR), p. 159-168.

BIOCHEMICAL EVOLUTION OF ENZYME SYSTEMS AS A BASIS OF THE FUNCTIONAL EVOLUTION OF VERTEBRATES [BIOKHIMICHESKAIA EVOLIUTSIIA FERMENTNYKH SISTEM KAK OSNOVA FUNKTSIONAL'NOI EVOLIUTSII POZVONOCHNYKH ZHIVOTNYKH]. N. A. Verzhbinskaia (Akademiia Nauk SSSR, Leningrad, USSR), p. 169-180.

COMPARATIVE BIOCHEMICAL STUDY OF MUSCLES [SRAVNITEL'NO-BIOKHIMICHESKOE IZUCHENIE MYSHTS]. I. I. Ivanov (Voenno-Meditsinskaia Akademiia, Leningrad, USSR), p. 181-187.

GEOCHEMICAL ECOLOGY [GEOKHIMICHESKAIA EKOLOGIIA]. V. V. Koval'skii (Akademiia Nauk SSSR, Moscow, USSR), p. 188-197. 5 refs. [See A68-45593 24-04]

GEOCHEMICAL ECOLOGY OF SILT AND SOIL MICROFLORA [GEOKHIMICHESKAIA EKOLOGIIA ILOVOI I POCHVENNOI MIKROFLORY]. S. V. Letunova (Akademiia Nauk SSSR, Moscow, USSR), p. 198-201.

GEOCHEMICAL ECOLOGY OF PLANTS [GEOKHIMICHESKAIA EKOLOGIIA RASTENII]. N. S. Petrunina (Akademiia Nauk SSSR, Moscow, USSR), p. 202-206.

A68-45574 #
STATE AND PROBLEMS OF STUDIES OF THE PROBLEM OF THE ORIGIN OF LIFE [SOSTOIANIE I ZADACHI ISSLEDOVANII PO PROBLEME PROISKHOZHDENIIA ZHIZNI].
A. I. Oparin (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR).
IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI].
Edited by A. I. Oparin.
Moscow, Izdatel'stvo Nauka, 1968, p. 5-10. In Russian.

General assessment of modern approaches to the problem of the origin of life on earth. It is contended that the beginning of life on earth should be considered as a process of gradual formation of carbonaceous compounds of greater complexity composing multimolecular systems. Stages of this process are outlined as (1) the formation of hydrocarbons and their closest derivatives during the development of the earth as a planet and during the formation of the earth's crust, the atmosphere, and the hydrosphere; (2) the transformation of the carbonaceous compounds on the earth's surface into more complex organic compounds; (3) further formation and multiplication of open systems capable of reacting with the ambient medium; and (4) further evolution of carbonaceous compounds into primordial organisms by way of prebiological selection. V. Z.

A68-45575 #
EVOLUTION OF THE GASES OF THE EARTH'S CRUST AND THE ATMOSPHERE AND ITS ROLE IN THE ORIGIN OF LIFE ON EARTH [EVOLIUTSIIA GAZOV ZEMNOI KORY I ATMOSFERY I EE ROL' V PROISKHOZHDENII ZHIZNI NA ZEMLE].
V. A. Sokolov (Akademiia Nauk SSSR, Institut Geologii i Razrabotki Goriuchikh Iskopaemykh, Moscow, USSR).
IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI].
Edited by A. I. Oparin.
Moscow, Izdatel'stvo Nauka, 1968, p. 11-15. 6 refs. In Russian.

Outline of a scheme for the evolution of gases in the earth's crust and the atmosphere. The evolution is described as a successive multistage process of the initial differentiation of the primordial protoplanetary gas cloud followed in succession by the development of gases from the hot earth's crust, by the beginning of the atmosphere when the temperature of the earth's surface decreased below 100°C, and, finally, by the formation of the atmosphere as a medium of life. V. Z.

A68-45576 #
CARBONACEOUS CHONDRITES [UGLISTYE KHONDRITY].
L. G. Kvasha (Akademiia Nauk SSSR, Komitet po Meteoritam, Moscow, USSR).
IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI].
Edited by A. I. Oparin.
Moscow, Izdatel'stvo Nauka, 1968, p. 16-22. 25 refs. In Russian.

Discussion of the structural characteristics and chemical and mineralogical composition of carbonaceous chondrites, based on published materials and presented in an attempt to extend existing knowledge concerning abiogenetic synthesis of organic compounds. Fluctuations in the content of the principal elements and their oxides in carbonaceous chondrites are tabulated. Indications are found that carbonaceous chondrites were not heated during their formation. A relation is believed to exist between the gaseous components of carbonaceous chondrites and their silicate components. V. Z.

A68-45577 #
ORGANIC COMPOUNDS OF METEORITES IN RELATION TO THE PROBLEM OF THE ORIGIN OF LIVING MATTER [ORGANICHESKIE SOEDINENIIA METEORITOV V SVIAZI S PROBLEMOI VOZNIKNOVENIIA ZHIVOGO VESHCHESTVA].
G. P. Vdovykin (Akademiia Nauk SSSR, Institut Geokhimii i Analiticheskoi Khimii, Moscow, USSR).
IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI].
Edited by A. I. Oparin.
Moscow, Izdatel'stvo Nauka, 1968, p. 23-33. 26 refs. In Russian.

Review of studies of the organic compounds of meteorites conducted in recent years by the author and other researchers in an attempt to come closer to an understanding of the prebiological evolution of organic matter. The studies have shown that most of the carbonaceous compounds of meteorites represent polymer organic matter with condensed aromatic structures containing free organic radicals and finely dispersed bituminous substances. It is

surmised that the presence of free radicals is due to the effect of cosmic rays. It is also noted that all the organic compounds found in meteorites are known to occur on earth. A listing of organic compounds established in carbonaceous chondrites is given. V. Z.

A68-45578 #
RESULTS OF THE DIAGNOSTICS OF CARBONACEOUS SUBSTANCES FORMED DURING VARIOUS GEOLOGICAL PROCESSES [REZUL'TATY DIAGNOSTIKI UGLERODISTYKH VESHCHESTV, OBRAZUIUSHCHIKHSIA PRI RAZLICHNYKH GEOLOGICHESKIKH PROTSESSAKH].
V. N. Florovskaia (Moskovskii Gosudarstvennyi Universitet, Geologicheskii Fakul'tet, Moscow, USSR).
IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI].
Edited by A. I. Oparin.
Moscow, Izdatel'stvo Nauka, 1968, p. 34-40. In Russian.
Discussion of recent Moscow University studies dealing with the diagnostics of the presence of various carbonaceous compounds in a large group of rocks from the Kola peninsula, the Urals, Siberia, Armenia, and the Caspian Sea coast by mass-scale luminescent microscopy, luminescent and IR spectroscopy, and chemical and mineralogical analysis. The occurrence of free and bonded dispersed bituminous compounds, various carbonaceous minerals, tar, and hydrocarbons of the pyrene series is established in the rock. Hypothetical carbon evolution cycles taking place during the endogenous rock formation process are reconstructed. V. Z.

A68-45579 #
PREBIOLOGICAL SYNTHESIS OF BIOCHEMICALLY IMPORTANT COMPOUNDS [DOBIOLOGICHESKII SINTEZ BIOKHIMICHESKI VAZHNYKH SOEDINENII].
T. E. Pavlovskaia, V. S. Sidorov, A. I. Ladyzhenskaia (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR), and A. G. Pasynskii.
IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI].
Edited by A. I. Oparin.
Moscow, Izdatel'stvo Nauka, 1968, p. 41-48. 14 refs. In Russian.
Experimental demonstration that complex combinations of amino acids can be obtained when systems containing very simple aldehydes and ammonium salts are exposed to UV rays. It is contended that serine and threonine, established among these amino acids, might have played an important role in the prebiological evolution of active protein-like substances. The formation of imidazole and its derivatives along with amino acids is also established. It is further shown that indole and its derivatives are formed when aqueous acetaldehyde and NH_4NO_3 solutions are subjected to UV irradiation. The possible si nificance of these observations for an understanding of the abiogenetic carbon evolution on earth is discussed. V. Z.

A68-45580 #
SYNTHESIS OF BIOLOGICALLY ACTIVE SUBSTANCES IN AN ULTRASONIC-WAVE FIELD [SINTEZ BIOLOGICHESKI AKTIVNYKH VESHCHESTV V POLE UL'TRAZVUKOVYKH VOLN].
I. E. El'piner (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Moscow, USSR).
IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI].
Edited by A. I. Oparin.
Moscow, Izdatel'stvo Nauka, 1968, p. 49-51. In Russian.
Brief comment on a theory of Oparin according to which organic substances were synthesized in a primordial reducing atmosphere during the early stages of the formation of the earth. Studies are cited in which amino acids, ammonia, formaldehyde, and cyanides were obtained from N, H, CH_4, and CO in an aqueous medium under the action of ultrasonic waves. V. Z.

A68-45581 #
STUDIES OF ASYMMETRIC ADSORBENTS AND CATALYSTS SIMULATING THE ASYMMETRIZING EFFECT OF ENZYMES [OB ISSLEDOVANIIAKH ASIMMETRICHESKIKH ADSORBENTOV I KATALIZATOROV, MODELIRUIUSHCHIKH ASIMMETRIZUIUSHCHEE DEISTVIE FERMENTOV].
E. I. Klabunovskii (Akademiia Nauk SSSR, Institut Organicheskoi Khimii, Moscow, USSR).
IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI].
Edited by A. I. Oparin.
Moscow, Izdatel'stvo Nauka, 1968, p. 52-55. 15 refs. In Russian.
Brief review of recent advances in the synthesis of optical and geometrical isomers by using asymmetric adsorbents and asymmetric catalysts with an asymmetrizing effect similar to that of natural enzymes. Starch, cellulose, optically active polymers, and silica gels are considered as asymmetric adsorbents. Optically active metallic catalysts are considered as asymmetric catalysts. The role of asymmetric catalysis in the occurrence of primary optically active isomers of organic compounds in nature is indicated. V. Z.

A68-45582 #
THE MATCHING OF DIFFUSION PROCESSES AND CHEMICAL REACTIONS, AND THE EVOLUTION OF OPEN BIOCHEMICAL SYSTEMS [SOPRIAZHENIE PROTSESSOV DIFFUZII I KHIMICHESKIKH REAKTSII I EVOLIUTSIIA OTKRYTYKH BIOKHIMICHESKIKH SISTEM].
L. N. Moiseeva, V. P. Slobodskaia (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR), and A. G. Pasynskii.
IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI].
Edited by A. I. Oparin.
Moscow, Izdatel'stvo Nauka, 1968, p. 56-62. 9 refs. In Russian.
Results of a simulation study of dynamically stable enzymatic coacervates. An enzyme/substrate complex of RNA-RNA-ase is used at pH 4.5 to 5.5 as a stabilizing membrane. The coacervate stability is measured by changes in the solution turbidity. The rate of diffusion of the RNA toward the enzyme particles is found to be 300 times that of the enzymatic reaction. Simulated data are given for carbohydrate transport through negatively charged membranes in the course of the phosphorylation of glucose by hexokinase. The experiments are based on matching the chemical and enzymatic reactions. The results are discussed in terms of a theory of the evolutionary development of coacervate systems. V. Z.

A68-45583 #
ENZYMATIC PROCESSES ON MEMBRANE MODELS [FERMENTATIVNYE PROTSESSY NA MODEL'NYKH MEMBRANAKH].
G. A. Deborin (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR).
IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI].
Edited by A. I. Oparin.
Moscow, Izdatel'stvo Nauka, 1968, p. 63-68. 18 refs. In Russian.
Results of a study of enzymatic activity in an experimental setup with a lipide membrane separating the enzyme (ribonuclease) from the substrate (RNA). The migration of the enzyme through the membrane to the RNA is established. The effect of pH on this process is investigated. Considerations are given concerning the role of membranes in controlling the enzymatic activity in the biological cell. V. Z.

A68-45584 #
ORGANIZATION PRINCIPLE OF COACERVATE SYSTEMS AND SIMULATION OF PRIMARY FORMS OF METABOLISM IN THEM [O PRINTSIPE ORGANIZATSII KOATSERVATNYKH SISTEM I MODELIROVANII V NIKH PERVICHNYKH FORM OBMENA VESHCHESTV].
A. I. Oparin (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR).
IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI].
Edited by A. I. Oparin.

Moscow, Izdatel'stvo Nauka, 1968, p. 69-75. In Russian.

Discussion of experimental results concerning the organization principle of coacervate systems and the simulation of enzymatic processes in such systems. It is felt that the degree of polymerization of the polymers taking part in these enzymatic processes plays the most important role in the self-formation of coacervate droplets. Experimental results indicate that the presence of a synthesizing enzyme in these droplets leads to their growth. It is found that an increase in the number of components of the external medium which can be used by the droplets intensifies their growth. It is concluded that the subsequent evolution of primordial life systems proceeded via the successive selection of forms which possessed more complex and multistage processes, thus reducing the dependence of the system on the external medium. P.G.M.

A68-45585 #

CHEMICAL CHANGES IN LIPOPROTEIN COACERVATES [KHIMICHESKIE PREVRASHCHENIIA V LIPOPROTEIDNYKH KOATSERVATAKH].

K. B. Serebrovskaia (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR).

IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI]. Edited by A. I. Oparin.

Moscow, Izdatel'stvo Nauka, 1968, p. 76-80. 30 refs. In Russian.

Study of the oxidation-reduction reaction sensitized by chlorophyll in oleate-protein and phosphatide-protein coacervates. It is shown that coacervates which contain phosphatides are characterized by a higher sensitizing activity than coacervates which contain oleates of potassium. Pigment activity in a coacervate is found to be more than 100 times greater than the activity in lecithin ash and in a suspension in the presence of protein. The combining of chlorophyll with a phosphatide leads to a shift of the pigment absorption spectrum into the longwave region of the spectrum. P.G.M.

A68-45586 #

NUCLEIC ACIDS AND EVOLUTIONARY SYSTEMATIZATION [NUKLEINOVYE KISLOTY I EVOLIUTSIONNAIA SISTEMATIKA].

A. N. Belozerskii (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR).

IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI]. Edited by A. I. Oparin.

Moscow, Izdatel'stvo Nauka, 1968, p. 81-91. 21 refs. In Russian.

Discussion of experimental data concerning the composition of nucleic acids, and specifically DNA, in relation to the evolutionary systematization of microbes, plants, and animals. The main conclusion is that DNA, which forms the basis of the species specificity or organisms, may serve as one of the most important criteria for the determination of a systematic position of a group of organisms. I.P.

A68-45587 #

INORGANIC POLYPHOSPHATES IN THE EVOLUTION OF PHOSPHORUS EXCHANGE [NEORGANICHESKIE POLIFOSFATY V EVOLIUTSII FOSFORNOGO OBMENA].

I. S. Kulaev (Moskovskii Gosudarstvennyi Universitet; Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR).

IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI]. Edited by A. I. Oparin.

Moscow, Izdatel'stvo Nauka, 1968, p. 97-102. 20 refs. In Russian.

Analysis showing that, in principle, inorganic polyphosphates or their esters may have participated in the synthesis of various organic compounds under the conditions which prevailed on the primeval earth. It is pointed out that numerous compounds synthesized under conditions created in model tests are very close to the compounds encountered in modern organisms. The possible role played by polyphosphates in the metabolism of primeval living organisms is examined. V.P.

A68-45588 #

EVOLUTION OF THE BIOGEOCHEMICAL FUNCTIONS OF THE BIOSPHERE [OB EVOLIUTSII BIOGEOKHIMICHESKIKH FUNKTSII BIOSFERY].

E. A. Boichenko (Akademiia Nauk SSSR, Institut Geokhimii i Analiticheskoi Khimii, Moscow, USSR).

IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI]. Edited by A. I. Oparin.

Moscow, Izdatel'stvo Nauka, 1968, p. 103-108. 18 refs. In Russian.

Discussion of the changes produced by plants in the biochemical functions of the biosphere, and of the changes experienced by the plants themselves during the evolution of the biosphere. It is shown how morphological changes have led from green-blue algae to highly differentiated plants, such as the oak tree. The changes in the fermentative processes which have transformed the ancient anaerobic biosphere into the present oxidized biosphere are also examined. V.P.

A68-45589 #

EVOLUTION OF THE PHOTOSYNTHETIC ASSIMILATION OF CARBON [OB EVOLIUTSII FOTOSINTETICHESKOI ASSIMILIATSII UGLERODA].

N. G. Doman (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR).

IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI]. Edited by A. I. Oparin.

Moscow, Izdatel'stvo Nauka, 1968, p. 109-113. 12 refs. In Russian.

Discussion of the role played by organic compounds in the general photoassimilation of carbon by photosynthesizing organisms, in particular by the various types of bacteria. The heterotrophic and autotrophic assimilation of carbon dioxide is also examined. It is shown that there exist several independent types of heterotrophic fixation of carbon dioxide by leaves of green plants. The results of various investigators concerning these types of fixation are reviewed. V.P.

A68-45590 #

ULTRAVIOLET RAYS AND ONE-CELLED ORGANISMS [UL'TRAFIOLETOVYE LUCHI I ODNOKLETOCHNYE ORGANIZMY].

M. M. Kamshilov (Akademiia Nauk SSSR, Institut Biologii Vnutrennykh Vod, Borok, USSR).

IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI].

Edited by A. I. Oparin.

Moscow, Izdatel'stvo Nauka, 1968, p. 119-121. 7 refs. In Russian.

Results of a systematic study of the effect of ultraviolet radiation at 253.7 mμ on the following one-celled organisms: Bodo marina, Rhodoturula glutinis, and Paramecium caudatum. These results are found to support the hypothesis that there exist two basic centers which are affected by the action of UV radiation: the pyrimidines of nucleic acids and the adenine system. At least two rudimentary UV stages in the formation of life are, it seems, present in the organisms studied: photoreactivation and the stimulating effect of weak UV doses. P.G.M.

A68-45591 #

STUDY OF THE COMPONENTS OF FOSSIL ORGANIC MATTER [ISSLEDOVANIE KOMPONENTOV ISKOPAEMOGO ORGANICHESKOGO VESHCHESTVA].

T. V. Drozdova (Akademiia Nauk SSSR, Institut Geokhimii i Analiticheskoi Khimii, Moscow, USSR).

IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI]. Edited by A. I. Oparin.

Moscow, Izdatel'stvo Nauka, 1968, p. 122-129. 19 refs. In Russian.

Study of the various organic components of fossil remains and their use in establishing place for an organism in the evolution scheme. The components considered include proteins, amino acids, and carbohydrates. It is claimed that under natural conditions the organic remains of organisms are most often subjected to chemical changes leading to the formation of highly condensed carbonaceous

matter which forms the basis of peat, coal, and the organic part of shale. The role of the melanoid reaction in these condensation processes and a scheme for the possible paths of humic acid formation are discussed. It is shown that one of the characteristic indices of the condensability of fossil organic matter is the qualitative and quantitative composition of amino acids in the hydrolysates.

P.G.M.

A68-45592 #

THE EARLIEST FORMS OF LIFE IN NORTHERN EURASIA [O DREVNEISHIKH FORMAKH ZHIZNI SEVERNOI EVRAZII].

A. G. Vologdin (Akademiia Nauk SSSR, Paleontologicheskii Institut, Moscow, USSR).

IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI]. Edited by A. I. Oparin.

Moscow, Izdatel'stvo Nauka, 1968, p. 130-136. In Russian.

Application of the paleontological method of studying sedimentary deposits to an investigation of the earliest forms of life. A study of cross sections of many rock formations in the USSR, Mongolia, China, Czechoslovakia, and Poland resulted in the observation and partial recording of vestiges of a number of groups of organisms which clearly belong to various stages of the development of life during Precambrian times. The data collected supplement the small amount of data available in foreign countries on vestiges of organisms by citing a large number of new species of blue-green algae. Vestiges of simple life forms such as jellyfish and sponges were also discovered. The earliest forms of organisms on the territory of the USSR were established as being about 2.6 billion years old, which definitely cannot be considered as the time of origin of life.

I.P.

A68-45593 #

GEOCHEMICAL ECOLOGY [GEOKHIMICHESKAIA EKOLOGIIA].

V. V. Koval'skii (Akademiia Nauk SSSR, Institut Geokhimii i Analiticheskoi Khimii, Moscow, USSR).

IN: ABIOGENESIS AND THE INITIAL STAGES OF THE EVOLUTION OF LIFE [ABIOGENEZ I NACHAL'NYE STADII EVOLIUTSII ZHIZNI]. Edited by A. I. Oparin.

Moscow, Izdatel'stvo Nauka, 1968, p. 188-197. 5 refs. In Russian.

Discussion of a system of biogeochemical distributions, in which the environment of living organisms and the physiological and biochemical properties of organisms defined by natural and artificially controlled biogeochemical alimentary cycles are treated from a unified point of view. Particular attention is given to the part played by an excess or deficiency in the microelements, the variability of the biogeochemical alimentary cycles, the intermediate metabolism, and morphological indices in the adaptation of organisms to geochemical environmental conditions and the appearance of biogeochemical endemias.

V.P.

A68-45610

SPACE CARDIOLOGY [KOSMICHESKAIA KARDIOLOGIIA].

V. V. Parin, R. M. Baevskii, Iu. N. Volkov, and O. G. Gazenko. Leningrad, Izdatel'stvo Meditsina, 1967. 208 p. 275 refs. In Russian.

This book deals with the problems of space medicine and the preservation of human health during space flight. An attempt is made to systematize the results of experimental investigations obtained during space flight. Cardiological methods of space research, including those based on mathematical and statistical data, are described in detail. Certain clinical data obtained with the aid of space cardiology and the results of a clinicophysiological analysis of data obtained during space flights are also presented. Cardiological theories are considered in connection with the overall reactions of the organism to space flight factors. Electrocardiograph measurements made during the flights of Vostoks 3 to 6 are presented, and the results of the American Mercury and Gemini missions are discussed.

M.G.

A68-45611 *#

TRANSMISSION CHARACTERISTICS OF AXIAL WAVES IN BLOOD VESSELS.

M. Anliker (Stanford University, Dept. of Aeronautics and Astronautics, Stanford, Calif.), E. Ogden (NASA, Ames Research Center, Moffett Field, Calif.), and W. E. Moritz.

Society for Experimental Stress Analysis, Spring Meeting, Albany, N.Y., May 7-10, 1968, Paper 1350. 39 p. 23 refs.

$0.50.

Grant No. NGR-05-020-223.

Determination of the phase velocities and damping of sinusoidal axial waves in the carotid artery of anesthetized dogs using an electrooptical tracking system. For frequencies between 25 and 150 Hz, the speed of the axial waves ranged between 20 and 40 m/sec and generally increased with frequency, while the natural pressure wave traveled at a speed of about 10 m/sec. It is noted, however, that on the basis of an isotropic wall model, the axial wave speed should be approximately 5 times higher than the pressure wave speed. This discrepancy can be interpreted as an indication of anisotropic behavior of the carotid wall. The carotid artery appears to be more elastic in the axial than in the circumferential direction.

M.M.

A68-45645

AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 7TH, CHICAGO, ILL., MAY 13-16, 1968, PROCEEDINGS.

Boston, American Association for Contamination Control, 1968. 163 p.

Members, $15.; nonmembers, $18.

CONTENTS:

AN APPROACH TO UNDERSTANDING THE BASIC PHYSICS INVOLVED IN MEETING PLANETARY QUARANTINE. D. L. Enlow and P. E. Kubasko (General Electric Co., Valley Forge, Pa.), p. 38-41. 5 refs. [See A68-45646 24-05]

HANDBOOK OF BIOLOGICAL ASPECTS OF SPACECRAFT STERILIZATION. M. G. Koesterer (General Electric Co., King of Prussia, Pa.) and F. J. Beyerle (NASA, Marshall Space Flight Center, Huntsville, Ala.), p. 50-52. [See A68-45647 24-05]

HIGH BAY LAMINAR FLOW CLEAN ROOMS. D. W. Stanfill (NASA, Goddard Space Flight Center, Greenbelt, Md.) and J. C. Little (Union Carbide Corp., Oak Ridge, Tenn.), p. 66-75. [See A68-45648 24-11]

EVALUATING SATURN S-IC VENDOR CLEANING CAPABILITIES. J. P. Hartman (Boeing Co., New Orleans, La.), p. 95-98. 11 refs. [See A68-45649 24-11]

DEVELOPMENT OF DETECTION TECHNIQUES FOR THE PENETRATION OF BACTERIAL CELLS THROUGH ISOLATION SUIT MATERIALS. A. Bryce (General Electric Co., King of Prussia, Pa.), p. 99-101. [See A68-45650 24-05]

STUDIES OF METHODS FOR THE PREVENTION OF MICROBIAL CONTAMINATION OF CLEAN ROOMS AT CAPE KENNEDY. G. C. Webster and R. C. Sanborn (Pan American World Airways, Inc., Cape Kennedy, Fla.), p. 102-107. 9 refs. [See A68-45651 24-05]

CONTAMINATION CONTROL FOR SPACECRAFT QUALITY. J. I. Black (TRW Systems Group, Redondo Beach, Calif.), p. 108-111. 7 refs. [See A68-45652 24-05]

A68-45646

AN APPROACH TO UNDERSTANDING THE BASIC PHYSICS INVOLVED IN MEETING PLANETARY QUARANTINE.

D. L. Enlow and P. E. Kubasko (General Electric Co., Aerospace Group, Missile and Space Div., Re-Entry Systems Dept., Space and Biological Physics Laboratory, Valley Forge, Pa.).

IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 7TH, CHICAGO, ILL., MAY 13-16, 1968, PROCEEDINGS. [A68-45645 24-05]

Boston, American Association for Contamination Control, 1968, p. 38-41. 5 refs.

Discussion of the problem of contamination control in landings on other planets to preclude the possibility that earth organisms were deposited there by the spacecraft. Such organisms, especially bacteria able to survive in a great variety of environments, could disrupt the entire nature and flora of the planet visited. To maintain the quarantine of extraterrestrial systems, numerous precautions would be implemented into the design and fabrication of spacecraft for these missions. It is also necessary to know that, once a probe or lander is sterile, its condition can be maintained for the period

of the mission. Experiments made in ambient conditions are discussed; however, in order to understand the basic physical concepts involved in adhesion and charge phenomena, the experiments must be done in a vacuum environment. P.v.T.

A68-45647 *
HANDBOOK OF BIOLOGICAL ASPECTS OF SPACECRAFT STERILIZATION.
Martin G. Koesterer (General Electric Co., Aerospace Group, Valley Forge Space Technology Center, King of Prussia, Pa.) and Frederick J. Beyerle (NASA, Marshall Space Flight Center, Huntsville, Ala.).
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 7TH, CHICAGO, ILL., MAY 13-16, 1968, PROCEEDINGS. [A68-45645 24-05]
Boston, American Association for Contamination Control, 1968, p. 50-52.

Discussion of a handbook on the biological aspects of sterilization prepared for the nonlife-science oriented individual concerned with the development of a planetary spacecraft program. The purpose of this handbook is to present microbiological background information useful to personnel so that they are better able to appreciate the microbiological requirements imposed on planetary spacecraft and to evaluate the effects of engineering procedure on microbial life, as well as the effects of contamination control, decontamination, and sterilization procedures on spacecraft design and functional test requirements. An outline of the contents of the handbook is presented, listing the topics covered in the manual, with some examples of the material. P.v.T.

A68-45650 *
DEVELOPMENT OF DETECTION TECHNIQUES FOR THE PENETRATION OF BACTERIAL CELLS THROUGH ISOLATION SUIT MATERIALS.
A. Bryce (General Electric Co., Biological Physics Laboratory, King of Prussia, Pa.).
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 7TH, CHICAGO, ILL., MAY 13-16, 1968, PROCEEDINGS. [A68-45645 24-05]
Boston, American Association for Contamination Control, 1968, p. 99-101.
Contract No. NAS 1-6537.

Study and preliminary specification of a Bio-Isolator Suit System (BISS) with the object of developing a "glove suit" which would allow aseptic assembly of a spacecraft in a sterile chamber by a worker who would be topically isolated from it. The chamber and suit would be isolated by dry heat. The chamber would then be supplied with an overpressure of sterile nitrogen of 4 in. of water. The physical requirements for the suit were quite unique. Along with properties of resistance to wear due to flex, abrasion, and repeated heating, these materials had to function as absolute barriers to the passage of microorganisms. Two techniques have been demonstrated for determining the effectiveness of suit materials as biological barriers: the isotope methods and the viable culture method. Both have been proven to be effective. P.v.T.

A68-45651
STUDIES OF METHODS FOR THE PREVENTION OF MICROBIAL CONTAMINATION OF CLEAN ROOMS AT CAPE KENNEDY.
G. C. Webster and R. C. Sanborn (Pan American World Airways, Inc., Aerospace Services Div., Medical Dept., Cape Kennedy, Fla.).
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 7TH, CHICAGO, ILL., MAY 13-16, 1968, PROCEEDINGS. [A68-45645 24-05]
Boston, American Association for Contamination Control, 1968, p. 102-107. 9 refs.

Discussion of the necessity of clean rooms in the aerospace industry and for medical purposes. In both cases, the utility of clean rooms for the control of microbial levels depends upon the attainment of the desired low microbial levels without undue interference with the activities and comfort of personnel in the clean room. In order to ascertain how effective clean rooms can be in the control of microbial levels, these levels were examined in five different clean rooms at Cape Kennedy. These clean rooms were operated under a variety of conditions likely to influence microbial levels and offered some insight into conditions important for the control of microbial populations in clean rooms. Microbial levels in different clean rooms varied from 25 to 438 microorganisms per square foot of surface and 0.02 to 1.05 microorganisms per cubic foot of air. Major pathways of microbial entrance into the clean rooms were on personnel clothing and equipment, in water and in personnel. Restriction of microbial entrance via these pathways resulted in a lowering of microbial levels to the lowest levels hitherto obtained during operations in the clean rooms under study. P.v.T.

A68-45652
CONTAMINATION CONTROL FOR SPACECRAFT QUALITY.
J. I. Black (TRW Systems Group, Systems Engineering and Integration Div., Redondo Beach, Calif.).
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 7TH, CHICAGO, ILL., MAY 13-16, 1968, PROCEEDINGS. [A68-45645 24-05]
Boston, American Association for Contamination Control, 1968, p. 108-111. 7 refs.

The vital role which contamination control plays in assuring success in spacecraft launchings is presented by reviewing several failure modes detected in recent years. The objectives and elements of a typical contamination control program are given to describe its operation as part of the overall quality effort. Types of contamination and typical examples are described. (Author)

A68-45656 #
APPLICATION OF AVIATION MEDICINE AND AEROMEDICAL RESEARCH.
P. V. Siegel (Federal Aviation Administration, Washington, D.C.).
IN: CIVIL AVIATION SAFETY CENTRE, ANNUAL TECHNICAL CONFERENCE, 4TH, BEIRUT, LEBANON, JUNE 4-7, 1968, PROCEEDINGS. [A68-45653 24-02]
Beirut, Lebanon, Civil Aviation Safety Centre, 1968. 16 p.

Discussion of the practice of preventive medicine in aviation, regarded from the standpoint of preventive safety. Based on the experience of many years, it is believed that an annual physical examination of pilots is probably frequent enough. Many significant changes have been made in the physical standards as a result of past experience. Thus the modern improved contact lenses are now acceptable for pilot use and often provide better corrections than conventional glasses. States, management, and pilots are all interested in fatigue studies in relation to flight time limitation. It is believed that, in this field, the standards must be revised, to be adapted to the changing aircraft equipment. Finally, the important part played by airport operators in aviation safety is discussed. P.v.T.

A68-45657 #
MEDICAL ASPECTS OF SUPERSONIC TRANSPORTATION.
F. H. Zebouni.
IN: CIVIL AVIATION SAFETY CENTRE, ANNUAL TECHNICAL CONFERENCE, 4TH, BEIRUT, LEBANON, JUNE 4-7, 1968, PROCEEDINGS. [A68-45653 24-02]
Beirut, Lebanon, Civil Aviation Safety Centre, 1968. 13 p.

Discussion of two types of medical problems occurring in supersonic transportation - namely, high-speed problems and high-altitude problems. The human body is not affected by speed and in fact has no means of appreciating speed without external visual reference. It will be different, however, when altering course, for a centrifugal force will add its weight to the gravitation force, due to speed. The smaller the radius curve, the higher the centrifugal force exerted on the body. High acceleration reacts adversely on heart and circulation. To avoid these symptoms, pilots of SST aircraft will have to alter course over a very wide radius. SST aircraft will fly between 15,000 and 25,000-m altitude. Since at these altitudes no human being can live without pressurization, pressurized cabins must be used. The effects of a possible loss of pressurization would be fatal. In discussing the psychology of the SST passengers, it is pointed out that the acceleration and deceleration of the SST aircraft in the takeoff and landing might produce anxiety among the passengers. Last but not least, it is believed that the upsetting of the physiological time scale of the passengers will have an adverse effect on their body functions. P.v.T.

A68-45745
PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968. 271 p. In Russian.

CONTENTS:

ACCLIMATION TO LOW BAROMETRIC PRESSURE AS A MEANS OF INCREASING THE RESISTANCE TO VARIOUS EXTREMAL FACTORS [AKKLIMATIZATSIIA K PONIZHENNOMU BAROMETRICHESKOMU DAVLENIIU KAK SREDSTVO POVYSHENIIA USTOICHIVOSTI K RAZLICHNYM EKSTREMAL'NYM FAKTORAM], p. 5-10.

EFFECT OF PREVIOUS ACCLIMATIZATION AT MOUNTAIN HEIGHTS ON HUMAN TOLERANCE OF TRANSVERSE ACCELERATIONS [VLIIANIE PREDVARITEL'NOI AKKLIMATIZATSII V GORAKH NA PERENOSIMOST' CHELOVEKOM POPERECHNYKH PEREGRUZOK]. A. R. Kotovskaia, P. V. Vasil'ev, R. A. Vartbaronov, and S. F. Simpura, p. 11-19. 19 refs. [See A68-45746 24-05]

PHYSIOLOGICAL REACTIONS OF MAN DURING THE ACTION OF TRANSVERSE ACCELERATIONS AFTER ADAPTATION TO HIGH-MOUNTAIN CONDITIONS [FIZIOLOGICHESKIE REAKTSII CHELOVEKA PRI DEISTVII POPERECHNYKH PEREGRUZOK POSLE ADAPTATSII K USLOVIIAM VYSOKOGOR'IA]. A. R. Kotovskaia, R. A. Vartbaronov, and S. F. Simpura, p. 19-39. 22 refs. [See A68-45747 24-04]

EFFECT OF ADAPTATION TO HYPOXIA UNDER PRESSURE CHAMBER CONDITIONS ON THE TRANSVERSE-ACCELERATION TOLERANCE [VLIIANIE ADAPTATSII K GIPOKSII V USLOVIIAKH BAROKAMERY NA PERENOSIMOST' POPERECHNYKH PEREGRUZOK]. A. R. Kotovskaia, R. A. Vartbaronov, F. V. Babchinskii, and S. F. Simpura, p. 40-48. 15 refs. [See A68-45748 24-04]

CHARACTERISTICS OF THE DEVELOPMENT OF AN ACUTE HYPOXIA ADAPTATION SYNDROME IN MOUNTAIN CLIMBERS [OSOBENNOSTI RAZVITIIA ADAPTATSIONNOGO SINDROMA K OSTROI GIPOKSII U AL'PINISTOV]. V. B. Malkin, N. M. Asiamolova, and A. K. Kochetov, p. 48-57. 7 refs. [See A68-45749 24-04]

EFFECT OF HIGH-MOUNTAIN ADAPTATION ON HUMAN RESISTANCE TO ACUTE HYPOXIA, HIGH TEMPERATURE, AND VESTIBULAR STIMULI [VLIIANIE ADAPTATSII K VYSOKOGOR'IU NA USTOICHIVOST' CHELOVEKA K OSTROI GIPOKSII, VYSOKOI TEMPERATURE I VESTIBULIARNYM RAZDRAZHENIIAM]. V. B. Malkin, G. D. Iukhnovskii, and S. S. Markarian, p. 57-65. 8 refs. [See A68-45750 24-04]

EFFECT OF A REPEATED STAY AT MOUNTAIN HEIGHTS ON THE RESISTANCE OF MOUNTAIN CLIMBERS TO ACUTE HYPOXIA [O VLIIANII POVTORNOGO PREBYVANIIA V GORAKH NA USTOICHIVOST' AL'PINISTOV K OSTROI GIPOKSII]. N. M. Asiamolova and V. B. Malkin, p. 65-72. 7 refs. [See A68-45751 24-04]

RESISTANCE OF ANIMALS TO HYPEROXIA, HYPERCAPNIA AND HIGH TEMPERATURE AFTER ADAPTATION TO LOW BAROMETRIC PRESSURE [USTOICHIVOST' ZHIVOTNYKH K GIPEROKSII, GIPERKAPNII I VYSOKOI TEMPERATURE POSLE ADAPTATSII K PONIZHENNOMU BAROMETRICHESKOMU DAVLENIIU]. F. V. Babchinskii, V. B. Malkin, and G. D. Iukhnovskii, p. 72-79. 12 refs. [See A68-45752 24-04]

EFFECT OF ADAPTATION TO LOW BAROMETRIC PRESSURE ON RESISTANCE TO HYPOCAPNIA [VLIIANIE ADAPTATSII K PONIZHENNOMU BAROMETRICHESKOMU DAVLENIIU NA USTOICHIVOST' K GIPOKAPNII]. A. K. Kochetov, p. 79-84. 6 refs. [See A68-45753 24-04]

RESISTANCE OF ANIMALS TO ACUTE HYPOXIA AFTER TRAINING WITH PHYSICAL LOADS UNDER HIGH-MOUNTAIN CONDITIONS [USTOICHIVOST' ZHIVOTNYKH K OSTROI GIPOKSII POSLE TRENIROVKI K FIZICHESKIM NAGRUZKAM V USLOVIIAKH VYSOKOGOR'IA]. E. V. Loginova, p. 84-93. 25 refs. [See A68-45754 24-04]

MUTUAL EFFECTS OF TRAINING WITH PHYSICAL LOADS AND ADAPTATION TO HYPOXIC HYPOXIA [O VZAIMOVLIIANII TRENIROVKI K FIZICHESKIM NAGRUZKAM I ADAPTATSII K GIPOKSICHESKOI GIPOKSII]. E. V. Loginova, p. 93-96. [See A68-45755 24-04]

EFFECT OF PROLONGED PERIODS UNDER CONDITIONS OF REDUCED BAROMETRIC PRESSURE ON RESISTANCE TO ACCELERATIONS [VLIIANIE DLITEL'NOGO PREBYVANIIA V USLOVIIAKH PONIZHENNOGO BAROMETRICHESKOGO DAVLENIIA NA USTOICHIVOST' K PEREGRUZKAM]. N. N. Uglova, p. 97-103. [See A68-45756 24-04]

THE EFFECT OF A PRELIMINARY INTERMITTENT EXPOSURE TO RAREFIED ATMOSPHERE ON THE ABILITY OF RATS TO ENDURE TRANSVERSE ACCELERATIONS [VLIIANIE PREDVARITEL'NOGO PRERYVISTOGO PREBYVANIIA V RAZREZHENNOI ATMOSFERE NA PERENOSIMOST' KRYSAMI POPERECHNYKH PEREGRUZOK]. V. G. Petrukhin, p. 103-109. 23 refs. [See A68-45757 24-04]

EFFECT OF ADAPTATION TO CONDITIONS OF AN ALTERED GAS MEDIUM ON RESISTANCE TO ACCELERATIONS [VLIIANIE ADAPTATSII K USLOVIIAM IZMENENNOI GAZOVOI SREDY NA USTOICHIVOST' K PEREGRUZKAM]. P. V. Vasil'ev and N. N. Uglova, p. 109-122. 43 refs. [See A68-45758 24-04]

COMPARATIVE EVALUATION OF THE EFFECTIVENESS OF VARIOUS MODES OF ADAPTATION TO HYPOXIA [SRAVNITEL'NAIA OTSENKA EFFEKTIVNOSTI RAZLICHNYKH REZHIMOV ADAPTATSII K GIPOKSII]. P. V. Vasil'ev, F. V. Babinskii, E. V. Loginova, V. B. Malkin, N. A. Roshchina, and G. D. Iukhnovskii, p. 122-129. [See A68-45759 24-04]

INFLUENCE OF HYPOXIA ON THE STATE OF PROTECTIVE MECHANISMS IN THE ORGANISMS OF MICE [VLIIANIE GIPOKSII NA SOSTOIANIE ZASHCHITNYKH MEKHANIZMOV ORGANIZMA MYSHI]. A. S. Kaplanskii, G. N. Durnova, and N. A. Roshchina, p. 129-137. 28 refs. [See A68-45760 24-04]

SIGNIFICANCE OF CERTAIN CONTROL SYSTEMS IN THE DEVELOPMENT OF ADAPTATION TO HYPOXIA [O ZNACHENII NEKOTORYKH UPRAVLIAIUSHCHIKH SISTEM V RAZVITII ADAPTATSII K GIPOKSII]. V. B. Malkin, p. 137-143. 10 refs. [See A68-45761 24-04]

ROLE OF CERTAIN SUBCORTICAL FORMATIONS IN THE DEVELOPMENT OF ADAPTATION TO OXYGEN INSUFFICIENCY [O ROLI NEKOTORYKH PODKORKOVYKH OBRAZOVANII V RAZVITII PRISPOSOBLENIIA K KISLORODNOI NEDOSTATOCHNOSTI]. N. Z. Epshtein, p. 143-146. [See A68-45762 24-04]

INFLUENCE OF AMINAZINE ON THE RESISTANCE OF ANIMALS TO SEVERE OXYGEN DEFICIENCY [VLIIANIE AMINAZINA NA USTOICHIVOST' ZHIVOTNYKH K OSTROMU KISLORODNOMU GOLODANIIU]. V. B. Malkin and E. V. Loginova, p. 147-151. 8 refs. [See A68-45763 24-04]

ROLE OF THE ADRENAL GLANDS IN THE DEVELOPMENT OF ADAPTATION TO HYPOXIA [ROL' NADPOCHECHNIKOV V RAZVITII ADAPTATSII K GIPOKSII]. N. A. Roshchina, p. 151-157. 15 refs. [See A68-45764 24-04]

REACTION OF THE BLOOD OF ADRENALECTOMIZED AND HYPOPHYSECTOMIZED RATS TO HYPOXIA [REAKTSII KROVI NA GIPOKSIIU U ADRENALEKTOMIROVANNYKH I GIPOFIZEKTOMIROVANNYKH KRYS]. N. P. Blagovestova and N. A. Roshchina, p. 158-166. 12 refs. [See A68-45765 24-04]

THE SIGNIFICANCE OF THE HYPOPHYSICS IN DEVELOPING AN ADAPTATION TO HYPOXIA [O ZNACHENII GIPOFIZA V RAZVITII PRISPOSOBLENIIA K GIPOKSII]. N. A. Roshchina, p. 166-171. 7 refs. [See A68-45766 24-04]

DYNAMICS OF THE CHANGE OF THE OSMOTIC RESISTANCE OF ERYTHROCYTES IN HUMANS AND ANIMALS IN THE PERIOD OF NATURAL ACCLIMATIZATION TO HIGH-MOUNTAIN CONDITIONS [O DINAMIKE IZMENENIIA OSMOTICHESKOI REZISTENTNOSTI ERITROTSITOV U LIUDEI I ZHIVOTNYKH V PERIOD ESTESTVENNOI AKKLIMATIZATSII K VYSOKOGOR'IU]. Z. I. Barbashova and G. I. Grigor'eva, p. 171-181. [See A68-45767 24-04]

CHANGE IN THE OSMOTIC RESISTANCE OF ERYTHROCYTES IN ADRENALECTOMIZED AND HYPOPHYSECTOMIZED RATS UNDER HIGH-MOUNTAIN CONDITIONS [IZMENENIE OSMOTICHESKOI REZISTENTNOSTI ERITROTSITOV U ADRENALEKTOMIROVANNYKH I GIPOFIZEKTOMIROVANNYKH KRYS, NAKHODIVSHIKHSIA V USLOVIIAKH VYSOKOGOR'IA]. Z. I. Barbashova and G. I. Grigor'eva, p. 181-188. 5 refs. [See A68-45768 24-05]

REPEATED EXPOSURE TO "HIGH ALTITUDE" AS A METHOD OF DETECTING LATENT TRACES OF HYPOXIA ADAPTATION [POVTORNAIA EKSPOZITSIIA NA "VYSOTE" KAK METOD

VYIAVLENIIA SKRYTYKH SLEDOV ADAPTATSII K GIPOKSII].
E. V. Loginova, p. 188-198. 8 refs. [See A68-45769 24-04]

DURATION OF THE REACTION OF BONE MARROW TO ACCLIMATIZATION TO HYPOXIA [PRODOLZHITEL'NOST' REAKTSII KOSTNOGO MOZGA NA AKKLIMATIZATSIIU K GIPOKSII]. N. P. Blagovestova, E. V. Loginova, E. E. Simonov, and M. M. Fomenko, p. 198-204. 9 refs. [See A68-45770 24-04]

THE MECHANISM OF ADAPTATION OF WHITE MICE TO A HYPERCAPNIC GASEOUS MEDIUM [O MEKHANIZME ADAPTATSII BELYKH MYSHEI K GIPERKAPNICHESKOI GAZOVOI SREDE].
V. E. Belai, P. V. Vasil'ev, and G. D. Glod, p. 204-211. 19 refs. [See A68-45771 24-04]

ENZYMATIC ACTIVITY OF MONOAMINOXIDASE IN DIFFERENT TISSUES AND ORGANS OF EXPERIMENTAL ANIMALS DURING THE ACTION OF CERTAIN EXTREMAL FACTORS. I - MONOAMINOXIDASE ACTIVITY IN DIFFERENT TISSUES AND ORGANS OF WHITE RATS UNDER NORMAL CONDITIONS AND DURING ADAPTATION TO CHRONIC HYPOXIA [FERMENTATIVNAIA AKTIVNOST' MONOAMINOKSIDAZY V RAZLICHNYKH TKANIAKH I ORGANAKH EKSPERIMENTAL'NYKH ZHIVOTNYKH PRI DEISTVII NEKOTORYKH EKSTREMAL'NYKH FAKTOROV. I - AKTIVNOST' MONOAMINOKSIDAZY V RAZLICHNYKH TKANIAKH I ORGANAKH BELYKH KRYS V OBYCHNYKH USLOVIIAKH I PRI ADAPTATSII K KHRONICHESKOI GIPOKSII].
Iu. N. Kopaev, E. F. Kotovskii, V. V. Korolev, Iu. N. Korolev, and L. L. Shimkevich, p. 211-218. 10 refs. [See A68-45772 24-04]

ENZYMATIC ACTIVITY OF MONOAMINOXIDASE IN DIFFERENT TISSUES AND ORGANS OF EXPERIMENTAL ANIMALS DURING THE ACTION OF CERTAIN EXTREMAL FACTORS. II - MONOAMINOXIDASE ACTIVITY IN DIFFERENT TISSUES AND ORGANS OF WHITE RATS SUBJECTED TO ACCELERATIONS [FERMENTATIVNAIA AKTIVNOST' MONOAMINOKSIDAZY V RAZLICHNYKH TKANIAKH I ORGANAKH EKSPERIMENTAL'NYKH ZHIVOTNYKH PRI DEISTVII NEKOTORYKH EKSTREMAL'NYKH FAKTOROV. II - AKTIVNOST' MONOAMINOKSIDAZY V RAZLICHNYKH TKANIAKH I ORGANAKH BELYKH KRYS PRI VOZDEISTVII NA NIKH PEREGRUZOK]. E. F. Kotovskii, V. V. Korolev, Iu. N. Korolev, L. L. Shimkevich, and Iu. N. Kopaev, p. 218-222. [See A68-45773 24-04]

DEHYDROGENASE ACTIVITY OF THE SUCCINIC AND LACTIC ACIDS UNDER CONDITIONS OF CHRONIC HYPOXIA [AKTIVNOST' DEGIDROGENAZ IANTARNOI I MOLOCHNOI KISLOT V USLOVIIAKH KHRONICHESKOI GIPOKSII]. L. L. Shimkevich, Iu. N. Kopaev, E. F. Kotovskii, V. V. Korolev, and Iu. N. Korolev, p. 222-229. 14 refs. [See A68-45774 24-04]

INFLUENCE OF HYPOXIA ON THE REACTIVITY TO CERTAIN PHARMACOLOGICAL SUBSTANCES [VLIIANIE GIPOKSII NA REAKTIVNOST' K NEKOTORYM FARMAKOLOGICHESKIM VESHCHESTVAM]. V. E. Belai, M. I. Briuzgina, P. V. Vasil'ev, and G. D. Glod, p. 230-235. 19 refs. [See A68-45775 24-04]

EFFECT OF ANTIOXIDANTS ON THE RESISTIVITY OF AN ORGANISM AND ON CERTAIN FUNCTIONS DURING HYPOXIA [VLIIANIE ANTIOKSIDANTOV NA REZISTENTNOST' ORGANIZMA I NEKOTORYE FUNKTSII PRI GIPOKSII]. E. Ia. Kaplan and V. V. Ogleznev, p. 235-243. 9 refs. [See A68-45776 24-04]

THE MECHANISM OF THE ACTION OF MEXAMINE DURING HYPOXIA [K VOPROSU O MEKHANIZME DEISTVIIA MEKSAMINA PRI GIPOKSII]. E. Ia. Kaplan, V. G. Petrukhin, and V. I. Solov'ev, p. 243-253. 6 refs. [See A68-45777 24-04]

EFFECT OF ATHLETIC TRAINING AND ACCLIMATIZATION UNDER AVERAGE-MOUNTAIN CONDITIONS IN THE CAUCASUS ON SOME PERIPHERAL BLOOD INDICES OF YOUNG TRACK AND FIELD ATHLETES [VLIIANIE SPORTIVNOI TRENIROVKI I AKKLIMATIZATSII V USLOVIIAKH SREDNEGOR'IA KAVKAZA NA NEKOTORYE POKAZATELI PERIFERICHESKOI KROVI IUNYKH LEGKOATLETOV]. E. B. Gippenreiter, p. 254-261. 24 refs. [See A68-45778 24-04]

A68-45746 #
EFFECT OF PREVIOUS ACCLIMATIZATION AT MOUNTAIN HEIGHTS ON HUMAN TOLERANCE OF TRANSVERSE ACCELERATIONS [VLIIANIE PREDVARITEL'NOI AKKLIMATIZATSII V GORAKH NA PERENOSIMOST' CHELOVEKOM POPERECHNYKH PEREGRUZOK].
A. R. Kotovskaia, P. V. Vasil'ev, R. A. Vartbaronov, and S. F. Simpura.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 11-19. 19 refs. In Russian.

Study of the effect of a 1 to 1.5-month stay at mountain altitudes ranging from 2000 to 4000 m on the transverse-acceleration tolerance of a group of 16 mountain climbers and persons without a high-altitude background. It is found that high-altitude adaptation strengthens the functions of the human organism under hypoxic conditions and increases the resistance to transverse accelerations by an average of 1.7 g. This positive effect persists for about 1 to 3 months. It is suggested that a stay at mountain heights be included in the preflight training program of astronauts. V.Z.

A68-45747 #
PHYSIOLOGICAL REACTIONS OF MAN DURING THE ACTION OF TRANSVERSE ACCELERATIONS AFTER ADAPTATION TO HIGH-MOUNTAIN CONDITIONS [FIZIOLOGICHESKIE REAKTSII CHELOVEKA PRI DEISTVII POPERECHNYKH PEREGRUZOK POSLE ADAPTATSII K USLOVIIAM VYSOKOGOR'IA].
A. R. Kotovskaia, R. A. Vartbaronov, and S. F. Simpura.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 19-39. 22 refs. In Russian.

Investigation of the physiological reactions to transverse accelerations of a group of 14 mountain climbers and persons without a previous high-altitude background who stayed at mountain altitudes ranging from 2000 to 4000 m for 1 to 1.5 months before the tests. The EKG, EEG, arterial pressure, respiration rates, pulmonary ventilation and gas exchange, and the time of motor reactions to light signals are recorded. It was found that a stay at mountain heights strengthened the physiological functions of these persons and markedly increased their resistance to transverse accelerations. The positive effects of exposure to the hypoxic conditions of mountain heights on the functions of the cardiovascular and respiratory systems are noted. The possible mechanisms of these effects are discussed. V.Z.

A68-45748 #
EFFECT OF ADAPTATION TO HYPOXIA UNDER PRESSURE-CHAMBER CONDITIONS ON THE TRANSVERSE-ACCELERATION TOLERANCE [VLIIANIE ADAPTATSII K GIPOKSII V USLOVIIAKH BAROKAMERY NA PERENOSIMOST' POPERECHNYKH PEREGRUZOK].
A. R. Kotovskaia, R. A. Vartbaronov, F. V. Babchinskii, and S. F. Simpura.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 40-48. 15 refs. In Russian.

Study of the effect of intermittent adaptation to hypoxia in a pressure chamber on the resistance of humans to transverse accelerations. A group of four subjects was exposed for 30 min at intervals of 3 to 7 days to pressures corresponding to altitudes of 4000, 5000, 6000, 6500, and 7000 m in a training cycle lasting 20 to 25 days. An average increase of 1.35 g is established in the tolerance of the subjects to transverse accelerations after the pressure-chamber exposures. It is believed that adaptation to hypoxia in a pressure chamber can be usefully applied in a preflight training program for astronauts. V.Z.

A68-45749 #
CHARACTERISTICS OF THE DEVELOPMENT OF AN ACUTE HYPOXIA ADAPTATION SYNDROME IN MOUNTAIN CLIMBERS [OSOBENNOSTI RAZVITIIA ADAPTATSIONNOGO SINDROMA K OSTROI GIPOKSII U AL'PINISTOV].
V. B. Malkin, N. M. Asiamolova, and A. K. Kochetov.

IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 48-57. 7 refs. In Russian.

Study of the development of a hypoxic syndrome in a group of 19 mountain climbers and a group of 20 control subjects performing a stepwise "ascent" in a pressure chamber. The altitude resistance is found to be higher in the mountain climbers than in the control subjects. Most mountain climbers of the group showed a greater increase in pulmonary ventilation after pressure chamber exposures than the control subjects. The reactions of the respiratory, cardiovascular, and central nervous systems at pressure-chamber altitudes of 7000 to 9000 m are described. V. Z.

A68-45750 #
EFFECT OF HIGH-MOUNTAIN ADAPTATION ON HUMAN RESISTANCE TO ACUTE HYPOXIA, HIGH TEMPERATURE, AND VESTIBULAR STIMULI [VLIIANIE ADAPTATSII K VYSOKOGOR'IU NA USTOICHIVOST' CHELOVEKA K OSTROI GIPOKSII, VYSOKOI TEMPERATURE I VESTIBULIARNYM RAZDRAZHENIIAM].
V. B. Malkin, G. D. Iukhnovskii, and S. S. Markarian.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 57-65. 8 refs. In Russian.

Pressure-chamber investigation of the resistance to acute hypoxia, high temperature, and vestibular stimuli in a group of 11 mountain climbers and a group of 15 persons without high-mountain training, prior to and after a stay of up to 20 days at high-mountain altitudes ranging from 2000 to 4200 m. An increased resistance to hypoxia after a stay at high-mountain altitudes is established in most subjects without a previous high-altitude background. The resistance to high temperatures decreased slightly, while the resistance to vestibular stimuli increased slightly after a stay at high altitudes. V. Z.

A68-45751 #
EFFECT OF A REPEATED STAY AT MOUNTAIN HEIGHTS ON THE RESISTANCE OF MOUNTAIN CLIMBERS TO ACUTE HYPOXIA [O VLIIANII POVTORNOGO PREBYVANIIA V GORAKH NA USTOICHIVOST' AL'PINISTOV K OSTROI GIPOKSII].
N. M. Asiamolova and V. B. Malkin.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 65-72. 7 refs. In Russian.

Pressure-chamber investigation of the resistance to acute hypoxia in a group of 12 professional mountain climbers prior to and after high-mountain expeditions of 5 to 6 weeks to altitudes of up to 6995 m. A relatively insignificant increase in the resistance to hypoxia was established in the subjects after the expedition. A correlation between the altitudes and the content of hemoglobin and erythrocytes in the blood could not be established. V. Z.

A68-45752 #
RESISTANCE OF ANIMALS TO HYPEROXIA, HYPERCAPNIA AND HIGH TEMPERATURE AFTER ADAPTATION TO LOW BAROMETRIC PRESSURE [USTOICHIVOST' ZHIVOTNYKH K GIPEROKSII, GIPERKAPNII I VYSOKOI TEMPERATURE POSLE ADAPTATSII K PONIZHENNOMU BAROMETRICHESKOMU DAVLENIIU].
F. V. Babchinskii, V. B. Malkin, and G. D. Iukhnovskii.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 72-79. 12 refs. In Russian.

Study of the survival rates of white mice kept in an atmosphere of 96% oxygen, or 40% carbon dioxide, at temperatures ranging from 50 to 60°C prior to and after adaptation to hypoxia under low barometric pressures. It is found that prior adaptation to hypoxia does not increase the resistance of mice to high oxygen concentrations or to high carbon dioxide concentrations. The resistance of mice to elevated temperatures, on the other hand, did increase slightly after adaptation to hypoxia. V. Z.

A68-45753 #
EFFECT OF ADAPTATION TO LOW BAROMETRIC PRESSURE ON RESISTANCE TO HYPOCAPNIA [VLIIANIE ADAPTATSII K PONIZHENNOMU BAROMETRICHESKOMU DAVLENIIU NA USTOICHIVOST' K GIPOKAPNII].
A. K. Kochetov.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 79-84. 6 refs. In Russian.

Investigation of the EEG, EKG, blood pressure, and CO_2 partial pressure in the alveolar air in groups of 12 mountain climbers and 12 persons without a high-mountain background under hypocapnic conditions at normal barometric pressure. The resistance to hypocapnia is found to be higher in mountain climbers than in persons without previous high-mountain training. The increase in the mean heart contraction rates due to hypocapnia was 12% greater in the second group than in the first. The changes in the EEG were also more pronounced in the second group, even though the CO_2 partial pressure in the alveolar air decreased to a lower level in the first group than in the second. No substantial difference, on the other hand, could be established in the blood pressure of either group. V. Z.

A68-45754 #
RESISTANCE OF ANIMALS TO ACUTE HYPOXIA AFTER TRAINING WITH PHYSICAL LOADS UNDER HIGH-MOUNTAIN CONDITIONS [USTOICHIVOST' ZHIVOTNYKH K OSTROI GIPOKSII POSLE TRENIROVKI K FIZICHESKIM NAGRUZKAM V USLOVIIAKH VYSOKOGOR'IA].
E. V. Loginova.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 84-93. 25 refs. In Russian.

Pressure-chamber investigation of the resistance to acute hypoxia of a group of 180 white mice and a group of 45 white rats previously subjected to static and dynamic loads at high-mountain altitudes ranging from 2000 to 3800 m. The mice and the rats were compelled to run for certain periods of time in a special stand, and the mice were also kept hanging on poles with 10-gram weights attached to their tails prior to exposure to hypoxia in a pressure chamber at pressures corresponding to altitudes ranging from 9000 to 12,000 m. The weight, the blood oxygen requirement, the hemoglobin, erythrocyte, reticulocyte and eosinophil contents in the blood, and the survival rates of the animals were determined. Only in rats subjected to dynamic loads was a slightly increased resistance established. V. Z.

A68-45755 #
MUTUAL EFFECTS OF TRAINING WITH PHYSICAL LOADS AND ADAPTATION TO HYPOXIC HYPOXIA [O VZAIMOVLIIANII TRENIROVKI K FIZICHESKIM NAGRUZKAM I ADAPTATSII K GIPOKSICHESKOI GIPOKSII].
E. V. Loginova.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 93-96. In Russian.

Pressure-chamber study of adaptation to hypoxia carried out on

a total of 44 white rats subjected to stepwise decreasing pressures at simulated altitudes ranging from 3000 to 7000 m with or without simultaneously performing running exercises in a special stand, or after running exercises at normal barometric pressure. The weight, the hemoglobin and erythrocyte contents in the blood, and the survival rates of the rats are determined in the process. The survival rates were generally lower in the experimental rats than in the control rats, which did not perform running exercises. V. Z.

A68-45756 #
EFFECT OF PROLONGED PERIODS UNDER CONDITIONS OF REDUCED BAROMETRIC PRESSURE ON RESISTANCE TO ACCELERATIONS [VLIIANIE DLITEL'NOGO PREBYVANIIA V USLOVIIAKH PONIZHENNOGO BAROMETRICHESKOGO DAVLENIIA NA USTOICHIVOST' K PEREGRUZKAM].
N. N. Uglova.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 97-103. 28 refs. In Russian.

Results of experiments to determine the effect of the adaptation of white mice, rats, and guinea pigs to hypoxia on their ability to endure transverse accelerations. It is established that an intermittent 14-day adaptation to hypoxia at vacuums of 525.8 to 307 mm Hg, as well as a 30-day acclimatization to altitudes of 2000 to 3800 m, causes an increase in survival during accelerations of 25% for adapted mice (on the average), 19% for rats and 30% for guinea pigs. In view of this, it is noted that the adaptation effect lasts approximately three weeks. Both forms of training are found to be accompanied by an increase in the quantity of hemoglobin and erythrocytes in the peripheral blood supply. P.G.M.

A68-45757 #
THE EFFECT OF A PRELIMINARY INTERMITTENT EXPOSURE TO RAREFIED ATMOSPHERE ON THE ABILITY OF RATS TO ENDURE TRANSVERSE ACCELERATIONS [VLIIANIE PREDVARITEL'NOGO PRERYVISTOGO PREBYVANIIA V RAZREZHENNOI ATMOSFERE NA PERENOSIMOST' KRYSAMI POPERECHNYKH PEREGRUZOK].
V. G. Petrukhin.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 103-109. 23 refs. In Russian.

Results of an experiment to determine the effect of a 23-day period at altitudes of 4500 to 5000 m on the ability of white rats to endure transverse accelerations. The trained rats showed a higher level of endurance to such accelerations than did rats that did not undergo training in rarefied atmospheres. For the trained rats, a statistically reliable increase in the relative weight of the adrenal glands and the heart, an abrupt hemorrhaging in the lungs, and in many cases glycogen in the liver were found. It was also found that the dystrophitic and necrobiotic changes in the myogenic miocardium fibers of the trained rats were less than those occurring in the untrained animals. The basis for the favorable effect of training is found to lie in the increased resistance of the organism to an insufficient supply of oxygen to the tissues and to an improvement of the oxygen supply to the vital organs, as well as in a strengthening of the red blood cells and an increase in the ability of the miocardium to perform more physical work than before the experiment. P.G.M.

A68-45758 #
EFFECT OF ADAPTATION TO CONDITIONS OF AN ALTERED GAS MEDIUM ON RESISTANCE TO ACCELERATIONS [VLIIANIE ADAPTATSII K USLOVIIAM IZMENENNOI GAZOVOI SREDY NA USTOICHIVOST' K PEREGRUZKAM].
P. V. Vasil'ev and N. N. Uglova.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 109-122. 43 refs. In Russian.

Results of an investigation on white mice and rats to study the effect of prolonged periods under conditions of an altered gas medium on the resistance of such organisms to accelerations. It is found that when these animals breathe hypercapnic gas mixtures (5 to 12% CO_2) for six hours a day during a 14-day period, their resistance to accelerations does not change. However, when they breathe a mixture which is deficient in oxygen (down to 8.6% O_2) or a mixture which is both hypoxic and hypercapnic, their resistance to accelerations is increased. It is shown that hypercapnia inhibits the reaction of erythrocytes to a lack of oxygen. The physiological mechanisms of such reactions are discussed. P.G.M.

A68-45759 #
COMPARATIVE EVALUATION OF THE EFFECTIVENESS OF VARIOUS MODES OF ADAPTATION TO HYPOXIA [SRAVNITEL'NAIA OTSENKA EFFEKTIVNOSTI RAZLICHNYKH REZHIMOV ADAPTATSII K GIPOKSII].
P. V. Vasil'ev, F. V. Babinskii, E. V. Loginova, V. B. Malkin, N. A. Roshchina, and G. D. Iukhnovskii.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 122-129. In Russian.

Comparison of high-mountain and pressure chamber adaptation of white mice and rats, using data from the measurement of weight, erythrocyte count, quantity of hemoglobin, oxygen consumption, and survival. The adaptation schemes investigated were (1) prolonged and continuous adaptation (30 days at altitudes of 2000 to 3800 m), (2) short-duration adaptation (3 days at altitudes of 3000 to 7000 m), and (3) discontinuous adaptation (6 hours each day for a period of 2 weeks at altitudes of 3000 to 7000 m). It is established that the effects of adaptation at high altitudes and at simulated high altitudes (using a pressure chamber) are essentially the same. P.G.M.

A68-45760 #
INFLUENCE OF HYPOXIA ON THE STATE OF PROTECTIVE MECHANISMS IN THE ORGANISMS OF MICE [VLIIANIE GIPOKSII NA SOSTOIANIE ZASHCHITNYKH MEKHANIZMOV ORGANIZMA MYSHI].
A. S. Kaplanskii, G. N. Durnova, and N. A. Roshchina.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 129-137. 28 refs. In Russian.

Investigation of the state of the cellular and humoral immunity as well as the peculiar features of immunomorphological reactions in lymph organs and subcutaneous tissue at the point of antigen introduction in mice kept under low atmospheric pressure. The tests were performed on mice kept continuously for two weeks in a pressure chamber at 596 mm Hg, then immunized by killed typhoid vaccine. It is shown that there is no observed variation in the cellular or humoral immunity. There is no change in the character of the immunomorphological reaction which develops in the subcutaneous tissue, at the point of antigen introduction, and in the regional lymph nodes. In the course of multiple 6-hr daily "ascents" of mice in the pressure chamber to altitudes ranging from 4000 to 6500 m for a period of 10 days, it was observed that the animals revealed a decrease in antibody production, a decrease in glycogen content in neutrophils, which infiltrate the tissues at the point of antigen introduction, and a decrease in the reactive changes on the part of the light centers of the lymphoidal follicles of regional lymph nodes. I.P.

A68-45761 #
SIGNIFICANCE OF CERTAIN CONTROL SYSTEMS IN THE DEVELOPMENT OF ADAPTATION TO HYPOXIA [O ZNACHENII NEKOTORYKH UPRAVLIAIUSHCHIKH SISTEM V RAZVITII ADAPTATSII K GIPOKSII].
V. B. Malkin.

IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 137-143. 10 refs. In Russian.

Study of the role of the cerebral cortex, cerebellum, adrenal glands, and the hypophysis in the adaptation of white rats to a moderate degree of hypoxia. It is shown that the removal of the cortex of one or both cerebral hemispheres significantly increases the resistance of the animals to severe hypoxia. The adaptation of such animals to moderate hypoxia does not influence their altitude resistance. The removal of the cerebellum reduces the resistance of the animals to severe hypoxia. After adaptation of the animals to hypoxia, the removal of the adrenal glands does not result in disappearance of the adaptation effect, and the altitude resistance is higher than that of intact animals. T. M.

A68-45762 #
ROLE OF CERTAIN SUBCORTICAL FORMATIONS IN THE DEVELOPMENT OF ADAPTATION TO OXYGEN INSUFFICIENCY [O ROLI NEKOTORYKH PODKORKOVYKH OBRAZOVANII V RAZVITII PRISPOSOBLENIIA K KISLORODNOI NEDOSTATOCHNOSTI].
N. Z. Epshtein.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 143-146. In Russian.

Study of the role of certain subcortical formations of the brain on the adaptation of white rats to chronic hypoxia. The study involved the impairment of these formations before and after adaptation to hypoxia. It is shown that the impairment of the formatio reticularis of the pons (including the nucleus reticularis tegmenti) increases the survival capability of the animals at 12,500 m both before and after adaptation to hypoxia. Brain damage in the area of the ventromedian thalamus and the posterior hypothalamus increases the stability of the animals to severe hypoxia. Damage in the area of the anterior hypothalamus before adaptation increases the altitude resistance and after adaptation reduces the altitude resistance. T. M.

A68-45763 #
INFLUENCE OF AMINAZINE ON THE RESISTANCE OF ANIMALS TO SEVERE OXYGEN DEFICIENCY [VLIIANIE AMINAZINA NA USTOICHIVOST' ZHIVOTNYKH K OSTROMU KISLORODNOMU GOLODANIIU].
V. B. Malkin and E. V. Loginova.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 147-151. 8 refs. In Russian.

Study of the role of the formatio reticularis of the brain on adaptation to severe oxygen deficiency in white rats and mice both adapted and unadapted to hypoxia. The Aminazine was introduced intraperitoneally in a dose of 10 mg for 1 kg of weight. The oxygen consumption of the animals was studied along with the survival capability at high altitudes in a pressure chamber. It is shown that the utilized dose of Aminazine reduces the resistance of the animals to oxygen deficiency. Previous adaptation to severe hypoxia does not fully disappear after treatment with Aminazine and improves the immunity to the effects of Aminazine. T. M.

A68-45764 #
ROLE OF THE ADRENAL GLANDS IN THE DEVELOPMENT OF ADAPTATION TO HYPOXIA [ROL' NADPOCHECHNIKOV V RAZVITII ADAPTATSII K GIPOKSII].
N. A. Roshchina.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 151-157. 15 refs. In Russian.

Experimental study of the significance of the adrenal glands in the process of adaptation of white rats to long-term hypoxia. Tests involved adrenalectomized and intact animals in mountainous environments and in a pressure chamber. Observations were made of the erythrocytes, the weight, and the altitude resistance of the animals. The results indicate that removal of the adrenal glands does not impair the adaptation of the animals to long-term oxygen deficiency. The adaptive changes observed in the adrenalectomized animals are similar to those evident in the intact animals. T. M.

A68-45765 #
REACTION OF THE BLOOD OF ADRENALECTOMIZED AND HYPOPHYSECTOMIZED RATS TO HYPOXIA [REAKTSIIA KROVI NA GIPOKSIIU U ADRENALEKTOMIROVANNYKH I GIPOFIZEKTOMIROVANNYKH KRYS].
N. P. Blagovestova and N. A. Roshchina.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 158-166. 12 refs. In Russian.

Discussion of the changes in the blood and hemopoietic organs of adrenalectomized and hypophysectomized rats, and of the effect of hypoxia on their blood systems. The morphology of the bone marrow and the mitotic activity of cells from the bone marrow and the spleen were studied. It is found that after an adrenalectomy or a hypophysectomy the rats became anemic. After the action of hypoxia, the adrenalectomized rats contracted erythrocytosis, while the hypophysectomized rats showed no stimulation of the blood system. P.G.M.

A68-45766 #
THE SIGNIFICANCE OF THE HYPOPHYSIS IN DEVELOPING AN ADAPTATION TO HYPOXIA [O ZNACHENII GIPOFIZA V RAZVITII PRISPOSOBLENIIA K GIPOKSII].
N. A. Roshchina.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 166-171. 7 refs. In Russian.

Study of the role of the hypophysis in the adaptation of white rats to hypoxic hypoxia. Both intact and hypophysectomized rats were brought to heights of 2000 to 3800 m, where their adaptation to hypoxia was observed. The arterial blood, weight, and altitude resistance were then studied during a simulated ascent in a pressure chamber. It was found that the altitude resistance to acute hypoxia for hypophysectomized rats increased. However, a gradual anemic condition was noted. The removal of the hypophysis did not essentially change the altitude resistance of the rats. P. G. M.

A68-45767 #
DYNAMICS OF THE CHANGE OF THE OSMOTIC RESISTANCE OF ERYTHROCYTES IN HUMANS AND ANIMALS IN THE PERIOD OF NATURAL ACCLIMATIZATION TO HIGH-MOUNTAIN CONDITIONS [O DINAMIKE IZMENENIIA OSMOTICHESKOI REZISTENTNOSTI ERITROTSITOV U LIUDEI I ZHIVOTNYKH V PERIOD ESTESTVENNOI AKKLIMATIZATSII K VYSOKOGOR'IU].
Z. I. Barbashova and G. I. Grigor'eva.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.

Moscow, Izdatel'stvo Nauka, 1968, p. 171-181. In Russian.

Study of the osmotic resistance of erythrocytes (ORE) in humans and rats during acclimatization to altitudes of 2000 to 5635 m. A rise in the ORE in humans was noted during active high-mountain acclimatization. This rise was found to be correlated with an increase in the general resistance of the organism to acute hypoxia and accelerations. In the absence of special physical training, a regular change in ORE was not observed. A rise in the ORE in rats was likewise correlated with an increase in the overall resistance of the organism. No regularity between changes in ORE and morphological blood structure could be found. P. G. M.

A68-45768 #

CHANGE IN THE OSMOTIC RESISTANCE OF ERYTHROCYTES IN ADRENALECTOMIZED AND HYPOPHYSECTOMIZED RATS UNDER HIGH-MOUNTAIN CONDITIONS [IZMENENIE OSMOTICHESKOI REZISTENTNOSTI ERITROTSITOV U ADRENALEKTOMIROVANNYKH I GIPOFIZEKTOMIROVANNYKH KRYS, NAKHODIVSHIKHSIA V USLOVIIAKH VYSOKOGOR'IA].

Z. I. Barbashova and G. I. Grigor'eva.

IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].

Edited by V. N. Chernigovskii.

Moscow, Izdatel'stvo Nauka, 1968, p. 181-188. 5 refs. In Russian.

Study of the effect of adaptation to altitudes of 2000 to 3900 m on the osmotic resistance of erythrocytes (ORE) in adrenalectomized and hypophysectomized rats. It was found that after the operation, both groups of animals showed an increase in ORE. This increase was greatest in the hypophysectomized rats, and was significantly higher than the ORE level in intact animals under similar conditions. No change in ORE was noted in the adrenalectomized rats. The possible mechanisms for changes in ORE and the role of adrenal and pituitary hormones in these mechanisms are discussed. P. G. M.

A68-45769 #

REPEATED EXPOSURE TO "HIGH ALTITUDE" AS A METHOD OF DETECTING LATENT TRACES OF HYPOXIA ADAPTATION [POVTORNAIA EKSPOZITSIIA NA "VYSOTE" KAK METOD VYIAVLENIIA SKRYTYKH SLEDOV ADAPTATSII K GIPOKSII].

E. V. Loginova.

IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].

Edited by V. N. Chernigovskii.

Moscow, Izdatel'stvo Nauka, 1968, p. 188-198. 8 refs. In Russian.

Discussion of data concerning latent traces of hypoxia adaptation following high-mountain and pressure-chamber adaptation. White mice and rats were used in the tests. Trace phenomena were determined from the variation in animal weight, erythrocyte number, hemoglobin capacity, and oxygen consumption. The adaptation was carried out for 6 hr per 24-hr period for 13 days at altitudes from 3000 to 7000 m. After the animals had been exposed to these altitudes, even following normalization of the erythrocyte frequency, hemoglobin capacity, and other indicators, there still remained latent traces of reactions from the preceding adaptation. The presence of trace reactions makes it possible for animals subjected to repeated adaptation to acquire a greater resistance to acute hypoxia more rapidly. In the course of multiple repetitions of altitude training the trace reactions are found to be cumulative. I.P.

A68-45770 #

DURATION OF THE REACTION OF BONE MARROW TO ACCLIMATIZATION TO HYPOXIA [PRODOLZHITEL'NOST' REAKTSII KOSTNOGO MOZGA NA AKKLIMATIZATSIIU K GIPOKSII].

N. P. Blagovestova, E. V. Loginova, E. E. Simonov, and M. M. Fomenko.

IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].

Edited by V. N. Chernigovskii.

Moscow, Izdatel'stvo Nauka, 1968, p. 198-204. 9 refs. In Russian.

Experimental investigation, under high-mountain and pressure-chamber conditions, of the duration of the hemopoietic reaction of rats to different procedures of acclimatization to hypoxia. The state of hemopoiesis was judged from the variation in the proliferation rate of bone marrow elements, estimated by means of statmokinetic indices and curves of variation of the quantity of desoxyribonucleic acid in the cell nuclei. The acid content was considered as an indicator of the intensity of the synthetic processes underlying the preparation of a cell for division. Prolonged one-time and repeated presence of animals under decreased pressure, corresponding to "altitudes" of 2000 to 7000 m above sea level, caused an appreciable increase in the number of acid-synthesizing cells and in the mitotic activity of the erythroblast elements, as observed during a 3 to 5-week period after termination of the tests. An increase in the rate of proliferation of cells in this series was independent of the acclimatization procedure and was even observed in cases where the blood picture typical of hypoxic states did not develop. The mitotic activity of myeloid cells in the test rats was, by contrast, depressed. The changes in the proliferative activity of the myeloid cells make it possible to observe not only the influence of various acclimatization procedures, but also the possibility of a cumulative effect of changes during a repeated exposure of the organism to hypoxia. I.P.

A68-45771 #

THE MECHANISM OF ADAPTATION OF WHITE MICE TO A HYPERCAPNIC GASEOUS MEDIUM [O MEKHANIZME ADAPTATSII BELYKH MYSHEI K GIPERKAPNICHESKOI GAZOVOI SREDE].

V. E. Belai, P. V. Vasil'ev, and G. D. Glod.

IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].

Edited by V. N. Chernigovskii.

Moscow, Izdatel'stvo Nauka, 1968, p. 204-211. 19 refs. In Russian.

Investigation of the character of the shifts of the functional state of various sections of the central nervous system of animals in the course of their adaptation to various degrees of hypercapnia. Indicators of the changes of the reactivity of the animals to narcotic media were used as the criteria of the functional state of the nervous system. Prolonged presence in a hypercapnic gaseous medium is accompanied by phase shifts in the reactivity of animals to narcotics. A change in the reactivity to narcotics testifies to the disruption of the functional interrelationship between the cortex and the subcortical structures of the brain. The adaptation of animals to a 3 to 5% CO_2 medium is accompanied by a manifestation of symptoms of retardation primarily of the subcortical formations. Prolonged action of an 8 to 10% CO_2 medium is accompanied by an inhibition of the functions of the cortical structures of the brain. I.P.

A68-45772 #

ENZYMATIC ACTIVITY OF MONOAMINOXIDASE IN DIFFERENT TISSUES AND ORGANS OF EXPERIMENTAL ANIMALS DURING THE ACTION OF CERTAIN EXTREMAL FACTORS. I - MONOAMINOXIDASE ACTIVITY IN DIFFERENT TISSUES AND ORGANS OF WHITE RATS UNDER NORMAL CONDITIONS AND DURING ADAPTATION TO CHRONIC HYPOXIA [FERMENTATIVNAIA AKTIVNOST' MONOAMINOKSIDAZY V RAZLICHNYKH TKANIAKH I ORGANAKH EKSPERIMENTAL'NYKH ZHIVOTNYKH PRI DEISTVII NEKOTORYKH EKSTREMAL'NYKH FAKTOROV. I - AKTIVNOST' MONOAMINOKSIDAZY V RAZLICHNYKH TKANIAKH I ORGANAKH BELYKH KRYS V OBYCHNYKH USLOVIIAKH I PRI ADAPTATSII K KHRONICHESKOI GIPOKSII].

Iu. N. Kopaev, E. F. Kotovskii, V. V. Korolev, Iu. N. Korolev, and L. L. Shimkevich.

IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].

Edited by V. N. Chernigovskii.

Moscow, Izdatel'stvo Nauka, 1968, p. 211-218. 10 refs. In Russian.

Experimental study of monoaminoxidase (MAO) activity in the lungs, kidneys, liver, pancreas, intestines, and skin tissues of white rats. The highest MAO activity for the control animals occurs in the peripheral nerves, cells of the vegetative nerve networks, intestinal epithelium, and the parenchymatous elements of the liver and pancreas. A significant decrease in MAO activity was noted in most tissues and organs during adaptation to chronic hypoxia. Subsequently MAO activity sharply recovers, which is an indication of adaptation to chronic hypoxia on the cellular level. T.M.

A68-45773 #
ENZYMATIC ACTIVITY OF MONOAMINOXIDASE IN DIFFERENT TISSUES AND ORGANS OF EXPERIMENTAL ANIMALS DURING THE ACTION OF CERTAIN EXTREMAL FACTORS. II - MONOAMINOXIDASE ACTIVITY IN DIFFERENT TISSUES AND ORGANS OF WHITE RATS SUBJECTED TO ACCELERATIONS [FERMENTATIVNAIA AKTIVNOST' MONOAMINOKSIDAZY V RAZLICHNYKH TKANIAKH I ORGANAKH EKSPERIMENTAL'NYKH ZHIVOTNYKH PRI DEISTVII NEKOTORYKH EKSTREMAL'NYKH FAKTOROV. II - AKTIVNOST' MONOAMINOKSIDAZY V RAZLICHNYKH TKANIAKH I ORGANAKH BELYKH KRYS PRI VOZDEISTVII NA NIKH PEREGRUZOK].
E. F. Kotovskii, V. V. Korolev, Iu. N. Korolev, L. L. Shimkevich, and Iu. N. Kopaev.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 218-222. In Russian.

Experimental study of the monoaminoxidase activity in the lungs, kidneys, liver, pancreas, and small and large intestines of white rats subjected to accelerations. The animals were subjected to lateral (chest-spine) accelerations of 25 g for 10 min. The enzymatic activity in the organs was studied by a histochemical method and compared with that in control animals and animals adapted to hypoxia. A weak reduction of enzymatic activity was noted in all the studied organs of the test animals. The results obtained are discussed from the viewpoint of the mechanisms of cellular adaptation to accelerations. T.M.

A68-45774 #
DEHYDROGENASE ACTIVITY OF THE SUCCINIC AND LACTIC ACIDS UNDER CONDITIONS OF CHRONIC HYPOXIA [AKTIVNOST' DEGIDROGENAZ IANTARNOI I MOLOCHNOI KISLOT V USLOVIIAKH KHRONICHESKOI GIPOKSII].
L. L. Shimkevich, Iu. N. Kopaev, E. F. Kotovskii, V. V. Korolev, and Iu. N. Korolev.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 222-229. 14 refs. In Russian.

Results of histochemical studies of the activity of the dehydrogenases of succinic and lactic acids in white rats during their acclimatization to chronic hypoxia. Reduced dehydrogenase activity of succinic acid and increased dehydrogenase activity of lactic acid were noticed in most organs of the animals during the tests. Data concerning the features of the adaptive changes in various tissues and organs are presented. The results obtained are analyzed from the viewpoint of the cellular-adaptation mechanisms which constitute a part of the overall adaptation of the organism to chronic hypoxia. T.M.

A68-45775 #
INFLUENCE OF HYPOXIA ON THE REACTIVITY TO CERTAIN PHARMACOLOGICAL SUBSTANCES [VLIIANIE GIPOKSII NA REAKTIVNOST' K NEKOTORYM FARMAKOLOGICHESKIM VESHCHESTVAM].
V. E. Belai, M. I. Briuzgina, P. V. Vasil'ev, and G. D. Glod.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 230-235. 19 refs. In Russian.

Experimental study of the effects of breathing a hypoxic gas mixture (7.5 to 9.0% O_2) for periods ranging from 1 to 4 hr on the reactivity of white mice to certain narcotics (ether, Intranarcone) and analeptics (Corazol). It is shown that the effects of hypoxia are associated with phase changes in the sensitivity of the animals to the pharmacological media. The narcotic effect of ether and Intranarcone is increased, while the sensitivity to toxic doses of Corazol decreases. It is concluded that the hypoxia-associated change in the resistivity to the medicines signifies functional changes in the central nervous system with retardation processes predominating. T.M.

A68-45776 #
EFFECT OF ANTIOXIDANTS ON THE RESISTIVITY OF AN ORGANISM AND ON CERTAIN FUNCTIONS DURING HYPOXIA [VLIIANIE ANTIOKSIDANTOV NA REZISTENTNOST' ORGANIZMA I NEKOTORYE FUNKTSII PRI GIPOKSII].
E. Ia. Kaplan and V. V. Ogleznev.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 235-243. 9 refs. In Russian.

Study of the effect of antioxidants on selected functions of the organisms of white mice and rats and on their resistivity to hypoxia. It is established that antioxidants increase the resistivity of these animals to acute, subacute, and chronic hypoxia. An especially stable increase was noted after frequent injections of 5-methoxytriptamine (mexamine). In this case, smaller changes in the latent motor reflex time and less pronounced changes in the stimulating process were observed in the animals' brains. After the mexamine injections, the oxygen requirement of these animals was reduced. P.G.M.

A68-45777 #
THE MECHANISM OF THE ACTION OF MEXAMINE DURING HYPOXIA [K VOPROSU O MEKHANIZME DEISTVIIA MEKSAMINA PRI GIPOKSII].
E. Ia. Kaplan, V. G. Petrukhin, and V. I. Solov'ev.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 243-253. 6 refs. In Russian.

Study of the biochemical blood characteristics and the histochemical changes in the organs of rats exposed to acute, subacute, and chronic hypoxia and a prior injection of mexamine. It is found that single and chronic mexamine injections are accompanied by a decrease in pH, standard bicarbonate, and the overall CO_2 content in the blood, a slight suppression of alkaline phosphatase activity, and other changes. Mexamine injections also promote a faster structural recovery in the organs of the animals tested. The protective action of these animals is found to be connected with a decrease in the oxidation-reduction processes in tissues under the influence of mexamine injections. P.G.M.

A68-45778 #
EFFECT OF ATHLETIC TRAINING AND ACCLIMATIZATION UNDER AVERAGE-MOUNTAIN CONDITIONS IN THE CAUCASUS ON SOME PERIPHERAL BLOOD INDICES OF YOUNG TRACK AND FIELD ATHLETES [VLIIANIE SPORTIVNOI TRENIROVKI I AKKLIMATIZATSII V USLOVIIAKH SREDNEGOR'IA KAVKAZA NA NEKOTORYE POKAZATELI PERIFERICHESKOI KROVI IUNYKH LEGKOATLETOV].
E. B. Gippenreiter.
IN: PROBLEMS OF SPACE BIOLOGY: ADAPTATION TO HYPOXIA AND STABILITY OF THE ORGANISM. VOLUME 8 [PROBLEMY KOSMICHESKOI BIOLOGII: ADAPTATSIIA K GIPOKSII I USTOICHIVOST' ORGANIZMA. VOLUME 8].
Edited by V. N. Chernigovskii.
Moscow, Izdatel'stvo Nauka, 1968, p. 254-261. 24 refs. In Russian.

Investigation of the effect of training and acclimatization of young track and field athletes at an altitude of 2000 m on certain peripheral blood indices. Six boys and four girls, with an average age of 16 years and an athletic experience of less than 8 months, sprinted, ran medium distances, and walked. A control group rested at the same altitude. An increase in the number of erythrocytes, reticulocytes, and in the amount of hemoglobin was observed in the blood of the members of the experimental group. A decrease in the number of eosinophils in the blood, which indicates an activation of the functioning of the hypophysial-adrenal system, was also detected. P.G.M.

A68-45912
SENSORY DEPRIVATION PROBLEM IN SPACE MEDICINE.
F. P. Kosmolinskii.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 3-11.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 231-237. 48 refs. Translation.

A68-45913
EXTRALABYRINTHINE SYMPTOMS OF MOTION SICKNESS IN SPACE FLIGHT.
I. M. Khazen.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 11-18.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 238-243. 56 refs. Translation.

A68-45914
CONTINUOUS MICROALGAE CULTURE AS A COMPONENT OF A CLOSED ECOLOGICAL SYSTEM.
L. V. Kirenskii, I. A. Terskov, I. I. Gitel'zon, G. M. Lisovskii, B. G. Kovrov, and Iu. N. Okladnikov.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 19-22.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 244-246. 9 refs. Translation.

A68-45915
GAS EXCHANGE BETWEEN MAN AND ALGAL CULTURE DURING A 30-DAY EXPERIMENT.
L. V. Kirenskii, I. A. Terskov, I. I. Gitel'zon, G. M. Lisovskii, B. G. Kovrov, F. Ia. Sid'ko, Iu. N. Okladnikov, M. P. Antoniuk, V. N. Belianin, and M. S. Rerberg.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 23-28.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 247-251. Translation.

A68-45916
PROLONGED CULTIVATION OF CHLORELLA WITH A DIRECT RETURN OF THE MEDIUM.
G. I. Meleshko, E. K. Lebedeva, O. A. Kurapova, and Iu. N. Ul'ianin.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 28-32.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 252-255. 6 refs. Translation.

A68-45917
DETERMINATION OF THE BIOLOGICAL VALUE OF PROTEIN FROM UNICELLULAR ALGAE AND SOY BEAN FOR FOUR GENERATIONS OF WHITE RATS.
N. S. Kliushkina, V. I. Fofanov, and I. T. Troitskaia.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 33-35.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 256-258. Translation.

A68-45918
EXPERIMENTAL INVESTIGATION OF REFLEX INTERACTION BETWEEN SENSORY SYSTEMS.
Z. Novotnyi.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 36-40.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 259-262. 6 refs. Translation.

A68-45919
REACTIVITY AND RESISTANCE OF WARM-BLOODED ANIMALS.
L. L. Marfina.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 40-47.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 263-268. 19 refs. Translation.

A68-45920
REACTIVITY OF ANIMALS TO CAFFEINE AND STRYCHNINE DURING AFTEREFFECTS OF TRANSVERSE ACCELERATION.
V. E. Belai, P. V. Vasil'ev, G. D. Glod, and M. I. Briuzgina.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 47-53.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 269-273. 27 refs. Translation.

A68-45921
DEOXYGENATION OF THE ORGANISM DURING ELEVATION TO HIGH ALTITUDES.
E. A. Kovalenko.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 53-61.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 274-280. 12 refs. Translation.

A68-45922
EFFECT OF LOSS OF AFFERENT IMPULSE ACTIVITY ON TONIC FUNCTION OF SKELETAL MUSCLE.
M. N. Murav'ev.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 61-65.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 281-284. 26 refs. Translation.

A68-45923
HISTOCHEMICAL EXAMINATION OF TISSUE ENZYMES IN HYPOTHERMIA AND HYPOBIOSIS.
V. V. Portugalov, I. B. Krasnov, E. I. Il'ina-Kakueva, N. N. Timofeev, and L. L. Marfina.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 66-70.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 285-288. 5 refs. Translation.

A68-45924
HYPEROXIA AND THE FORMATION OF TOXIC LIPIDS IN RATS.
F. V. Babchinskii and I. N. Savateev.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 70-73.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 289-291. 10 refs. Translation.

A68-45925
PSYCHOPHYSIOLOGICAL CHANGES PRODUCED BY AUTOGENOUS AND EXOGENOUS SUGGESTION.
G. I. Gurvich, V. L. Marishchuk, M. I. Tishchenko, G. D. Efimenko, and B. S. Khvoinov.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 73-76.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 292-294. Translation.

A68-45926
SIMULATION OF PSYCHOPATHOLOGICAL SYNDROMES BY METHODS OF SPACE PSYCHOLOGY.
O. N. Kuznetsov and V. I. Lebedev.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 77-81.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 295-298. 11 refs. Translation.

A68-45927
COMPUTER ANALYSIS OF CERTAIN CHARACTERISTICS OF MOTION IN BIOMECHANICAL INVESTIGATIONS.
B. A. Dushkov, V. P. Produnov, and S. A. Kosilov.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 81-87.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 299-304. Translation.

A68-45928
STRUCTURE OF COORDINATION AND PHASES IN THE REORGANIZATION OF MOTOR HABITS UNDER CONDITIONS OF WEIGHTLESSNESS AND IN POSITIVE ACCELERATIONS.
I. F. Chekirda.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 87-92.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 305-308. 5 refs. Translation.

A68-45929
EFFECT OF ELECTRICAL STIMULATION ON RESPONSES OF THE HUMAN VESTIBULAR APPARATUS TO ACCELERATION.
G. V. Voronin.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, July-Aug. 1967, p. 92-99.)
Environmental Space Sciences, vol. 1, July-Aug. 1967, p. 309-313. Translation.

A68-46110
RADIATION AND SPACE FLIGHTS.
Iu. G. Grigor'ev, E. E. Kovalev, and V. N. Pravetskii.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 3-6.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 81-83. Translation.

A68-46111
AUTOMATION OF OPERATIONAL MEDICAL CONTROL IN COSMIC FLIGHT.
B. B. Egorov, A. D. Egorov, A. A. Kiselev, and I. S. Shadrintsev.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 7-14.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 84-89. 5 refs. Translation.

A68-46112
TRENDS IN THE DEVELOPMENT OF SPACE PSYCHOLOGY.
B. S. Aliakrinskii.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 14-21.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 90-95. 42 refs. Translation.

A68-46113
INVESTIGATIONS OF THE CUMULATIVE EFFECT OF IMPACT ACCELERATIONS.
S. A. Gozulov, N. P. Morozova, and V. A. Elivanov.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 22-26.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 96-99. 8 refs. Translation.

A68-46114
OXYGEN METABOLISM OF THE BODY EXPOSED TO PROLONGED ACCELERATION.
E. I. Sorokina.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 26-30.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 100-103. 9 refs. Translation.

A68-46115
INFLUENCE OF HYPOXIA ON CELLULAR AND HUMORAL IMMUNITY IN MICE.
A. S. Kaplanskii, G. N. Durnova, and N. A. Roshchina.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 31-35.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 104-107. 24 refs. Translation.

A68-46116
OBJECTIVE ASSESSMENT OF THE RESPONSE OF THE ORGANISM.
L. Novak.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 35-38.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 108, 109. Translation.

A68-46117
BIOLOGIC VALUE OF PLANT PROTEINS IN CONNECTION WITH THEIR POSSIBLE UTILIZATION IN A CLOSED LIFE-SUPPORTING SYSTEM.
N. S. Kliushkina, V. I. Fofanov, and I. T. Troitskaia.

(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 38-43.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 110-113.
8 refs. Translation.

A68-46118
PHYSIOLOGICAL REGENERATION OF THE EPITHELIUM OF THE CORNEA AND DUODENUM EXPOSED TO FRACTIONATED FISSION NEUTRON IRRADIATION.
V. M. Mastriukova and A. D. Strzhizhovskii.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 43-47.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 114-117.
9 refs. Translation.

A68-46120
EXTREME FACTORS IN LONG SPACE FLIGHTS AND HEALTH REQUIREMENTS OF SPACESHIP CREW MEMBERS.
P. V. Buianov and V. G. Terent'ev.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 52-54.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 122, 123.
13 refs. Translation.

A68-46121
ACTIVITY CYCLES IN GROUPS OF TEST SUBJECTS EXPOSED TO RELATIVE ISOLATION.
N. N. Gurovskii, B. A. Dushkov, and F. P. Kosmolinskii.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 54-59.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 124-127.
6 refs. Translation.

A68-46122
FEATURES OF SLEEP IN SIMULATED COSMIC FLIGHT.
V. I. Miasnikov.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 59-63.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 128-131.
5 refs. Translation.

A68-46123
CHANGE IN MOVEMENT COORDINATION DURING A PROLONGED STAY IN A SMALL CHAMBER.
B. A. Dushkov.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 64-70.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 132-136.
8 refs. Translation.

A68-46124
EFFECTS OF ACCELERATION AND HYPOKINESIA UPON GASTRIC FUNCTION.
P. I. Egorov, K. V. Smirnov, M. M. Korotaev, and M. V. Lukasheva.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 71-74.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 137-139.
6 refs. Translation.

A68-46125
CHANGES IN WATER AND ELECTROLYTE METABOLISM DURING HYPOKINESIA.
E. N. Biriukov, L. I. Kakurin, G. I. Kozyrevskaia, Iu. S. Koloskova, Z. P. Paek, and S. V. Chizhov.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 74-79.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 140-143.
12 refs. Translation.

A68-46126
EFFECT OF VIBRATION AND NOISE ON ABILITY TO DO MENTAL WORK UNDER CONDITIONS OF TIME SHORTAGE.
K. K. Ioseliani.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 79-82.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 144-146.
5 refs. Translation.

A68-46127
EFFECT OF VESTIBULAR STIMULATION ON DARK ADAPTATION BY NYCTOMETRY.
T. A. Petrova, M. P. Kuz'min, I. Ia. Iakovleva, and V. P. Baranova.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, Mar.-Apr. 1967, p. 82-86.)
Environmental Space Sciences, vol. 1, Mar.-Apr. 1967, p. 147-150.
19 refs. Translation.

A68-46144
NUTRITION ON SPACE FLIGHTS.
V. P. Bychkov.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 8-15.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 155-160.
41 refs. Translation.

A68-46145
PROBLEMS OF PHARMACOLOGY IN SPACE MEDICINE.
V. E. Belai, P. V. Vasil'ev, and G. D. Glod.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 15-21.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 161-165.
32 refs. Translation.

A68-46146
MECHANISM OF THE FORMATION OF RESPONSES AND ADAPTATION TO HYPOXIA.
G. I. Gurvich and N. Z. Epshtein.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 22-25.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 166-168.
9 refs. Translation.

A68-46147
VITAL ACTIVITY OF CHLORELLA UNDER CONDITIONS OF SPACE FLIGHT.
V. A. Shevchenko, I. S. Sakovich, L. K. Meshcheriakova, and M. G. Petrovnin.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 25-28.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 169-171.
9 refs. Translation.

A68-46148
SPERMATOGENESIS IN THE DOGS UGOLEK AND VETEROK AFTER THEIR FLIGHT IN THE SATELLITE "KOSMOS"-110.
N. L. Federova.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 28-31.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 172-175.
6 refs. Translation.

A68-46149
INFLUENCE OF EXTEROCEPTION ON THE MOTOR REACTION OF PIGEONS UNDER CONDITIONS OF BRIEF WEIGHTLESSNESS.
Zd. Novotnyi.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 32-37.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 176-179.
8 refs. Translation.

A68-46150
ALTITUDE TOLERANCE OF ANIMALS AS A FUNCTION OF THE STATE OF PHOSPHORYLATION PROCESSES.
T. A. Allik and L. I. Karpova.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 37-39.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 180, 181.
Translation.

A68-46151
MEASUREMENT OF TISSUE DOSES OF COSMIC RADIATION WITH NUCLEAR EMULSIONS.
K. S. Bogomolov, Ia. M. Veprik, M. Iu. Deberdeev, E. E. Kovalev, E. G. Litvinova, K. M. Romanovskaia, A. A. Sirotinskaia, S. S. Skvortsov, V. P. Skuredin, and L. N. Smirennyi.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 39-43.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 182-185.
9 refs. Translation.

A68-46152
NITROGEN METABOLISM IN ANIMALS EXPOSED TO HYPOKINESIA.
I. V. Fedorov and L. A. Grishanina.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 43-48.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 186-189.
10 refs. Translation.

A68-46153
EXPERIMENTAL STUDY OF MASS METABOLISM IN CLOSED LIFE-SUPPORT SYSTEMS.
A. P. Tereshchenko.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 48-51.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 190-192.
17 refs. Translation.

A68-46154
SENSORIMOTOR COORDINATION IN MAN DURING WEIGHTLESSNESS.
N. N. Gurovskii and M. A. Cherepakhin.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 52-54.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 193-195.
5 refs. Translation.

A68-46155
POSITION OF PILOT'S HANDS AND FEET ON COCKPIT CONTROLS AFTER FAINTING DURING FLIGHT SIMULATION.
I. I. Dvorzhak, V. V. Cherny, S. S. Chizhek, B. F. Filsa'kova, B. I. Grubeshova, L. Ia. Kdyrova, and A. A. Roubichek.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 55-57.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 196, 197.
Translation.

A68-46156
TRACKING ACTIVITY OF THE HUMAN OPERATOR WHEN EXPOSED TO SOME FACTORS OF COSMIC FLIGHT.
E. S. Zav'ialov and S. G. Mel'nik.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 57-62.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 198-201.
Translation.

A68-46157
CEREBRAL HEMODYNAMICS DURING PROLONGED HYPOKINESIA.
G. I. Gurvich and G. D. Efimenko.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 62-66.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 202-205.
7 refs. Translation.

A68-46158
FUNCTIONAL STATE OF AUDITORY SYSTEM IN PROLONGED (TWO MONTHS) HYPOKINESIA.
I. Ia. Iakovleva and E. I. Matsnev.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 66-70.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 206-208.
18 refs. Translation.

A68-46159
DIFFERENTIAL DIAGNOSIS OF SOMNOLENT AND PRECOLLAPSE STATES IN MAN.
O. P. Kozerenko and V. I. Miasnikov.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 70-76.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 209-213.
12 refs. Translation.

A68-46160
SOME INDICES OF NATURAL IMMUNITY IN MAN FOLLOWING THE SUBSTITUTION OF ANIMAL PROTEINS BY CHLORELLA PROTEINS IN THE DIET.
V. I. Fofanov, M. I. Kozar', and N. N. Dobronravova.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 77-80.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 214-217.
18 refs. Translation.

A68-46161
USE OF THE MONOSYNAPTIC H-REFLEX METHOD TO RECORD THE EFFECT OF ELECTRICAL STIMULATION OF THE HUMAN VESTIBULAR APPARATUS.
Ia. M. Kots and V. A. Mart'ianov.
(Kosmicheskaia Biologiia i Meditsina, vol. 1, May-June 1967, p. 81-85.)
Environmental Space Sciences, vol. 1, May-June 1967, p. 218-221.
10 refs. Translation.

LC ENTRIES

A68-82253
THE HIBERNATOR AS A TOOL IN BIOLOGICAL RESEARCH.
Roger A. Hoffman (Colgate U., Dept. of Biol., Hamilton, N. Y.).
Federation Proceedings, vol. 27, Jul. 1968, p. 999–1007. 19 refs.
Grant DA-HC19-67-G-0032.

A brief and generalized account of current knowledge on gibernation was presented. The major seasonal changes in the life cycle of hibernators called the homeothermic phase, the preparation or acclimatization phase and the hibernating phase were described. The endocrinological, neurophysiological, biochemical, nutritional, biophysica, and pharmacological aspects of hibernation were studied. The information derived from these studies would be most helpful in the field of clinical medicine. The hibernator seemed to be the biological tool of choice for basic studies of frostbite, shock and trauma, stress of all types, excessive irradiation, nutritional diseases etc., because of its unique change from one state to another with concurrent changes in its response to various abnormal conditions. Thus far its use had been limited, but its potentials in most disciplines were far reaching.

A68-82254
CLINICAL OBSERVATIONS ON ADAPTATION TO ANTARCTIC LIFE.
Robert B. Hunt (Mary Imogene Bassett Hosp., Cooperstown, N.Y.).
Military Medicine, vol. 133, Aug. 1968, p. 625–628.

Monthly physical examinations, laboratory studies and chest roentgenograms were performed on persons living in Antarctica in order to detect any clinical changes which may occur. Although the subjects remained in good health for the most part, significant elevations in white blood cell counts and hematocrits were noted. Hematocrit elevations were thought to be on basis of altitude and possible mild dehydration and cold stimulation. The cause for white blood cell count elevations remains obscure, though mild dehydration could be a factor. That no person developed hypertension and that personnel in general lost weight during winter is in contrast with previous studies in Antarctica.

A68-82255
IMPROVED CLINICAL CARE ALOFT.
Harold F. Funsch.
Military Medicine, vol. 133, Aug. 1968, p. 647–649.

A general description is given of a newly constructed aircraft for air transportation of ambulatory or litter patients. The C-9 (DC-9) is specifically designed for en route care to the extent that Air Force Medical Service personnel worked on the specifications in conjunction with the aeronautical engineers. Major features include a three-patient isolation area, a folding hydraulic ramp for enplaning patients, a capacity of forty, special litters, rearward facing seats and 110 volt, 60 cycle current for using existing hospital equipment. With this aircraft continuous treatment can be provided from hospital to hospital while en route.

A68-82256
OCCUPATIONAL DERMATITIS FROM PLASTICS.
Marcus M. Key (HEW, Dept., Natl. Center for Urban and Ind. Health, Cincinnati, Ohio).
Journal of the Medical Association Georgia, vol. 57, Sep. 1968, p. 421–424. 12 refs.

Occupational dermatitis from plastics is discussed. Those groups of plastics usually associated with occupational dermatitis include the phenolics, aminos, epoxies, polyesters, polyvinyls and polyurethanes. Some methods of minimizing contact while working with plastics and personal methods, such as protective clothing and ointments, are presented. Occupational dematitis is easy to diagnose and is amenable to local therapy, but prevention is complicated by the complexity of technology, inadequate labeling and poor communication between the practicing physician and plant management.

A68-82257
EFFECT OF STARVATION AND REFEEDING ON SERUM IMMUNOREACTIVE GLUCAGON AND INSULIN LEVELS.
James E. Vance, Keith D. Buchanan, and Robert H. Williams (Wash., U., School of Med., Div. of Endocrinol. and Metab., Seattle).
Journal of Laboratory and Clinical Medicine, vol. 72, Aug. 1968, p. 290–297.
Am. Diabetes Assn., 27th Ann. Meeting, Atlantic City, Jun. 17–18, 1967
Grants PHS AM 02456-09, PHS AM 05020-13, PHS F-37, and PHS F2 AM-32, 466-2.

The effect of starvation on circulating immunoreactive glucagon (IRG) levels was reinvestigated, employing new techniques which prevent degradation of glucagon in the assay. During a three day starvation period, peripheral venous IRG levels fell in six normal male subjects, but in 11 mongrel dogs starved for a similar period, IRG levels remained unchanged. Serum immunoreactive insulin (IRI) levels declined during the starvation in both the humans and the dogs. Acute refeeding following starvation demonstrated carbohydrate intolerance, and in the human subjects this was associated with a delayed and excessive IRI response. The serum IRG responses to a carbohydrate meal before starvation were variable and statistically insignificant in the humans. After starvation, carbohydrate ingestion elicited a slow, steady rise in circulating IRG levels. The demonstrated fall in circulating IRG levels does not necessarily reflect the actual secretory status of pancreatic glucagon, since serum glucagon levels are probably derived from more than one source, including the pancreas and the intestine. It is suggested that glucagon may play a role in the regulation of insulin secretion during starvation and after carbohydrate ingestion.

A68-82258
ADRENALINE DEPLETION INDUCED BY LIGHT IN THE DARK-ADAPTED RETINA.
B. D. Drujan and J. M. Diaz Borges (Inst. Venezolano de Invest. Cient., Dept. of Neurobiol., Caracas, Venezuela).
Experientia, vol. 24, Jul. 15, 1968, p. 676–677. 8 refs.
Grant NIH R01-NB-05770.

Toads *(Bufo marinus)* having been dark-adapted were exposed to strong light of variable duration. The epinephrine content was measured in the retina. The results showed that a marked depletion in this catecholamine occurred in the retina. At five min. of light exposure a 50% decrease in epinephrine was found, and recovery did not begin for five to ten min. It was suggested that light could only liberate epinephrine from one specific pool, and that another epinephrine source was not affected by light.

A68-82259
EXPLORING MARS VIA ANTARCTICA.
Judith Randal.
BioScience, vol. 18, Aug. 1968, p. 789–790.

A microbial investigation of Antarctica is reviewed. Studies of Antarctic life are being conducted in the hopes that a greater understanding of a similar life on Mars might be acquired. Although they are only partial imitations of conditions on Mars, they are the closest approximations to the ones found on Earth. The findings are encouraging in terms of the likelihood of there being life on other planets.

A68-82260
EVALUATION OF THE EFFECT OF ISOMETRIC TRAINING IN FUNCTIONAL AND ORGANIC MUSCLE ATROPHY.
Hans Stoboy (Freien U., Physiol. Inst., Berlin, West Germany), Guenter Friedebold (Staedisches Krankenhaus, Berlin-Britz, West Germany), and F. L. Strand (N. Y. U., Washington Square Coll., Dept. of Biol., New York City).
Archives of Physical Medicine and Rehabilitation, vol. 49, Sep. 1968, p. 508–514. 16 refs.
Am. Congr. of Rehabil. Med., 45th Ann. Session, Miami Beach, Aug. 30, 1967.

Progressive isometric training of the human quadriceps femoris was undertaken for ten wk. Four groups of subjects were studied: healthy physical therapy students; subjects with muscular atrophy due to disuse; patients with residual paralysis after poliomyelitis; and patients with tabes dorsalis. Each week, maximal strength, thigh circumference, static endurance, strength-endurance, electrical activity, average change of circumference of thigh during contraction, and the initial circumference at the beginning of the contraction were measured. In all the groups except the tabetic, a marked increase in strength and circumference of the thigh occurred. It is concluded that the atrophied or poliomyelitic muscle cannot be trained as well as the normal muscle and that training has no effect on the tabetic muscle. Intact peripheral nerve fibers are essential therefore for the training of a muscle. Once a critical threshold of strength or hypertrophy has been reached muscle contraction becomes more economical, as indicated by the change in pattern of electrical activity.

A68-82261
OCULAR EFFECTS PRODUCED BY EXPERIMENTAL LASTER. 1. Q-SWITCHED RUBY LASER.
Charles J. Campbell, M. Catherine Rittler (Columbia U., Coll. of Physicians and Surgeons, Presbyterian Hosp., Inst. of Ophthalmol., Knapp Mem. Lab. of Physiol. Optics, New York, N.Y.), C. Hermas Swope, and Charles J. Koester (Am. Opt. Corp., Res. Div., Framingham, Mass.).
American Journal of Ophthalmology, vol. 66, Sep. 1968, p. 459–470. 10 refs.
Grant PHS NB-07130.

The ocular effects of an experimental Q-switched ruby laser were explored in rabbits. Little or no damage was caused to any structure other than the retina. At low-power values the retinal lesions appear clinically similar to those produced by a conventional ruby laser, except that little fibrosis and pigmentation were found histologically several weeks after treatment. With higher-power values, the lesions were explosively hemorrhagic in character and resulted in total local retinal destruction. The ocular hzard of high powered Q-switched equipment was demonstrated. No clinical applications were found.

A68-82262
FILTERS USED BY DRIVERS AT NIGHT.
A. J. Phillips.
Ophthalmic Optician, vol. 8, Jul. 1968, p. 756–758, 763. 20 refs.

Some implications of the use of filters which may be worn intentionally or unintentionally by drivers at night were discussed. It was shown that, while any form of tinted filter may aid in reducing discomfort glare, such filters will worsen other visual functions. Some possible dangers of this were discussed. Special consideration was given to the use of tinted contact lenses. Ophthalmic and dispensing opticians can help their patients by advising them upon their particular visual needs for night driving, and by actively discouraging the use of any form of tinted filter, except in very special cases.

A68-82263
COMMAND RADIATION GUIDANCE.
Roger E. Linnemann (Minn., U., Hosp., Minneapolis).
Military Medicine, vol. 133, Sep. 1968, p. 711–716. 14 refs.
Norweg. Armed Forces Ann. Med. Meeting, Bergen, Norway, Sep. 14–17, 1966.

The knowledge and estimates of human response to whole body irradiation are based on a relatively small group of individuals subjected to non-uniform conditions of exposure and on extrapolation from animal data. Neither is sufficient to warrent a sophisticated quantitative approach to fighting a "rad" war. The staff surgeon, like the clinician, must look at the patient and heavily weigh his advice with medical evaluation.

A68-82264
LIVER REACTION AS MANIFESTED IN INCREASED ACTIVITY OF ORNITHINE CARBAMOYL TRANSFERASE IN SERUM AFTER SHORT HEAVY EXERCISE AND PROLONGED EXERCISE IN MAN.
Björn Ahlborg and Johan Brohult (Mil. Med. Exam. Center (MMUC) and Karolinska sjukhuset, Dept. of Clin. Physiol., Stockholm and Danderyds sjukhus, Dept. of Clin. Chem., Danderyd, Sweden).
Förscardmedicin, vol. 4, Jul. 1968, p. 133–140. 21 refs.
Min. of Defence, Stockholm County Council, and Carl-Berthel Nathorst Found. supported research.

The course of serum ornithine carbomoyl transferase (S-OCT) was studied after two principally different types of physical work in order to elucidate the various conceivable causes of the liver reaction that is manifested as an elevation of S-OCT after physical exercise. Anthropometric data for the subjects were given. Subjects displayed significant increases in S-OCT immediately after short exercise, but no such immediate rise was found after prolonged exercise. The probable explanation for the lack of increase after prolonged exercise was that, judging from the pulse rate, circulatory factors were not as decisive for the duration of the prolonged exercise. This suggested that the impairment of the circulation was not as great as after the short exercise, which supports the assumption that it was the impaired circulation in the liver and not the functional demands for the liver that elicited the rise in S-OCT after the short exercise. The subjects did not display any significant rise in S-OCT one wk. after prolonged exercise, in contrast to earlier results.

A68-82265
THERMOREGULATION DISTURBANCES IN RABBITS DURING HYPOXIA ORIGINATING AT DIFFERENT RATE [NARUSHENIIA TERMOREGULIATSII U KROLIKOV VO VREMIA GIPOKSII, VOZNIKAIUSHCHEI S RAZLICHNOI SKOROST'IU].

V. A. Konstantinov, M. A. Alimbaeva, and V. I. Tsitsurin (USSR, Acad. of Sci., I. P. Pavlov Inst. of Physiol., Lab. of Thermoregulation, Leningrad).
Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia, vol. 12, May–Jun. 1968, p. 55–60. 19 refs. In Russian.

Disturbances of thermoregulation were studied in rabbits with acute and chronic hypoxia at room temperature and oxygen content in the inhaled gaseous mixture at 10%. Sudden reduction of oxygen content caused a rise in ear temperature by 6.6 ± 1.0°C., reduction in rectal temperature by 0.6 + 0.3°C., and a fall by about 50% in the electrical potentials of lumbar muscles. Gradual decline of oxygen content in the inhaled air to 10% failed to provoke any thermoregulation disturbances. The difference is evidently explained by the fact that in gradual reduction of oxygen content in the inspired air the organism had time to adapt to its deficiency. However, in conditions of cooling, a gradually developing hypoxia immediately caused depression of shivering. Evidently, in intense thermoregulation, even an insignificant degree of hypoxia produced an inhibitory effect on the central thermoregulation mechanism.

A68-82266
EFFECTS OF ANESTHESIA AND ARTIFICIAL VENTILATION ON CAVAL FLOW AND CARDIAC OUTPUT.
Francis L. Abel and John A. Waldhausen (Ind. U., School of Med., Heart Res. Center and Depts. of Physiol. and Surg., Indianapolis).
Journal of Applied Physiology, vol. 25, Nov. 1968, p. 479–484. 10 refs.
Grants PHS HE 08042, PHS HE 10659, and PHS H 6308.

The effects of droperidol-fentanyl and pentobarbital on heart rate, stroke volume, cardian output, and thoracic vena caval flow were studied in dogs with implanted electromagnetic flow probes. Droperiodol-fentanyl decreased heart rate and increased stroke volume without changing cardiac output. Administration of pentobarbital to the normal animal increased heart rate by 22% and decreased stroke volume by 32%. The percentage of cardiac output returning to the heart via the inferior thoracic vena cava increased from 59 to 74%. When the two drugs were combined, the results were similar to those whith pentobarbital alone. The animals were subsequently studied during positive-pressure ventilation and thoracotomy. The former decreased over-all venous return and cardiac output, without altering the relative distribution of caval flow. Thoracotomy had no significant effect.

A68-82267
COOLING REQUIRED TO SUPPRESS SWEATING DURING WORK.
Paul Webb and James F. Annis (Webb Associates, Yellow Springs, Ohio).
Journal of Applied Physiology, vol. 25, Nov. 1968, p. 489–493. 9 refs.
NASA Contract NASW-1306 and NASA Contract NAS9-3556.

During work, if environmental temperatures are low enough, sweating should not be needed to dissipate metabolic heat. This idea was explored with air-cooling experiments in which air-wall temperatures were lowered at the onset of work for men dressed in shorts and boots, and in other experiments with controlled cooling of thermally isolated working men in water-cooled suits. In both types of experiments weight loss was limited to 100 g./hr. Work levels ranged from 250 kcal./hr. to over 900 kcal./hr., with work periods ranging from 3 hr. to 10 min. The heart rates and rectal temperatures of the subjects increased as a function of work level, as expected, while mean skin temperatures were increasingly lower as the work was greater. In the first 30 to 60 min. of any work period there was heat storage, followed by an apparent steady state. During the steady state, the cooling required to supress sweating was calculated for each work level and found to be approximately 80% of the heat production estimated from oxygen consumption.

A68-82268
STIMULATION OF AORTIC AND CAROTID CHEMORECEPTORS DURING CARBON MONOXIDE INHALATION.
Elliott Mills and McIver W. Edwards, Jr. (Middlesex Hosp., Med. School, Dept. of Physiol., London, Great Britain).
Journal of Applied Physiology, vol. 25, Nov. 1968, p. 494–502. 23 refs.
Grants PHS 5-F2-HE-28, 390-02 and PHS 2-F2-NB-25, 982-02.

In carboxyhemoglobinemia it is more difficult for hemoglobin to give up oxygen to tissues than normally. Thus, a given decrease in O_2 content reduces P_{O_2} of tissues more when blood is carbonylated than when it is not, even at the same Pa_{O_2}. It was found that aortic and carotid chemoreceptors were always stimulated when anesthetized cats spontaneously breathed 1.0% or were ventilated with 0.3% CO in air. The frequency of chemoreceptor impulses when the cats were given CO was compared with that when they breathed air (Pa_{O_2} ± two mm. Hg.; blood pressure ± five mm. Hg.). When the percentage of saturation of hemoglobin with CO (S_{CO}) reached 18 to 40%, the impulse frequency was two to five times its air control rate. The rise was comparable to that in a low O_2 control period (Pa_{O_2} = 62 to 75 mm. Hg.) even though Pa_{O_2} was 16 to 20 mm Hg. higher during CO inhalation. When CO was discontinued, impulse frequency fell toward control rate as S_{CO} fell. The stimulation was not due to low arterial P_{O_2}, to hypotension, or to a direct effect of CO on cytochrome axidase. It is attributed to the decrease in local tissue P_{O_2} that occurs in carboxyhemoglobinemia.

A68-82269
CHANGES IN REGIONAL DISTRIBUTION OF SWEATING DURING ACCLIMATIZATION TO HEAT.
W. Höfler (Tübingen U., Tropenmed. Inst., West Germany).
Journal of Applied Physiology, vol. 25, Nov. 1968, p. 503–506. 8 refs.

Regional distribution of sweating was examined with the method of Weiner during acclimatization experiments of 18 to 35 days duration. Four subjects exposed to humid heat showed an increase in the relative sweating of the limbs from initial values of 28 to 42% to 34 to 54% of the total sweating rate. In two subjects exposed to dry heat an increase from 40 to 43% was not significant. Two subjects with high initial values of 48 to 55% of the total sweating rate did not exhibit a further increase during acclimatization. A shifting of sweat distribution toward the limbs implies a better utilization of large surface areas with most favorable evaporation conditions.

A68-82270
HEMODYNAMIC CHARACTERISTICS AND BLOOD GAS EXCHANGE IN THE NORMAL BABOON.
Clarence A. Guenter, Donald R. McCaffree, Lloyd J. Davis, and Vernon S. Smith (Okla., U., Dept. of Med. and Veterans Admin. Hosp., Oklahoma City).
Journal of Applied Physiology, vol. 25, Nov. 1968, p. 507–510. 14 refs.
Grant PHS AI 00326; Okla. Heart Assn. and Veterans Admin. Hosp. supported research.

Seven healthy male baboons were studied under light pentobarbital anesthesia. Following endotracheal intubation and right heart catheterization, the animals were evaluated with respect to minute ventilation, tidal volume, physiological dead space, oxygen consumption, and alveolo-arterial (A-a) oxygen tension gradients. Stimultaneous measurement of cardiac output, pulmonary artery pressure, systemic artery pressure, arterial pH, P_{CO_2}, and P_{O_2} were performed. The mean minute ventilation was 0.13 l./kg., the mean oxygen consumption 5.5 ml./kg., and the mean cardiac output 0.19 l./kg. per min. Inhalation of 10% oxygen in nitrogen

resulted in hyperventilation, increased cardiac output, and elevated pulmonary artery pressures. Inhalation of 100% oxygen reversed these changes. Arterial hypoxia associated with high A-a gradients occurred in animals breathing spontaneously. The hypoxia was readily prevented by deep inflation of the lungs every 15 min. Under the latter circumstances, A-a gradients breathing ambient air did not exceed 11 mm. Hg. These studies demonstrate the feasibility of detailed physiological evaluations of the baboon, document normal values, and demonstrate that the ventilatory and hemodynamic response to hypoxia is similar to that of man.

A68-82271
CIRCULATORY ADAPTATION TO ONE- AND TWO-LEG EXERCISE IN SUPINE POSITION.

Ulla Freyschuss and Tore Strandell (Karolinska Sjukhuset, Dept. of Clin. Physiol., Stockholm, Sweden).

Journal of Applied Physiology, vol. 25, Nov. 1968, p. 511–515. 17 refs.

Karolinska Inst. and Riksidrottsförbundets poliklinikkommitté supported research.

In eight healthy male subjects right and left femoral arteriovenous (A-V) oxygen and lactate differences, oxygen uptake of the lungs, and aortic pressures were measured during exercise with one and two legs. The loads were the same for the active, right leg during both types of exercise. During one-leg work, heart rate, aortic pressure, ventilation, and aortic lactate concentration were significantly higher than during two-leg exercise for a given oxygen uptake. With the same oxygen uptake per leg, the aortic pressures were similar during both types of exercise. In relation to work load and oxygen uptake per leg, the A-V oxygen difference over the right leg was significantly lower when the leg worked alone, indicating a higher blood flow. The observed difference in circulatory and metabolic adaptation to one- and two-leg exercise seems to be related to a higher sympathetic outflow with small muscle groups working. The results agree with comparisons between arm and leg work or a combined arm and leg exercise.

A68-82272
REGIONAL PULMONARY ARTERIAL-VENOUS SHUNTING CAUSED BY GRAVITATIONAL AND INERTIAL FORCES.

Russel A. Vandenberg, A. Clark Nolan, John H. Reed, Jr., and Earl H. Wood (Mayo Clin., Sect. of Physiol., Rochester, Minn.).

Journal of Applied Physiology, vol. 25, Nov. 1968, p. 516–527. 27 refs.

NASA Grant NsG-327, Grants NIH H-3532, NIH FR-00007, and AHA CI 10; Minn. Heart Assn. supported research.

Superior (SPV) and dependent pulmonary venous (DPV), aortic, and pulmonary arterial (PA) blood oxygen saturations were measured simultaneously and continuously in anesthetized dogs before, during, and after exposures to acceleration in different body positions. In right and left lateral decubitus positions during respiration with air or 99.6% oxygen, blood oxygen saturation in DPV decreased to the same level as in PA, remained unchanged in SPV, and decreased in aortic to a level between that in DPV and SPV. These changes and their time course suggest that pulmonary arterial-venous shunting occurs in dependent regions of the lungs and is caused by a combination of volume and absorption atelectasis of dependent alveoli. During respiration with 99.6% oxygen, aortic saturation increased, and calculated total (mixed) shunt decreased toward the end of 120-sec. exposures to five to seven g acceleration in lateral positions and, more strikingly, in the first 30 sec. after termination of the exposures. The fact that these decreases in total (mixed) shunt occurred despite persistent 100% arterial-venous shunting via dependent regions of the lungs suggests redistribution of pulmonary blood flow away from the atelectatic areas.

A68-82273
CIRCULATORY RESPONSES TO ARM EXERCISE WITH DIFFERENT ARM POSITIONS.

Irma Astrand, Asit Guharay, and John Wahren (Serafimerlasarettet, Karolinska Inst., Natl. Inst. of Occupational Health and Dept. of Clin. Physiol., Stockholm, Sweden).

Journal of Applied Physiology, vol. 25, Nov. 1968, p. 528–532. 20 refs.

Natl. Swed. Council for Building Res. supported research.

The circulatory response to arm exercise by nailing at bench capacity into wall at head level, and into ceiling 10 cm. above the head was studied in 11 subjects and compared to leg exercise. Oxygen uptake was approximately 1 liter/min. for all three types of arm exercise and for 300 k.p.m./min. on a bicycle ergometer. Heart rate, blood pressure, and lactate concentrations during arm exercise were higher for nailing into ceiling than for nailing into wall and bench. In comparison with nailing into bench, bicycle exercise at 300 k.p.m./min. resulted in lower heart rate, blood pressure, and ventilation in relation to oxygen uptake. The diastolic blood pressure during nailing into ceiling was higher than during maximal leg exercise. The observed differences between the hemodynamic responses to arm exercise in different positions indicate an increased sympathetic vasoconstrictor tone for exercise with elevated arms.

A68-82274
VASOCONSTRICTOR RESPONSE TO SIMULATED DIVING IN MAN.

Donald D. Heistad, Francois M. Abboud, and John W. Eckstein (Iowa, U., Coll. of Med., Dept. of Internal Med., Cardiovascular Res. Labs., Iowa City).

Journal of Applied Physiology, vol. 25, Nov. 1968, p. 542–549. 27 refs.

Grants PHS HE-09835, PHS HE-02644, PHS HE-K3-17013, PHS HE-K6-4626, and PHS 5T-12HE-05729; Am. Heart Assn. supported research.

A vasconstrictor response to simulated diving has not been demonstrated clearly in man. Intra-arterial blood pressure and blood flow to the forearm and finger were measured simultaneously. Measurements of blood flow were obtained with plethysmographs, and observations were made during breath holding and during immersion of the face in water. Both breath holding and immersion caused vasoconstriction as indicated by a reduction in blood flow and an increase in arterial pressure. The reduction in blood flow to the finger was greater than the reduction in flow to the forearm, and the vasoconstrictor response was more pronounced with immersion than with breath holding. A bradycardia was observed during immersion and breath holding, and the intravenous administration of atropine antagonized this bradycardia without altering the vasoconstrictor responses. The possibility that a reflex cholinergic vasodilation might have reduced the net vasoconstrictor responses in the forearm was thus excluded. A significant systolic pressure gradient occurred between the brachial and digital arteries during immersion, indicating constriction of arteries upstream from the digital arteries. The volumes of the congested finger and forearm decreased during breath holding and immersion of the face when pressure in the congesting cuffs was constant, suggesting decreased compliance of capacity vessels.

A68-82275
OXYGEN AND CARBON DIOXIDE TENSIONS IN TISSUE AND BLOOD OF NORMAL AND ACIDOTIC RATS.

Hugh D. Van Liew (N. Y., State U., Dept. of Physiol., Buffalo).

Journal of Applied Physiology, vol. 25, Nov. 1968, p. 575–580. 23 refs.

Contract ONR N0014-68-A-0216 and Grant PHS AM-08070-03.

Tensions of O_2 and CO_2 in tissue, insofar as they are close to tensions in venous blood, are determined by the relation

of alveolar ventilation to total metabolism, the relation of local blood perfusion to local metabolism, the quality of the local metabolism, and the gas-carrying characteristics of the blood. The interactions of these factors were studied in rats using subcutaneous gas pockets to estimate tissue gases. Conclusions: (a) in metabolic acidosis, altered blood-gas characteristics tend to counteract the effect of increased ventilation, so tissue P_{CO} is near normal although Pa_{CO_2} is low; (b) when local blood flow is so low that PO_2 of the tissue-venous environment is below 12 mm. Hg, tissue P_{CO_2} estimates are unexpectedly high, possibly because of local acid production; and (c) tissue P_{O_2} in normal air-breathing rats ranges from 0 to 40 mm. Hg and P_{CO2} from 40 to 60 mm. Hg. Part of this variability may be an artifact of the technique, but part is due to variability of the several factors that determine tissue gases.

A68-82276
CHANGES IN CENTRAL CIRCULATION AND BODY FLUID SPACES DURING ACCLIMATIZATION TO HEAT.

C. H. Wyndham, A. J. A. Benade, C. G. Williams, N. B. Strydom, A. Goldin, and A. J. A. Heyns (South Africa, Chamber of Mines, Human Sci. Lab. and Mining Res. Lab., Johannesburg, Transvaal).
Journal of Applied Physiology, vol. 25, Nov. 1968, p. 586–593. 20 refs.

Arterial-venous differences (using the acetylene rebreathing technique), oxygen consumption, and heart rates were measured on six subjects, and cardiac output and stroke volume were calculated on days 1, 3, 5, 7, 9, 13, and 17 of acclimatization to heat (four hr. of work daily at 1.0 l./min. oxygen consumption at 33.9°C. DB, 32.2°C. WB and air movement of 0.5 m./sec.) Plasma volume, extracellular volume, and total body water were determined with albumin - ^{131}I, ^{82}Br, and H_3O, respectively, before acclimatization, and again on days 5 and 17. Cardiac outputs and A-V differences did not change significantly; oxygen consumption rose on the first few days in heat and then returned to control values; heart rate rose to a mean of 153 beats/min. on day 1 and fell to 126 beats/min. by day 3; stroke volume fell sharply on day 1 but rose to close to control values by day 3. The increase in stroke volume was associated with an increase by day 5 in volumes of plasma, extracellular space, and total body water. The first two spaces decreased between days 5 and 17. It is postulated that both antidiuretic hormone and aldosterone are involved in the increase in the three body fluid spaces in the first five days of acclimatization as a result of the emergency of central circulatory instability which stimulates the volume receptors in the vascular system.

A68-82277
EFFECT OF SEASONAL TRAINING ON MAXIMAL CARDIAC OUTPUT.

F. G. V. Douglas and Margaret R. Becklake (McGill U. and Roy. Victoria Hosp., Cardiorespirat. Serv., Montreal, Canada).
Journal of Applied Physiology, vol. 25, Nov. 1968, p. 600–605. 23 refs.
John A. Hartford Found., Natl. Health and Welfare, Dept. and MRC supported research.

Four university hockey players were exercised up to maximal work capacity on a bicycle ergometer before the start of their season and again after four mo. of training. Measurements were made of heart rate (HR), cardiac output (Qc), oxygen uptake (V_{O_2}), and minute ventilation (V) at several increasing submaximal work loads as well as in the range of maximal capacity, both in the untrained and trained states. Although each subject increased his maximal work capacity after training, maximal HR, Q_c, V_{O_2}, and V showed no consistent or significant change. An explanation for this finding is afforded by the observation that, after training, subjects performed any given work load with less increase in HR, Q, and V; i.e., there was less stress on circulation and respiration than before training. Thus, a greater maximal work capacity was possible after training even though no increase in maximal circulatory capacity was demonstrable.

A68-82278
EFFECTS OF ALTITUDE ACCLIMATIZATION ON PULMONARY FUNCTION IN WOMEN.

J. L. Shields, John P. Hannon, C. W. Harris, and W. S. Platner (Fitzsimons Gen. Hosp., U.S. Army Med. Res. and Nutr. Lab., Physiol. Div., Denver, Colo.).
Journal of Applied Physiology, vol. 25, Nov. 1968, p. 606–609. 13 refs.

Forced vital capacity, timed vital capacity (FEV_1), maximum breathing capacity, maximum midexpiratory flow, and voluntary apnea were determined in eight college women first at low altitude and then during and after a summer's residence (65 days) at Pikes Peak, Colorado (14,100 ft.). Vital capacity decreased 3.7% by seven days at altitude and recovered after one mo. FEV_1 increased 4% at seven days and recovered by summer's end. Maximum breathing capacity and maximum midexpiratory flow increased 13.7% and 26%, respectively. Voluntary apnea was decreased approximately 50% during high-altitude residence. It was concluded that pulmonary function tests in women at high altitude are qualitatively and quantitatively similar to those in men, with the exception of a much smaller increase in maximum breathing capacity.

A68-82279
CARDIAC OUTPUT IN ATHLETES.

Björn Ekblom and Lars Hermansen (Gymnastik- och Idrottshögskolan, Dept. of Physiol., Stockholm, Sweden).
Journal of Applied Physiology, vol. 25, Nov. 1968, p. 619–625. 20 refs.
Swed. Natl. Assn. against Heart and Chest Diseases, Swed. Sports Federation, Swed. Med. Res. Council, and Norweg. Council for Humanities and Sci. supported research.

Cardiac output (dye-dilution technique) was determined during submaximal and maximal treadmill exercise on eight well-trained top athletes with very high maximal oxygen uptake (average value 5.57 l./min. or 73.9 ml./kg. per min.). Cardiac output and stroke volume averaged 36.0 l./min. and 189 ml., respectively. The highest individual values were 6.24 l./min. (81.1 ml./kg. per min.) for oxygen uptake and 42.3 l./min. for cardiac output. Owing to a relatively low arterial oxygen content (mean hemoglobin concentration 14.3 g./100 ml. of blood) during maximal exercise, the maximal arteriovenous oxygen difference averaged only 156 ml./l.

A68-82280
URIC ACID PRODUCTION OF MEN FED GRADED AMOUNTS OF EGG PROTEIN AND YEAST NUCLEIC ACID.

Carol I. Waslien, Doris Howes Calloway, and Sheldon Margen (Calif., U., Dept. of Nutr. Sci., Berkeley).
American Journal of Clinical Nutrition, vol. 21, Sep. 1968, p. 892–897. 18 refs.
Federation of Am. Soc. for Exptl. Biol., 52nd Ann. Meeting, Atlantic City, Apr. 1968.
NASA Grant NGR-05-003-068, NASA Grant NGR-05-003-089, and Grant NIH AM 10202.

Healthy male subjects were fed purine-free basal diets containing 0 to 75 g. of protein and, at the highest protein level, 0 to 8 g. of added yeast ribonucleic acid in order to differentiate effects of these dietary components on plasma and urinary uric acid production. Urinary uric acid levels were significantly higher and plasma levels lower with 75 g. of protein than with a protein-free diet. When nucleic acid was fed, plasma and urinary uric acid increased linearly in four of five subjects. Predictive equations were derived describing this response to dietary nucleic acid.

A68-82281
ULTRASTRUCTURE OF THE LUNGS OF DOGS EXPOSED TO BERYLLIUM-CONTAINING DUSTS.
Farrel R. Robinson (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio), Fenton Schaffner, and Esther Trachtenberg (Mt. Sinai School of Med., Dept. of Pathol., New York, N. Y.).
Archives of Environmental Health, vol. 17, Aug. 1968, p. 193–203. 24 refs.
Contract AF 33(615)-3464.

Two beagle dogs were exposed by the natural respiratory route to rocket exhaust fumes containing beryllium oxide, beryllium fluoride, and beryllium chloride. The lung tissue was examined electron microscopically after a three-yr. post-exposure period. Beryllium particles and small agglomerates less than 1μ in size were deposited in lysosomes in the cytoplasm of histiocytes in the interstitium of the septa. They were closely associated with collagen bundles several microns wide and with increases in numbers of septal capillaries. The lesions were more typical of the classical reaction to a foreign-body than immunologic in character and represented an early form of chronic beryllium disease.

A68-82282
PERCEPTUAL CONSTANCY OF AUDITORY DIRECTION WITH HEAD ROTATION.
R. H. Day (Monash U., Dept. of Psychol., Melbourne, Australia).
Nature, vol. 219, Aug. 3, 1968, p. 501–502. 8 refs.

The purpose of the work was to establish whether or not judgments of the direction of the sound source are relatively stable with changes in the binaural stimulus as the head rotates between 0° (median plane) and 80° with reference to a fixed body position. The reported data demonstrated the occurrence of perceptual constancy of auditory direction judgements with variation in the binaural stimulus consequent on head rotation.

A68-82283
THE *IN VITRO* OXYGEN UPTAKE OF TISSUES OF HEAT-STROKE ANIMALS.
F. J. Burger and F. M. Engelbrecht (Stellenbosch, U., Dept. of Physiol., CSIR Tissue-Damage and Cell-Metab. Res. Unit, South Africa).
South African Medical Journal, vol. 42, Aug. 3, 1968, p. 780–783. 28 refs.

In this investigation the oxygen uptake of several tissues of heat stroke and of control rats was measured manometrically. Male albino rats weighing about 250 g., and starved for 24 hr. were used. Heat stroke was induced by partial submersion of the animal in a waterbath at supranormal temperatures. Three supranormal waterbath temperatures were used, i.e. 41, 42 and 43° C. to obtain rectal temperatures of 41.5, 42.5 and 43.5° C., respectively. The animals were kept at a specific rectal temperature until air hunger developed. As soon as possible tissues were prepared for the measurement of oxygen uptake. Two control groups for each experimental group were used: one at room temperature and the other kept at waterbath at 37.5° C. for the same period as the experimental animals. The oxygen uptake of cerebral cortex, hypothalamus, cerebellum, liver, heart, lung, kidney cortex, skeletal muscle, small intestine and skin was measured. Judged by a decrease in oxygen uptake, liver, heart, lung, kidney cortex, skeletal muscle and small intenstine are partly damaged *in vivo*. The following parameters were also used as reference baseline for the rate of oxygen uptake: dry weight (in all tissues) and in some tissues total protein non-collagenous-protein nitrogen, deoxyribonucleic acid and ribonucleic acid content, and packed-mitochondria volume. No major differences were observed except in the total protein content of the kidney. The survival times for rats at rectal temperatures of 41.5, 42.5 and 43.5° C. were 100, 40 and 20 min., respectively. The degree of damage of a specific tissue at this end point (air hunger signs) was practically the same for all temperatures.

A68-82284
TOTAL CARDIAC OUTPUT RESPONSE DURING FOUR MINUTES OF EXERCISE.
W. B. Jones and T. J. Reeves (Ala., U., Med. Center and Med. Coll., Dept. of Med., Birmingham).
American Heart Journal, vol. 76, Aug. 1968, p. 209–216. 10 refs.
Grants NIH HE 11310-01 and VRA RD 2219-8.

Cardiac output was monitored continuously during four min. of steady state exercise in 34 human subjects, of whom 16 were normal volunteers, nine had heart disease with a cardiac index within normal limits during the fourth min. of exercise, and nine had subnormal levels of cardiac output during the same period of timed exercise. The linear flow velocity in the ascending aorta was computed. The cardiac output was examined each 30 sec. throughout the four min. period of exercise as a percentage of the level attained during the fourth min. Striking differences between the three groups were seen 30 sec. after the start of exercise. The normal subjects had achieved 88.4% of the maximal level at 30 sec. The patients with a subnormal steady state cardiac output had achieved only 77.9% of their final value at this time while the patients with normal steady state levels were intermediate at 30 sec. The differences in the groups were still present but diminished at one and two min. of exercise. The output was cumulated for the entire four min. exercise period in each patient and plotted as a function of work load. Considered in this manner, a wide separation of the patients with low steady-state cardiac output and the normal subjects was achieved without overlap. These data suggest that patients with a subnormal cardiac output during the steady state phase of exercise tend to increase their cardiac outputs more slowly in response to a given exercise than do normal subjects or patients with less severe heart disease.

A68-82285
THE EFFECTS OF SECOBARBITAL AND DEXTROAMPHETAMINE UPON TIME JUDGMENT: INTERSENSORY FACTORS.
Sanford Goldstone and James E. Kirkham (Cornell U., Med. Coll., New York, N. Y. and Baylor U., Coll. of Med., Houston, Tex.).
Psychopharmacologia, vol. 13, May 30, 1968, p. 65–73. 8 refs.

One hundred and sixty subjects judged the duration of short lights and sounds along nine-category response scales with no drug, a placebo, 200 mg. secobarbital, 15 mg. dextroamphetamine. Measures of average category response and intrasubject response variability were obtained from single stimuli judgments of blocks of alternately presented auditory and visual signals using two temporal standards (i.e., social and subjective) 30, 60, and 90 min. post-drug. The experiment produced main effects and interactions among six factors: (1) four drug conditions; (2) two sense modes; (3) two sense mode orders; (4) two temporal standards; (5) seven durations; and (6) three post-drug trials. Dextroamphetramine yielded longer judgments or overestimation relative to control conditions at 30 min. which persisted to 60 and 90 min.; secobarbital produced shorter judgments or underestimation at 60 and 90 min. The stimulant effect was more rapid and greater than the sedative effect in shifting the location of temporal scales, and these results were independent of sense mode, order and temporal standard. While the placebo and dextroamphetamine subjects were more variable than controls, this effect was greatest with secobarbital suggesting reduced consistency as the prime sedative effect.

A68-82286
THE USE OF TEAMS IN IMAGE INTERPRETATION: INFORMATION EXCHANGE, CONFIDENCE AND RESOLVING DISAGREEMENTS.

George W. Doten, John T. Cockrell (System Develop. Corp., Advan. Systems Div., Falls Church, Va.), and Robert Sadacca (U.S. Army Behavioral Sci. Res. Lab., Washington, D. C.)
Human Factors, vol. 10, Apr. 1968, p. 107–116.
Contract DA 49-092-ARO-65.

Using the common procedure of having each team member in two-man teams check the interpretations of his teammate, three experiments centered around the following questions: (1) How much knowledge should the checker have of the initial interpreter's work? (2) How accurately can the initial interpreter rate the accuracy of his interpretations and can the initial interpreter effectively designate which of his interpretations need checking? And, (3) how can a third interpreter best be utilized to resolve conflicts in interpretations made by the original two-man team? Variations centered about the amount of information passed from initial interpreter to checker, discussion between team members versus no discussion, consensus versus one-man decision in determining the team product, confidence ratings made by interpreters and confidence levels below which interpretations were checked, and participation of a third team member under varying conditions to resolve conflicts in interpretation. Results were evaluated in terms of completeness of information extracted, accuracy and efficiency.

A68-82287
TERRAIN-FOLLOWING WITH A HEAD-UP DISPLAY.
Stanley M. Soliday and James R. Milligan (North Am. Aviation, Inc., Human Factors Group, Columbus, Ohio).
Human Factors, vol. 10, Apr. 1968, p. 117–126.
Contract AF 33(657)-13798.

A head-up display (HUD) was evaluated in simulated low-altitude high-speed terrain-following flight using a four degree of freedom moving-base simulator. An aircraft representative of the RF-4C was programmed as the test vehicle through analog computers associated with the simulator. Six Air Force pilots made a total of 108 one-half hr. flights in various terrain, airspeed, and visibility conditions. The pilots' tasks during the flights were to *maintain a given clearance altitude and heading at all times.* The results showed that terrain-following with the HUD was better than it was with typical in-cockpit instruments. The pilots also preferred the HUD to the in-cockpit instruments, although they felt that numerous improvements could be made to the particular HUD that was used. General findings were that terrain-following efficiency varied with type of terrain, airspeed, and visibility.

A68-82288
WORK SCHEDULES AND PERFORMANCE DURING CONFINEMENT.
W. Dean Chiles (FAA, Civil Aeromed. Inst., Oklahoma City, Okla.), Earl A. Alluisi (Louisville, U., Dept. of Psychol., Ky.), and Oscar S. Adams (Lockheed-Ga. Co., Operations Res. Div., Marietta, Ga.).
Human Factors, vol. 10, Apr. 1968, p. 143–195. 28 refs.
Contracts AF 33(616)-3745, AF 33(616)-6050, AF 33(616)-7607, and AF 33(657)-10506.

Thirteen investigations were carried out as part of an eight-yr. program of research on the performance effects of various work/rest schedules during confinement to a simulated aerospace vehicle crew compartment. A total of 139 subjects were tested using a standard battery of performance tasks. The synthetic work approach used provided a reliable, face-valid, and sensitive technique for assessing complex operator performance. It was found that a man can work 12 hr. per day on a four-hr. work/four-hr. rest schedule for periods of at least 30 days. For shorter periods, a man can work 16 hr. per day on a four/two schedule but a significant cost to his reserves for meeting emergencies such as sleep loss. Circadian periodicities are found in psycho-physiological functions paralleled by similar periodicities in performance functions, the latter being subject to modification by special motivational instructions.

A68-82289
EFFECT OF SOME FACTORS OF HIGH-ALTITUDE FLIGHTS UPON VASCULAR SYSTEM STRUCTURE [VLIIANIE NEKOTORYKH FAKTOROV VYSOTNYKH POLETOV NA STROENIE SOSUDISTOI SISTEMY].
M. G. Prives, A. K. Kosourov, and A. A. Aleksina (I. P. Pavlov First Leningrad Med. Inst., Dept. of Normal Anat., USSR).
Arkhiv Anatomii, Gistologii i Embriologii, vol. 55, Jul. 1968, p. 54–60. 16 refs. In Russian.

Effects of high altitude flights on the structure of the vascular system in living organisms were roentgenologically studied. This method permitted a long-lasting follow-up of changes caused by various impacts in one and the same object. Roentgenoangiography of arteries in the rabbit pelvic extremity and of lymphatic capillaries in the pelvic extremity in the rat was applied. In the organs and parts of the body peripheral to the centrifuge (caudal half of the body: overloading directed from head to pelvis; cranial half of the body: reverse direction of overloading), hyperemia of the blood vessels was observed with resulting morphological changes in the vascular system (dilatation of the main extremital artery, tortuosity of the arterial trunk, increased number of arteries of the middle and small calibers relative to that in normal). Examination of the lymphatic system in living objects revealed an increased amount of injected lymphatic vessels, enlargement of their lumina, increased lymphatic nodes, etc. Similar changes, on a larger scale, were found in post-mortem examination. The arterial system suffered greater changes relative to the lymphatic one. Effect of hypokinesia (immobilization of extremities) upon the collateral lymph circulation was also studied. Immobilization of extremities caused a delay in restitution of the interrrupted main lymphatic pathway, long-lasting functioning of collaterals and phenomena of hyperemia. Increased physical loading contributed to a more rapid development of collaterals. Effect of preliminary special training in centrifuge was also studied. It was stated that preliminary training in the centrifuge prevented, to a considerable extent, changes in the lymphatic system produced by gravitation overloading. The authors came to a conclusion that training under gravitation overloading was of great importance for normalization of the vascular system activity and its rapid adaptation to new conditions.

A68-82290
SOVIET SPACE EXPLORATION: THE FIRST DECADE.
William Shelton.
New York, Washington Square Press, Inc., 1968, xii+339 p. 37 refs.
$6.95

An account is given of Soviet space exploration including the preparations and technical developments before the Sputnik I flight in 1957. Much of the story comes from the author's firsthand interviews with cosmonauts and others throughout Russia. An attempt is made to negate the myths and to present a true assessment of the Soviet flights. Topics of interest include: (1) a discussion of the contribution of German rocket technicians to the Soviet effort; (2) use of women in the space program; (3) deaths of Soviet cosmonauts; (4) use of automatic Earth satellites; (5) concealment of Soviet Space failures; (6) aspects of Soviet medical approach to space exploration; and (7) comparison of Soviet and American development of military applications in space. The author's personal observation of Soviet scientific centers, space vehicles and his talks with cosmonauts and scientific personel bring much interesting detail to the book. A chronology of Soviet space flights in included as an appendix.

A68-82291
FORM AND SPACE VISION.
Yves Le Grand (Museum Natl. d'Hist. Nat., Lab. de Phys., Paris, France).
Bloomington and London, Indiana U. Press, 1967, xvi+367 p. Many refs.
$17.50.

This book is a thoroughly revised and updated edition of the volume *L'Espace Visuel* first published in France in 1956. The book is not a tome on visual perception but is an effort to explain the visual phenomena of normal people on a physical and physiological basis. This explanation dictates an initial consideration of the analysis of the retinal image, and the theory of optical dioptrics. Gaussian optics is reinterpreted in light of the consideration of spherical and chromatic aberrations. This analysis is tied to the problems of form perception, visual acuity, motion perception and peripheral vision. Binocular vision is discussed in relation to the structure of visual space. A number of later chapters are devoted to practical applications such as carrying out visual tasks and using proper illumination, seeing in water, and seeing through the atmosphere. Many charts and graphs are used, and many references are cited in an extensive bibliography.

A68-82292
ORAL MICROBIOLOGY.
Edited by William A. Nolte (Tex., U., Houston Dental Branch, Dept. of Microbiol., Houston).
St. Louis, The C.V. Mosby Co., 1968, x+436 p. Many refs.

This book is a compilation of current information in the field of oral biology. Individual specialists contribute information on separate subject areas in each chapter. The book includes work on oral ecology, host defense mechanisms, microbial diseases, sterilization, chemotherapy, oral hygiene, and the use of laboratory animals in studying oral biology. An appendix on the morphological characteristics of the bacterial cell is included. Many references are given at the end of each chapter.

A68-82293
ADVANCES IN BIOMEDICAL ENGINEERING AND MEDICAL PHYSICS: VOLUME 1.
Edited by Sumner N. Levine (N. Y. State U., Coll. of Eng., Stony Brook).
New York, Interscience Publishers, 1968, vii+407 p. Many refs.

This first volume of the series presents various papers reviewing subjects in the field of biomedical engineering and medical physics. Articles of interest include those on biotelemetry, laser application in medicine and biology and analysis of pulsatile blood flow. In the discussion to telemetry application to biology the usage in the American and Soviet space programs are compared. It is stressed that the monitoring efforts of both countries need to develop multichannel transmission. Other problems in the space effort are mentioned. Each article included many references.

A68-82294
RADIATION BIOLOGY.
Alison P. Casarett (Cornell U., N. Y. State Vet. Coll., Dept. of Phys. Biol., Ithaca, N. Y.).
Englewood Cliffs, Prentice-Hall, Inc., 1968, xiv+368 p. Many refs.

This textbook presents a comprehensive work on many aspects of radiation biology. A short historical review is given, and the major principles of radiation physics are reviewed. Aspects of radiation biology covered in other chapters include: (1) radiation genetics; (2) radiation effects on the cell; (3) acute radiation effects in whole animals; (4) chemical protection; and (5) maximum permissible exposure and estimate of risks from radiation. The final chapter on applied radiation biology stresses the effects in humans as a result of the increasing use of radioactivity.

A68-82295
HEAT OF COMBUSTION IN THE BIOMASS OF THE ALGA SCENEDESMUS QUADRICAUDA DURING ITS ONTOGENETIC CYCLE
J. Komarek and S. Přibil (Czech. Acad. of Sci., Inst. of Microbiol., Lab. of Algol., Třebon).
Nature, vol. 219, Aug. 10, 1968, p. 635–636. 15 refs.

The combustion semimicrocalorimeter was used to evaluate changes in calorimetric values in the biomass of *Scenedesmus Quadricauda* during the ontogentic cycle in synchronous cultures, and to determine the influence of temperature on the quality of the biomass. The heat of combustion was determined by Bartošová and Konicěk's method. Values for heat of combustion (g.) changed from 5,700 to 6,060 cal./g. of dry weight. This range may vary in individual life cycles depending on the culture conditions, but the course of the changes during the life cycle is analogous in all conditions. The heat of combustion decreases slightly in the first third of a life cycle; in the second third it decreases intensely by four per cent, and at the time of the formation of autospores in the mother cells it again increases. Changes of the heat of combustion of the biomass of algae during one life cycle are probably connected with a higher energy consumption during differentiation of autospores and metabolism of lipids.

A68-82296
RENAL FUNCTION IN WATER DEPRIVATION.
I. Forgàcs, R. Châtel, and Mária Visy (U. Med. School, Inst. of Physiol., Budapest, Hungary).
Acta Physiologica Academiae Scientiarum Hungaricae, vol. 33, no. 3, 1968, p. 297–304. 15 refs.

The renal response to water deprivation with free food uptake was studied in dogs over periods of seven to 12 days. Urine osmolality reached its peak on the first or second day of fluid restriction. More sodium than water was retained by the kidneys. Towards the end of the experiments, plasma sodium level and hematocrit increased to extremely high values. Renal blood flow and glomerular filtration rate were significantly depressed. All the changes in renal function may be regarded as compensatory efforts to maintain extracellular fluid volume, and are not due to some impairment of the kidneys.

A68-82297
EFFECT OF COLD EXPOSURE ON OXYGEN TENSION IN BROWN ADIPOSE TISSUE IN THE NON-COLD-ADAPTED ADULT RAT.
Z. Szelenyi (U. Med. School, Inst. of Pathophysiol., Pécs, Hungary).
Acta Physiologica Academiae Scientiarum Hungaricae, vol. 33, no. 3, 1968, p. 311–316. 14 refs.

Adult rats adapted to room temperature were repeatedly exposed to an environmental temperature of 10° C. or 20° C. and 30° C. Temperature and oxygen tension (available oxygen) were measured in the interscapular brown adipose tissue with copper-constantan thermocouples and a gold oxygen electrode, respectively. In addition, colonic temperature and oxygen consumption were recorded. Cold exposure resulted in a fall of available oxygen in the brown fat, at the same time there was a rise in brown fat temperature and in increase in the animal's oxygen consumption. On the other hand, transfer of the rats from the cold into a thermoneutral environment induced a rise in brown fat available oxygen and a fall in brown fat temperature concurrently with the decrease in the animal's oxygen consumption. These results demonstrating the almost immediate increase in oxygen utilization of brown fat in response to cold confirm the inferences drawn from local temperature changes in brown fat in response to changes in the thermal environment.

A68-82298
SPACE TECHNOLOGY IN MEDICINE.
Arra S. Avakian (Eastern Operation Aerospace Corp., Washington, D. C.).
New York State Journal of Medicine, vol. 68, Sep. 1, 1968, p. 2319–2323.
N.Y., State, Med. Soc., 161st Ann. Meeting, New York City, Feb. 13, 1967.

A discussion is given of the benefits that the space program can bring to medicine. Two areas of knowledge are shared by space technology and medicine. These are the body of technology itself and the methodology of problem solving. The transfer of knowledge from the space program to medicine is briefly discussed, and the methods of problem solving such as systems analysis, decision making and technical management are applied to current problems in medicine. In conclusion the author calls for the establishment centers of space medicine to be organized at present universities to enlarge and unite various disciplines as space medicine develops.

A68-82299
ELECTROCARDIOGRAPHIC PATTERNS IN WORKERS EXPOSED TO CHRONIC TRICHLOROETHYLENE POISONING [QUADRI ELETTROCARDIOGRAFICI OSSERVATI IN UN GRUPPO DI OPERAIE ESPOSTE AL RISCHIO DI INTOSSICAZIONE DA TRICLOROETILENE].
E. Orlando and G. B. Raffi (Bologna, U., Inst. di Med. del Lavoro, Italy).
Lavoro e Medicina, vol. 21, Nov.–Dec. 1967, p. 215–223. 29 refs. In Italian.

The electrocardiograms of 54 subjects (women) working in a dry cleaning plant and exposed to chronic trichloroethylene poisoning, were recorded. The results obtained showed that 44% of the subjects had normal tracings, 39% presented minor electrocardiographic changes, and the rest showed chronic coronary insufficiency. It was inferred that chronic exposure to trichloroethylene could result in alteration of cardiac bioelectric phenomena.

A68-82300
THE PRESSURE-SENSITIVE RADIOTELEMETER.
Peter N. Desanctis and John K. Lattimer (Columbia-Presbyterian Med. Center, Squier Urol. Clin. and Columbia U., Coll. of Physicians and Surgeons, Dept. of Urol., New York, N. Y.).
Journal of Urology, vol. 100, Oct. 1968, p. 456–458.
Grants NIH AM 05225-03 and NIH TI AM 5451-02.

The feasibility and reliability of a new and smaller radiotelemeter for measuring intravesical pressure were determined in 11 female patients. The instrument was easy to calibrate and to use. Virtually no discomfort in its introduction or use has been found. Retrieval was not a problem as the patients eventually voided the capsule without pain. Correlation of the suprapubic and transurethral catheter technique in monitoring intravesical pressure was excellent. In 144 comparison measurements, the two results agreed within three mm. per Hg at all times. In comparing the radiotelemetered pressure to either the transurethral or suprapubic catheter measurement, agreement was found to be generally excellent at pressures less than 60 mm. per Hg. A signal strength meter is a necessary adjunct to this testing method since it identifies all erroneous signal data. The radiotelemeter permits measurements in all positions such as bending or squatting and allows unrestricted activity of the patient. We feel that the radiotelemeter has verified the accuracy of both the transurethal and suprapubic technique of measuring intravesical pressure.

A68-82301
DRY HEAT OR GASEOUS CHEMICAL RESISTANCE OF *BACILLUS SUBTILLIS* VAR. *NIGER* SPORES INCLUDED WITHIN WATER-SOLUBLE CRYSTALS.
Charles L. Mullican and Robert K. Hoffman (Army, Dept., Fort Detrick, Frederick, Md.).
Applied Microbiology, vol. 16, Aug. 1968, p. 1110–1113. 10 refs.

Inclusion of spores of *Bacillus subtilis* var. *niger* in water soluble crystals increased the resistance of the spores to dry heat to a gaseous mixture of methyl bromide and ethylene oxide. Resistance of spores in glycine crystals to dry heat at 125° C. was increased 5 to 24 times compared to unprotected spores. There appeared to be a positive correlation between the size of the crystal and the degree of resistance. The resistance to dry heat of spores included in sodium chloride crystals was about six times greater than unprotected spores. A gaseous mixture of methyl bromide (964 mg./l.) and ethylene oxide (642 mg./l.) at 37% relative humidity was ineffective in sterilizing spores enclosed within these water-soluble crystals, as was ethylene oxide alone. However, if the relative humidity was sufficiently high to dissolve the crystals during exposure to the vapor, viable-spore counts were drastically reduced or were negative. The surfaces of crystals grossly contaminated with dry spores were sterilized by exposure to gaseous ethylene oxide. Sterilization of heat-labile or moisture-labile materials with a critical requirement for sterility, as in planetary probes or drugs, may be complicated by the presence of spores in naturally occurring water soluble crystals. This phenomenon is similar to the protection afforded spores entrapped in solid plastics.

A68-82302
ISOLATION AND CHARACTERIZATION OF A CELLULOSE-UTILIZING BACTERIUM.
Y. W. Han and V. R. Srinivasan (La. State U., Dept. of Microbiol., Baton Rouge).
Applied Microbiology, vol. 16, Aug. 1968, p. 1140–1145. 11 refs.
La. State U. supported research

A cellulose-decomposing aerobic and mesophilic bacterium was isolated from soils of sugar cane fields. The terminal dilution method was adapted to isolate a single clone of cellulolytic organism from closely related contaminants. The cultural and physiological characteristics of the isolate were studied, and the organism was identified as a member of the genus *Cellulomonas*. The isolate excreted cellulase into the menstruum, and it hydrolyzed various cellulosic materials producing cellobiose as the final breakdown product in the menstruum. When sugar cane bagasse was properly treated with alkali and heat, the organism could decompose up to 90% the initial substrate within five days. Amino acid analysis of the cell crop revealed a high content of lysine, and the essential amino acid pattern compared favorably with that of Food and Agricultural Organization reference protein.

A68-82303
FACILITATION AND ADAPTATION OF THE HUMAN QUADRICEPS STRETCH REFLEX PRODUCED BY AUDITORY STIMULATION.
Christopher M. Davis and Randal D. Beaton (Calif. State Coll., Long Beach).
Journal of Comparative and Physiological Psychology, vol. 65, Oct. 1968, p. 483–487. 10 refs.
Long Beach Calif. State Coll. Found. supported research.

Two experiments were conducted on the human quadriceps stretch reflex. Experiment one showed differential facilitatory effects of two tone intensities on the amplitude of the knee jerk. The more intense tone produced the greatest facilitation when compared to the nonfacilitated response. Adaptation of these facilitatory effects was visible during 20 presentations. Experiment two indicated that the facilitation of the reflex by an intense tone adapts for at least 50 presentations.

A68-82304
MORPHOLOGICAL STATISTICAL ANALYSIS OF 5000 ELECTROENCEPHALOGRAPHIC RECORDINGS OF HEALTHY SUBJECTS AGED 18 TO 21 [ANALIZA MORFOLOGICZNO-STATYSTYCZNA 5000 ZAPISOW EEG KLINICZNIE ZDROWYCH OSOBNIKOW W WIEKU 18–21 LAT].
Jan Miszczak.
Lekarz Wojskowy, vol. 44, no. 1, 1968, p. 7–11. In Polish.

The studies were conducted on pilots and student pilots of the Polish Air Forces. The electroencephalograms (EEG) of 5,000 subjects (age 18–21 yr.) were recorded. The purpose of the investigation was to determine (in percent) the number of abnormal EEG recordings in healthy subjects and to establish the dominant waveform components of the fundamental function. The results obtained were presented.

A68-82305
EFFECT ON THE ORGANISM OF PROLONGED EXPOSURE TO OXYGEN AT HIGH PARTIAL PRESSURE [WPLYW DLUGOTRWALEGO ODDYCHANIA TLENEM O ZWIEKSZONYM CISNIENIU CZASTECZKOWYM NA USTROJ].
Bolesław Bembnowski.
Lekarz Wojskowy, vol. 44, no. 1, 1968, p. 27–32. 18 refs. In Polish.

A review was presented of the findings of research carried out on the effect of exposure to oxygen at high partial pressure on the respiratory, circulatory and nervous systems. The literature surveyed was mainly foreign.

A68-82306
CHRONAXIMETRY OF THE COLOR PHOSPHENE STIMULATION. 1. [CHRONAXIMETRIE BAREVNEHO FOSFENU. 1].
J. Vlk.
Ceskoslovenská Oftalmologie, vol. 24, Jan. 1968, p. 29–32. 28 refs. In Czech.

Stimulation of the optic nerve with electric current calls forth, with lower current intensities, colorless, fleeting phosphene, with higher intensities, tonic, colored phosphene, both being characteristic for the electric excitability of the visual apparatus. The phosphenes are described and the problems are discussed of estimation of the site of the first excitation in the origin of phosphene.

A68-82307
CHRONAXIE OF THE COLOR PHOSPHENE-PHYSIOLOGICAL VALUES. 2. [CHRONAXIE BAREVNEHO FOSFENU. 2].
J. Vlk.
Ceskoslovenská Oftalmologie, vol. 24, Jan. 1968, p. 33–36. 8 refs. In Czech.

The elicitability, shape and color of electric color phosphene were ascertained in 120 healthy subjects and its chronaxie was measured by the method of direct comparison with the use of a generator of a right-angle impulse. The phosphene could be elicited in all subjects, it was bilateral, of the same color and shape. Its chronaxie was ascertained in the range of 0.8-7.2 msec., on the average 3.95 msec. The maximum difference in chronaxie of the right and left eye was 1.2 msec. From these measurements values of the normal electric excitability of the eye, measured by the color phosphene, were ascertained.

A68-82308
EFFECT OF AMINAZIN ON THE BLOOD FLOW OF THE CARDIAC MUSCLE [PRO VPLYV AMINAZYNU NA KROVOSTRUMIN' U SERTSEVOMU M'IAZI].
A. V. Gurkovs'ka (UkrSSR, O. O. Bohomolits Inst. of Physiol., Kiev).
Fiziolohichnyi Zhurnal, vol. 14, Jan.–Feb. 1968, p. 44–50. 29 refs. In Ukrainian.

The effect of aminazin (chlorpromazine) was studied in cats. The administration of the drug to the animals was accompanied by a vasodilation manifested in various vascular regions. An increase in blood flow was observed in the myocardium of the left ventricle with a decrease in the systemic arterial pressure. The vasodilating effect could not always be detected due to the decrease in arterial pressure. The diminution of blood flow in the cardiac muscle subsequent to the sharp drop in the arterial pressure was evidenced mainly by changes occuring in the T wave of the electrocardiogram. With decrease in blood flow of the cardiac muscle a pronounced increase of the T wave was observed, particularly in the thoracic unipolar lead (V_{1-4}), as well as in the standard ones (II). Sometimes simultaneously with an increase of the T wave there was a decrease in the R wave.

A68-82309
THE IMPORTANCE OF THE THYROID GLAND IN THE ADAPTATION TO HIGH MOUNTAIN ALTITUDES OF RATS [PRO ZNACHENNIA SHCHYTOVYDNOI ZALOZY V ADAPTATSII SHCHURIV DO VYSOKOHIR'IA].
V. P. Dudarev and I. F. Sokolians'kyi (UkrSSR, Acad. of Sci., O. O. Bohomolits Inst. of Physiol., Kiev).
Fiziolohichnyi Zhurnal, vol. 14, Jan.–Feb. 1968, p. 64–71. 33 refs. In Ukrainian.

The importance of the thyroid gland during adaptation to high altitudes was studied in rats. It was shown that at high altitude the increase in erythrocytes and hemoglobin in thyroidectomized rats differed little from that of the intact animals, and the decrease in oxygen consumption was less pronounced then at ground level; therefore it was inferred that thyroidectomized rats did not lose the ability to active adaptation to hypoxia. After adaptation to hypoxia thyroidectomized rats showed a higher resistance to excess stress. There were no marked differences in the amount of oxygen tension decrease in brain tissues of both thyroidectomized and intact animals.

A68-82310
EFFECT OF DIFFERENT TEMPERATURES, WORK LOADS AND OXYGEN CONCENTRATIONS IN THE INHALED AIR ON THE THERMOREGULATORY FUNCTIONS OF MAN [KOMPLEKSNA DIIA RIZNOI TEMPERATURY SEREDOVYSHCHA, FIZYCHNOHO NAVANTAZHENNIA I KONTSENTRATSII KYSNIU U VDYKHUVANOMU POVITRI NA TERMOREHULIATSIINI FUNKTSII LIUDYNY].
O. O. Navakatikian, V. V. Lebedeva, I. M. Blahoveshchens'ka, and S. O. Pevnyi (Donets Inst. of Labor Hyg. and Occupational Diseases, UkrSSR).
Fiziolohichnyi Zhurnal, vol. 14, Jan.–Feb. 1968, p. 73–80. 10 refs. In Ukrainian.

To study the combined effect of temperature, work load and various oxygen concentrations in the inhaled air on thermoregulation, experiments were carried out on students and mountain rescue teams previously adapted to high altitude environments. The body and the skin temperature (chest and forehead), as well as the rate of perspiration were determined before, during and after the experiments. The results obtained attested of the concurrent effect of the studied factors. Exposure to oxygen at room temperature, caused an increase in the skin temperature, while at high temperature a decrease occurred. During work the skin temperature increased less at room temperature than in high temperature. Exposure to 50–100% oxygen concentration

caused a smaller rate of perspiration production during work at a low temperature than at a high one. A high oxygen concentration during the performance of heavy physical work in high environmental temperature was recommended; for men working with respirators provisions for regulating the oxygen concentration in the breathing gas mixture should be made.

A68-82311
EFFECT OF MOTION SICKNESS ON GASTROINTESTINAL BIOELECTRIC POTENTIALS IN DOGS BEFORE AND AFTER LABYRINTHECTOMY [VPLYV ZAKACHUVANNIA NA POTENTSIAL SHLUNKA SOBAK DO I PISLIA DELABIRYNTATSII].
M. P. Kozhukhar.
Fiziolohichnyi Zhurnal, vol. 14, Jan.–Feb. 1968, p. 109–113. 12 refs. In Ukrainian.

The purpose of this investigation was to study the changes occurring in gastrointestinal bioelectric potentials during motion sickness and to determine to what extent the vestibular apparatus contributed to their appearance. The experiments were carried out with intact and labyrinthetomized dogs. The results showed that motion sickness was accompanied by an increase of bioelectric potentials which attested to an inhibition of gastric glands secretion, and that the inhibition started two-three min. after the beginning of the rotary motion. The variations in the gastrointestinal potentials during motion sickness were evoked by stimulation of the vestibular system.

A68-82312
RELATIONSHIP BETWEEN STRUCTURE AND PHARMACOLOGICAL ACTION IN THE SERIES OF SOME PYRIMIDINE DERIVATIVES OF HYDRAZINE [ZAVISIMOST' MEZHDU STROENIEM I FARMAKOLOGICHESKIM DEISTVIEM V RIADU NEKOTORYKH PIRIMIDINOVYKH PROIZVODNYKH GIDRAZINA].
F. P. Trinus, V. A. Portniagina, T. K. Riabukha, and V. K. Karn (Kiev Sci.-Res. Inst. of Pharmacol. and Toxicol., UkrSSR).
Farmakologiia i Toksikologiia, vol. 31, Jan.–Feb. 1968, p. 37–41. 9 refs. In Russian.

Toxicity, mitochondrial monoaminoxidase inhibition and the action of pyrimidine derivatives upon the cardiovascular system were studied. A relationship between chemical structure of the cited substances and their pharmacological action was established. Thus, tri- and dihydrazine derivatives of pyrimidine elicited hypotension and exercised a greater inhibitory effect on the monoaminoxidase. On the other hand, monohydrizines produced hypertension and were less inhibitory in regard to monoaminoxidase in laboratory animals.

A68-82313
REACTION TO ETHER ANESTHESIA OF ANIMALS IRRADIATED WITH PRELIMINARY USE OF SOME RADIOPROTECTIVE AGENTS [REAKTSIIA ZHIVOTNYKH, OBLUCHENNYKH S PRIMENENIEM NEKOTORYKH RADIOZASHCHITNYKH SREDSTV, NA EFIRNYI NARKOZ].
A. V. Lazovskaia and A. V. Bogatyrev (USSR, Min. of Health, Central Sci.-Res. Roentgenol.-Radiol. Inst., Leningrad).
Farmakologiia i Toksikologiia, vol. 31, Jan.–Feb. 1968, p. 95–97. In Russian.

At the height of irradiation sickness cats and mice demonstrated increased sensitivity to ether. S,β-aminoethylisothiuronium in a great measure prevented this effect both in cats and mice. 5-methoxytryptamine failed to exert such an action.

A68-82314
THE RANGE OF RADIOPROTECTIVE MEXAMINE DOSES [O DIAPAZONE RADIOZASHCHITNYKH DOZ MEKSAMINA].
R. B. Strelkov (USSR, Acad. of Med. Sci., Inst. of Exptl. Pathol. and Therapy, Lab. of Radiol., Sukhumi).
Farmakologiia i Toksikologiia, vol. 31, Jan.–Feb. 1968, p. 98–100. 10 refs. In Russian.

Mexamine (5-methoxytryptamine) has a broad spectrum of antiradiation protective action. Doses of mexamine given at present may be appreciably reduced without any reduction to the anti-radiation effect. When investigating the action of various mexamine doses, a correlation between the ability of the compound to elicit reduction of the oxygen tension in the tissues of protected mice and its antiradiation activity was noted.

A68-82315
INFLUENCE EXERTED BY SOME NEUROPLEGIC, GANGLIOLYTIC AND ADRENOLYTIC AGENTS ON THE RESISTANCE OF ANIMALS TO ACUTE HYPOXIA [VLIIANIE NEKOTORYKH NEIROPLEGICHESKIKH, GANGLIOLITICHESKIKH I ADRENOLITICHESKIKH SREDSTV NA USTOICHIVOST' ZHIOTNYKH K OSTROI GIPOKSII].
P. I. Lukienko (Grodno Med. Inst., Dept. of Pharmacol., USSR).
Farmakologiia i Toksikologiia, vol. 31, Jan.–Feb. 1968, p. 100–103. 10 refs. In Russian.

Tests conducted on mice ascertained that the substances under study, except for pachycarpine, dihydroergotoxin and dihydroergotamine, tended to appreciably raise the resistance of the organism to hypoxia produced through reducing the ambient atmosphere. In so far as their activity was concerned they could be placed in the following order: reserpine > hydralizine > chlorpromazine > ethyzine > metamamizyl > diaphene > denactyzine > benzhexamethonium > diparcol > adiphenine > gangleron > aprophen. In a close space antihypoxic activity continued in hydralizine and chlorpromazine and was lost in reserpine and metamizyl.

A68-82316
THE ACTION OF CYSTAMINE AND OF SOME OF ITS DERIVATIVES ON THE ANIMALS IN ACUTE HYPOXIA AND OVERLOADS [VLIIANIE TSISTAMINA I NEKOTORYKH EGO PROIZVODNYKH NA ZHIVOTNYKH V USLOVIIAKH OSTROI GIPOKSII I NEREGRUZOK].
V. I. Generalov (S. M. Kirov Mil.-Med. Acad., Dept. of Pharmacol., Leningrad, USSR).
Farmakologiia i Toksikologiia, vol. 31, Jan.–Feb. 1968, p. 103–107. 12 refs. In Russian.

Under study was the effect of cystamine, tetramethylcystamine and difurfurylcystamine on the resistance of rats and mice to hypoxia as well as on the consumption of oxygen by the animals and oxygen tension in the brain. It was shown that cystamine, tetramethylcystamine and, to a lesser extent, difurfurylcystamine tend to increase the life span of animals in a rarefied atmosphere, and to augment their survival in lethal overloads. These preparations somewhat reduced consumption of oxygen and also decreased the oxygen level in the brain of rats.

A68-82317
THE EFFECT OF GUTIMINE ON THE THERMORESISTANCE OF MICE [VLIIANIE GUTIMINA NA TERMOUSTOICHIVOST' MYSHEI].
I. P. Shcherbachev (S. M. Kirov Mil.-Med. Acad., Leningrad, USSR).
Farmakologiia i Toksikologiia, vol. 31, Jan.–Feb. 1968, p. 107–110. 5 refs. In Russian.

In experiments on mice gutimine (guanilthiourea) was found to exert a considerable hypothermic action on the organism; the

body temperature of animals declining on the average by 3.5°. The degree of the rectal temperature drop and duration of hypothermic effect were directly proportional to the dosage of the preparation. Gutimine reduced the animals' tolerance of low temperatures without noticeably influencing their resistance to elevated ambient temperatures (40°), but tended to appreciable raise this resistance to high temperatures of the air (50 and 75°).

A68-82318
EXPERIMENTAL GENETIC RESEARCH ON LYSOGENIC BACTERIA DURING FLIGHT OF THE ARTIFICIAL EARTH SATELLITE COSMOS-110 [EKSPERIMENTAL'NO-GENETICHESKIE ISSLEDOVANIIA NA LIZOGENNYKH BAKTERIIAKH PRI POLETE ISZ "KOSMOS-110"].
N. N. Zhukov-Verezhnikov, M. N. Volkov, I. N. Maiskii, M. A. Gubernev, N. I. Rybakov, V. V. Antipov, V. A. Kozlov, P. P. Saksonov, G. P. Parfenov, A. V. Kolobov, K. D. Rybakova, and E. D. Aniskin.
Kosmicheskie Issledovaniia, vol. 6, Jan.–Feb. 1968, p. 144–149. 6 refs. In Russian.

The effects of induced phage formation in lysogenic bacteria as well as the possibilities of protecting the genetic system of bacterial cells from radiation injuries under space flight conditions were studied. The nature of cell induced bacteriophage formation (latent period, amount of phage particles formation for each bacterium) after recovery of the lysogenic cultures from space, the induction capacity of these bacteria using x-rays, ultraviolet and mitomycin C were investigated. The experiments carried out on lysogenic bacteria *Escherichia coli* K-12 (gamma) on board the satellite Cosmos 110, showed as in previous experiments (Vostok-4, –5 and –6) a moderate reduction of bacteriophage activity with increase of the space flight duration. This was apparently related to changes occurring in the induction properties of lysogenic bacteria and decrease of the amount of phage particles production by one bacterial cell. Studies on the duration of the latent period and the nature of phage components formation revealed no significant differences between experimental and control samples. Results of research on the radioprotective properties of various chemical compounds during the flight of the satellite Cosmos 110 proved the high antimutagenic effectiveness of aminothiol compounds group.

A68-82319
STIMULATION OF THE GROWTH OF THE ONION *ALLIUM CEPA* SUBSEQUENT TO THE EXPOSURE OF THE BULBS TO SPACE FLIGHT ON BOARD THE SATELLITE COSMOS-110 [STIMULIATSIIA ROSTA U LUKA *ALLIUM CEPA* POSLE PREBYVANIIA LUKOVITS V KOSMICHESKOM POLETE NA KORABLE-SPUTNIKE "KOSMOS-110"].
N. L. Delone, E. M. Morozova, V. V. Antipov, G. P. Parfenov, and A. S. Trusova.
Kosmicheskie Issledovanniia, vol. 5, Nov.–Dec. 1967, p. 939–943. 11 refs. In Russian.

As a result of exposure of the bulbs of *Allium cepa* to space flight on board Cosmos-110 a growth stimulation was observed in the plants during the ten days of the germination period. No differences were found in cell sizes in various parts of the roots, in the experimental and control plants. Chromosome rearrangements and the mitotic index were computed. An increase in the number of chromosome rearrangements were noted in experimental plants in comparison with the controls.

A68-82320
THE SIDE EFFECTS OF MODERN DRUGS WITH PARTICULAR REFERENCE TO THE EYE.
L. J. Fish.
Ophthalmic Optician, vol. 8, Jul. 20, 1968, p. 807–810; 817.

Important ocular adverse effects of drugs which are main offenders are listed and discussed. Drugs included in the discussion are the following: (1) corticosteroids; (2) anti-malarials; (3) oral contraceptives; and (4) phenothiazines. Symptoms of each of these drug categories are also listed and discussed. It is suggested that all patients at risk should have regular examinations to facilitate the chance of detecting the toxicity before it progresses to irreversible pathology.

A68-82321
LIGHT MICROSCOPIC OBSERVATIONS OF THE INNER EAR IN MAN AND MONKEY.
Joseph E. Hawkins, Jr. and Lars-Goran Johnsson (Mich., U., Med. School, Dept. of Otorhinolaryngol., Ann Arbor).
Annals of Otology Rhinology and Laryngology, vol. 77, Aug. 1968, p. 608–628. 25 refs.
Am. Otol. Soc., Inc., Centennial Celebration, Hollywood, Fla., Apr. 18–20, 1968.
Grants PHS NB 05065 and PHS NB 05785; Am. Otol. Soc., Inc. supported research.

Since so many problems of development, cytoarchitecture innervation and blood supply of the inner ear are still unresolved, it is not easy to agree with a previous investigator that the light microscopic features of the inner ear are now completely known. Despite its limited resolving power of about 0.25μ, the light microscope still has some use. In studying inner ear pathology it is possible to take advantage of the full range of magnifications offered by the microscope, by means of the techniques of microdissection and surface preparation. By applying these methods to temporal bones collected at autopsy from patients in whom recent and extensive audiological studies have been made, it will be possible to establish a firm basis for audiological diagnosis, which now rests on a rather shaky foundation of questionable cochlear pathology.

A68-82322
MECHANISMS OF THE INNER EAR.
Hallowell Davis.
Annals of Otology Rhinology and Laryngology, vol. 77, Aug. 1968, p. 644–655. 18 refs.
Am. Otol. Soc., Inc., Centennial Celebration, Hollywood, Fla., Apr. 18–20, 1968.
Grant PHS NB-03856.

Some of the fundamental bioacoustic and electrophysiological mechanisms of the inner ear were reviewed. A system of nomenclature based exclusively on anatomy was advocated. Mechanisms of the inner ear which were discussed included: (1) frequency analysis in the cochlea. (the place principle); (2) frequency transmission in the auditory nerve, (the volley principle); (3) the movements of the cochlear partition; (4) hair cells and the tectorial membrane; (5) the mechano-electrical theory of cochlear excitation; and (6) the nature and significance of the unique electrical and chemical features of the endolymph.

A68-82323
THE INNERVATION OF THE VESTIBULAR LABYRINTH.
Richard R. Gacek (Harvard Med. School and Mass. Eye and Ear Infirmary, Boston, Mass.).
Annals of Otology Rhinology and Laryngology, vol. 77, Aug. 1968, p. 676–685. 5 refs.
Am. Otol. Soc., Inc., Centennial Celebration, Hollywood, Fla., Apr. 18–20, 1968.
Grant NIH NB 05623-01.

The anatomical features of the efferent and afferent neural supply of the vestibular labyrinth was summarized. An anatomical map was presented through the use of diagrams and histochemical methods.

A68-82324
ASSESSMENT OF THE NEWER TESTS OF AUDITORY FUNCTION.
D. Thane R. Cody, Terry Griffing, and William F. Taylor (Mayo Clin. and Mayo Found., Rochester, Minn.).
Annals of Otology Rhinology and Laryngology, vol. 77, Aug. 1968, p. 686–705. 20 refs.
Am. Otol. Soc., Inc., Centennial Celebration, Hollywood, Fla. Apr. 18–20, 1968.
Grant NIH NB-6306.

Audiometric tests interpreted in the light of the results of a thorough examination of the patient can be of immense value in the diagnosis of lesions of the audiovestibular system. The newest of these tests, cortical audiometry, is an objective and accurate means of determining air-conduction and bone-conduction thresholds of hearing. Narrow band masking has a similar influence on cortical and conventional audiometric thresholds. It seems that cortical audiometry can be used as a rough objective measurement of recruitment. Cortical audiometry has been found of clinical value in testing infants, yound children, mentally retarded individuals, patients with disorders of the central nervous system, patients with functional hearing impairment and an occasional patient with loud tinnitus or fluctuating hearing loss.

A68-82325
EXAMINATION OF THE VESTIBULAR SYSTEM.
Terence Cawthorne.
Annals of Otology Rhinology and Laryngology, vol. 77, Aug. 1968, p. 727–732.
Am. Otol. Soc., Inc., Centennial Celebration, Hollywood, Fla., Apr. 18–20, 1968.

A scheme for neuro-otological examination was presented. Taking of a careful history was followed by a test for balance and gait and eye movement tests. Included in the eye movement tests were measurements of spontaneous nystagmus, positional nystagmus, optokinetic nystagmus, and caloric nystagmus. Electronystagmography made possible the differential diagnosis of peripheral, high and low brain stem lesions, cerebral lesions and cerebellar lesions, all of which exhibit characteristic electronystagmographic patterns. All methods outlined were found to be useful in the neuro-otological examination.

A68-82326
ELECTRONYSTAGMOGRAPHY: ITS USE AND USEFULNESS.
L. B. W. Jongkees (Amsterdam, U., Dept. of Oto-Rhino-Laryngol., The Netherlands).
Annals of Otology Rhinology and Laryngology, vol. 77, Aug. 1968, p. 733–739. 10 refs.
Am. Otol. Soc., Inc., Centennial Celebration, Hollywood, Fla., Apr. 18–20, 1968.

The use and advantages of electronystagmography (ENG) are discussed. Nystagmographic diagnosis of various diseases are analyzed, and it is pointed out that ENG is most helpful in solving problems concerned with disturbed equilibrium of peripheral or central origin in or outside of the vestibular field. Characteristics of various eye movements are correlated with the origin of disturbance, and it is stressed that positional nystagmus can only be discovered by ENG in a great percentage of cases. In basic research on the vestibular apparatus ENG has already and will in the furture greatly aid in scientific progress.

A68-82327
VESTIBULAR MECHANISMS IN HUMAN BEHAVIOR.
Ashton Graybiel (Naval Aerospace Med. Center, Naval Aerospace Med. Inst., Pensacola, Fla.).
Annals of Otology Rhinology and Laryngology, vol. 77, Aug. 1968, p. 772–786. 35 refs.
Am. Otol. Soc., Inc., Centennial Celebration, Hollywood, Fla., Apr. 18–20, 1968.
NASA-supported research.

The vestibular mechanisms in human behavior were discussed. Undoubtedly, the vestibular organs are of great importance even though their potentialities are not fully exploited; for some tasks these organs are essential. If there seems to be a disparity between the great representations of the vestibular organs in the central nervous system and their role in the human economy, this disparity disappears when their potentialities are considered for causing bodily disturbances. A weak but unusual stimulus may cause motion sickness and prostration. Labyrinthitis due to injury, disease, or functional disturbance may cause suffering far out of proportion to comparable injury or inflammation elsewhere. There are great gaps in the knowledge of the vestibular organs, highlighted by the fact that the collective term is often used rather than canals and otoliths which surely furnish different information despite their close relations. Simple, reliable tests of canal and particularly of otholith functions are lacking. The significance of functional test values such as exist in terms of behavioral responses is not known. There is much to learn about neural mechanisms underlying normal and abnormal responses. In short the role of the vestigular organs in man is now well known. There are good reasons why this is so, including the difficulty and cost of conducting research on man. The role of these organs is sufficiently different in animals with regard to behavioral aspects to require caution in making extrapolations to man.

A68-82328
THE SIDE EFFECTS OF MODERN DRUGS WITH PARTICULAR REFERENCE TO THE EYE.
L. J. Fish.
Ophthalmic Optician, vol. 8, Aug. 10, 1968, p. 877–879, 893. 24 refs.

A review of the unwanted effects of potentially dangerous drugs in common use which induce ocular toxicity was presented. The drugs discussed included oral contraceptive, sulphonamides and phenylbutazone, the phenothiazines, monoamine oxidase inhibitors, carbromal, anti-epileptics, antibiotics, antidiabetics, ganglion blocking agents, digitalis, diuretics and anticoagulants. Some of the reported effects of these compounds were mentioned for each one.

A68-82329
CIRCULATORY CHANGES IN DOGS UNDER HYPEROXIA WITHOUT AND UNDER ANESTHESIA [IZMENENIE KROVOOBRASHCHENIIA U SOBAKH PRI GIPEROSKII BEZ NARKOZA I POD NARKOZOM].
N. K. Savel'ev and IU. M. Smirnov (Orenburg Med. Inst., Dept. of Normal Physiol., USSR).
Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 66, Jul. 1968, p. 27–28. 14 refs. In Russian.

A68-82330

In chronic experimental inhalation of 90 to 96% oxygen in non-anesthetized dogs, no changes were produced in the arterial pressure and in the blood flow rate in the carotid. In dogs anesthetized with Nembutal, inhalation of oxygen resulted in all cases in a drop of the arterial pressure and marked decrease of the blood flow rate.

A68-82330
RADIATION PROTECTION ACTION OF ADENOSINE TRIPHOSPHORIC ACID SODIUM SALT IN EXPERIMENTS ON MICE [RADIOZASHCHITNOE DEISTVIE NATRIEVOI SOLI ADENOZINTRIFOSFORNOI KISLOTY V OPYTAKH NA MYSHAKH].
V. D. Rogozkin and E. I. Marinenko.
Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 66, Jul. 1968, p. 64–67. 13 refs. In Russian.

The sodium salt of adenosinetriphosphoric acid was administered intraperitoneally in a dose of 350 mg./kg. to 180 white mongrel male mice 15 to 20 min. prior to irradiation with 650 r (LD 80–85/30) and to 236 mice intramuscularly in doses of 500, 350, 200 mg./kg. Survival of protected mice after intraperitoneal administration rose by 41%, after intramuscular administration by 57, 28, 6.2% as compared to the control group. Peripheral blood was tested on the 1, 3, 7, 10, 15, 20, 25 and 30th day after irradiation of 40 mice with prophylactic administration of ATP in a dose of 350 g./kg. intraperitoneally; 40 irradiated mice served as control. Results show that after ATP there is less depression of hemopoiesis and it reverts to the normal earlier.

A68-82331
IMMUNOHISTOCHEMICAL INVESTIGATION OF THE ANTITOXIC IMMUNITY IN MICE UNDER HYPOXIA [IMMUNOGISTOKHIMICHESKOE ISSLEDOVANIE ANTITOKSICHESKOGO IMMUNITETA U MYSHEI PRI GIPOKSII].
A. S. Kaplanskii, G. N. Durnova, and G. M. Kopylova (USSR, Min. of Health, Inst. of Med.-Biol. Problem, Moscow).
Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 66, Jul. 1968, p. 90–92. In Russian.

The development of antitoxic immunity in mice immunized with tetanus antitoxin, kept for 30 days in a barochamber under pressure of 378 mm. Hg. was studied. Antitoxin level in the blood of the experimental animals and their resistance to the tetanus toxin remain at the normal level despite hypoplasia of lymph nodes and decrease of plasmatic cells in them. It is suggested that the conservation of the normal level of antibodies in the blood along with decrease in the number of the antibody producing cells takes palce at the expense of the increased synthesis of antibodies in each individual cell.

A68-82332
EFFECT OF LOBELINE, CORAZOLE AND NOSAMIDE ON SOME ASPECTS OF CARBOHYDRATE AND NITROGEN METABOLISM IN THE DOG BRAIN [VPLYV LOBELINU, KORAZOLU TA NASAMIDU NA DEIAKI STORONY VUHLEVODNOHO TA AZOTYSTOHO OBMINU V HOLOVNOMU MOZKU SOBAK].
L. H. Tomilina (UkrSSR, Acad. of Sci., Inst. of Biochem., Kiev).
Ukrains'kyi Biokhimichnyi Zhurnal, vol. 40, no. 3, 1968, p. 265–269. 22 refs. In Ukrainian.

Lobeline, corazole and nosamide (N-acetylsalicylamide) were found to cause an increase in the lactic acid level of the brain stem of dogs. The difference was positively observed in the hemispheres only on the administration of corazole, glycogen content decreased in the brain stem under the effect of lobeline and the glucose content remained unchanged. The content of ammonia glutamine and amide labile groups of proteins were not affected by the investigated substances either in the brain stem or hemispheres.

A68-82333
NITROGEN METABOLISM OF THE GOPHER BRAIN AT HYPOTHERMIA AND COMBINED ACTION OF HYPOTERMIA AND HYPEROXIA [AZOTISTYI METABOLIZM GOLOVNOGO MOZGA SUSLIKOV PRI GIPOTERMII I SOVMESTNOM DEISTVII GIPOTERMII I GIPEROKSII].
Z. S. Gershenovich and E. Z. Emirbekov (Daghestan State U., Dept. of Biochem., Makhach-Kala and Rostov-on-Don State U., Dept. of Biochem., USSR).
Ukrains'kyi Biokhimichnyi Zhurnal, vol. 40, no. 3, 1968, p. 270–273. 10 refs. In Russian.

Gophers (*Cittellus pigmaticus*) weighing 200 to 250 g. were cooled in cold blankets to a rectal temperature of 30, 20 to 19 and 11 to 10 C. Vigil normothermal gophers were used as control. It was found that cooling the body to 30° C. causes a 7.1-fold increase of the ammonium content in gopher brain hemispheres as compared with the control. At cooling to 20 to 19° C. the ammonia content decreases by 12.3 p. c. in comparison with the previous stage of cooling. In a state of cold narcosis which starts in animals with cooling to 11 to 10° C. the ammonia content is less by 26.3 p. c. than in the animals cooled to 20 to 19° C. The regularity of changes in the ammonia content in the gopher cerebellum at hypothermy differs from the regularity of its change in the hemispheres. Thirty min. action of hyperoxia on gophers cooled to 20 to 19° C. does not change nitrogen metabolism of the brain.

A68-82334
FOUR-METHYL URACIL EFFECT ON CARBOHYDRATE METABOLISM IN MUSCULAR ACTIVITY [VLIIANIE 4-METILURATSILA NA OBMEN UGLEVODOV PRI MYSHECHNOI DEIATEL'NOSTI].
N. I. Oreshchenko (P. F. Lesgaft Inst. of Phys. Cult., Leningrad, USSR).
Ukrains'kyi Biokhimichnyi Zhurnal, vol. 40, no. 3, 1968, p. 307–312. 11 refs. In Russian.

With introduction of 4-methyl uracil to adult albino rats (50 mg./1 kg. a day per os for 20 days) body weight increases (without an increase of the specific weight) and the glycogen content in the liver sharply grows. 4-methyl uracil has no effect on the glycogen content in skeletal muscles and myocardium and on sugar and lactic acid amount in blood. The intensity of muscle and myocardium glycogen consumption of animals that received 4-methyl uracil is the same as in control ones, but the intensity of liver glycogen consumption is higher. Besides, it is established that 4-methyl uracil favors the use of food carbohydrates for resynthesis of glycogen in the muscles, myocardium and liver at rest after work. The results of the experiments permit stating that 4-methyl uracil intensifies glycogen synthesis in the liver but does not limit its consumption.

A68-82335
NEUROPHYSIOLOGY OF POSTURAL MECHANISMS.
Tristan D. M. Roberts (Glasgow, U., Great Britain).
New York, Plenum Press, 1967, xvii+354 p. Many refs.

In this book a description is presented of the mechanisms involved in the regulation of posture. These mechanisms of necessity include many of the fundamental ideas of neurophysiology, including the following: (1) basic neurophysiology concepts and terminology; (2) mechanical properties of skeletal muscles; (3) electrical activity of nerve and muscle; (4) how nerve impulses convey information; (5) simple deformation receptors; (6) the mammalian muscle

spindle; (7) the stretch reflex and the muscle servo; (8) general problems of standing and locomotion; (9) the sense organs of the labyrinth; (10) reflexes of balance; and (11) central co-ordinating mechanisms. An appendix, a bibliography, and a combined subject and author index are included.

A68-82336
FURTHER OBSERVATIONS OF PSYCHOLOGICAL FACTORS INVOLVED IN CNV GENESIS.

Morton D. Low and Joseph W. McSherry (Baylor U., Coll. of Med., Dept. of Physiol., Sect. of Neurophysiol. and Methodist Hosp., Houston, Tex.).

Electroencephalography and Clinical Neurophysiology, vol. 25, Sep. 1968, p. 203–207. 14 refs.
NASA Grant NSG 390 and Grant PHS MH 05204.

Experiments were done in man in an attempt to define more extensively the psychological factors involved in contingent or conative negative variation (CNV) genesis. Conditioning, recording, and averaging techniques were similar to those previously described. Two experimental designs were used. In the first, S_1 was a picture of a number, S_2 was a tone pip following S_1 by one sec., and R was depression of a plunger so constructed that the force required to depress it increased linearly with displacement from rest. S_1 indicated the level to which the subject must depress the plunger. In the second experiment, separate anticipations were created by presenting subjects with two different $S_1 \rightarrow S_2$–R paradigms; then the two were presented superimposed in time. It was demonstrated that: (1) CNVs are additive if two anticipations are superimposed in time or if a subject is expecting to perform more than one response of the same kind; (2) increasing the force required to perform a response is associated with an increase in the magnitude of the CNV; and (3) the interposition of a metal task between S_1 and R diminishes the degree of expected increase in CNV magnitude associated with increased force requirments of R.

A68-82337
A HIGH FREQUENCY MECHANISM WHICH UNDERLIES VISUAL EVOKED POTENTIALS.

D. Regan (Keele, U., Dept. of Commun., Staffs, Great Britain).

Electroencephalography and Clinical Neurophysiology, vol. 25, Sep. 1968. p. 231–237. 11 refs.
Med. Res. Council supported research.

Dynamic steady-state scalp potentials were evoked in man by sinusoidally modulated light. An averaging computer was used to obtain average response waves; the amplitude and phase of individual harmonic components of the waves were measured with a cross-correlator. Evidence was found for a high frequency system which could be distinguished from a lower frequency system. The peak amplitude of the high frequency responses occurred at around 45 to 55 c.p.s., and their apparent latency was about 77 msec. (61 msec. after correction for phase shifts). The lower frequency responses had an apparent latency of about 120 msec. (about 100 msec. after correction for phase shifts) and could occur simultaneously with the high frequency responses. The amplitude of the high frequency responses was less dependent on stimulus intensity than that of the lower frequency responses, but was more dependent on field size. Evidence was found that the generators of the two types of response had different spatial distributions or orientations in the brain. The high frequency responses were generally in accord with Spekreijse's theoretical short latency system. The amplitude of the high frequency evoked responses increased as stimulus frequency was increased near and beyond the point of fusion of perceived flicker; some possible implications of this are discussed.

A68-82338
QUALITATIVE ALTERATION IN RADIATION INJURY UNDER HYPOXIC CONDITIONS.

Theodore L. Phillips (Calif., U., San Francisco Med. Center, Dept. of Radiol. and Lab. of Radiobiol., San Francisco).

Radiology, vol. 91, Sep. 1968, p. 529–536.
North Am., Radiol. Soc., 53rd Sci. Assembly and Ann. Meeting, Chicago, Nov. 26–Dec. 1, 1967.
AEC supported research.

Mouse bone marrow and spleen colony-forming cells (CFU's) were used to test for a qualitative change in the type of injury occurring to cells irradiated under hypoxic conditions. With cobalt-60 radiations, dose-response curves obtained *in vivo* with endogenous spleen CFU's indicate an oxygen enhancement ratio of 2.6. A fall in the extrapolation number suggests that there would be decreased recovery with hypoxic cells. Split-dose recovery measurements reveal an increase in the survival ratio to a maximum of 2.8 with cells irradiated in animals breathing air, but the increase occurs at only one point and only to a level of 1.25 in animals irradiated while breathing five per cent oxygen. To determine the exact nature of such dose-response curves, the effects of hypoxic irradiation on transplanted bone marrow CFU's were measured. Dose-response curves obtained *in vivo* with 300 kVp x-rays show an oxygen enhancement ratio of 2.3. The extrapolation number fell from 2 to 1.4 with hypoxia, and split-dose experiments with similar transplanted bone marrow CFU's indicate little or no early repair in hypoxic CFU's. Dose-response curves determined 27 hr. after the initial conditioning dose of radiation revealed that protection of cells by hypoxia continues during this time. Dose-response curves indicate that the degree of hypoxia obtained *in vivo* is similar to that *in vitro* and that the change in the extrapolation number can be duplicated *in vitro*. This group of experiments indicates that severe hypoxia can be obtained *in vivo* and that radiation injury incurred under this condition is less reparable. These results suggest that one of the factors contributing to the success of fractionated radiotherapy may be the advantage obtained with multiple fractions in the killing of hypoxid cells as compared to the killing of normal oxygenated cells. Such alterations in recovery caused by qualitative differences in the type of radiation injury would be augmented by metabolic suppression of recovery by hypoxia present between exposures.

A68-82339
AN ANALYSIS OF RAPID EYE MOVEMENTS OF SLEEP IN THE MONKEY.

Albert F. Fuchs and Samuel Ron (Johns Hopkins U., Depts. of Med. and Biomed. Eng., Baltimore, Md.).

Electroencephalography and Clinical Neurophysiology, vol. 25, Sep. 1968, p. 244–251. 17 refs.
Grants PHS AM-05524 and PHS 5-T1-GM-576; Johns Hopkins U. and Natl. Council to Combat Blindness, Inc. supported research.

Eye movements and the parietal electroencephalogram were measured in two *Macaca mulatta* monkeys during natural sleep. Most of the eye movements during the rapid eye movement (REM) period occurred at velocities less than 50 deg./sec. which corresponds to the velocity range of smooth pursuit movements in the awake monkey. Saccades or rapid fixation changes also occur during REM sleep but take up only 0.5% of the total episode time. In addition, the eye often turns at velocities intermediate to the normal saccadic and smooth pursuit velocities, exhibiting a type of movement which is not observed in the awake animal. During one-third of the REM episode the eye undergoes loop-shaped trajectories composed of movements of different velocities and there is a constancy of the velocity histograms among REM episodes. Neither of these phenomena were observed in the awake monkey suggesting that the interpretation that all eye movements during REM sleep are related to dream content should be made with caution.

A68-82340
DAILY CIRCADIAN RHYTHM IN RATS TO D-AMPHETAMINE SULPHATE: EFFECT OF BLINDING AND CONTINUOUS ILLUMINATION ON THE RHYTHM.
Lawrence E. Scheving (La. State U., Dept. of Anat., New Orleans), Donald F. Vedral (Cincinnati, U., Dept. of Anat., Ohio), and John E. Pauly (Ark., U., Dept. of Anat., Little Rock).
Nature, vol. 219, Aug. 10, 1968, p. 621–622. 18 refs.
PHS supported research.

This report demonstrates the daily pattern in susceptibility to D-amphetamine sulphate as measured by percentage of mortality for normal rats housed in a light-dark (LD) environment, for rats maintained in continuous illumination (LL), and for blinded rats kept in continuous darkness (DD). In animals maintained in LL there was a marked difference in response to a 26 mg./kg. dose of amphetamine when compared with LD and blinded animals. This dosage did not cause the characteristic tremor, or severity of reaction in LD or blinded rats. The injected LL animals (12/time point) were very nervous and showed some piloerection, but generally the characteristic tailbiting and dirty appearance of their coats are absent. No clear susceptibility rhythm could be detected with this dosage. Although there was about a 20% mortality at 1300 hr., such results could not be reproduced consistently in subsequent experiments. In experiments where the dosage was increased, but sampling was done at only one time point, the resistance to amphetamine in LL animals still could be detected. There was increased resistance to amphetamine associated with subjecting animals to constant light. Explanations of these findings are attempted.

A68-82341
RESPONSE OF FREE FATTY ACIDS TO COFFEE AND CAFFEINE.
Samuel Bellet, Alfred Kershbaum, and E. Michael Finck (Philadelphia Gen. Hosp., Div. of Cardiol., Pa.).
Metabolism, vol. 17, Aug. 1968, p. 702–707. 20 refs.
Grant NIH HE-05165; Sugar Res. Found., Inc. and Found. for Cardiovascular Res. supported research.

The effect of coffee, decaffeinated coffee and a control beverage on plasma free fatty acids (FFA) was studied in a group of normal human subjects. The effect of caffeine sodium benzoate was also studied in the dog. Significant elevations in FFA were observed after coffee and caffeine which usually reached their peak in three or four hrs. The administration of sucrose significantly reduced the immediate FFA response. The FFA effects with decaffeinated coffee were markedly less than with regular coffee and were similar to that of the control beverage. These effects are considered to be of importance, particularly in that they may be related to other disturbances in lipid metabolism.

A68-82342
THE EFFECT OF EXERCISE ON THE HEART AND PULMONARY VASCULATURE: A PRELIMINARY REPORT.
Asher Farhi, Henry Burko, Elliott Newman, Eugene C. Klatte, Glenn Carwell, and Thomas Arnold (Vanderbilt U., Hosp., Depts. of Med. and Radiol., Nashville, Tenn.).
Radiology, vol. 91, Sep. 1968, p. 488–492. 7 refs.
North Am., Radiol. Soc., 53rd Sci. Assembly and Ann. Meeting, Chicago, Nov. 26–Dec. 1, 1967.
Grant PHS HE-08195.

Cardiac volumes were determined by chest roentgenographic examinations of normal subjects performing moderate and exhaustive exercise under controlled conditions. Considerable variation in cardiac volumes was found after both moderate and exhaustive exercise. Subjects without elicited history of previous heart disease but with abnormal electrocardiograms tended to have larger cardiac volumes following exercise. A group of patients with striking increase in cardiac volume also demonstrated engorgement of upper lobe pulmonary veins after exhaustive exercise. The adaptive mechanisms of the heart in response to muscular exercise are discussed, and relative failures of adaptation are manifested by increase in cardiac volumes and pulmonary blood volumes. The method of investigation–by radiographic examination—is suggested as an approach to the assessment of myocardial function.

A68-82343
SEAT BELT FRACTURES: A REPORT OF TWO CASES.
T. B. Carroll and F. H. Gruber (S. C. Med. Coll., Dept. of Radiol., Charleston).
Radiology, vol. 91, Sep. 1968, p. 517–518.

Two seat belt fractures of the lumbar spine are illustrated and presented. The fracture is a horizontal splitting of the lamina, pedicles, transverse processes, and posterior aspect of the vertebral body. The spinous process may be included, and the body may be compressed anteriorly. A less extensive fracture of this type, involving only the lamina or spinous process, could easily be overlooked unless considered specifically. With greater use of seat belts we may expect to encounter these fractures more frequently.

A68-82344
UNIFORMITY OF PROTON BEAMS AVAILABLE AT THE NASA SYNCHROCYCLOTRON (SREL).
Gerald F. Hill, William C. Honaker, and K. H. Kim (NASA, Langley Res. Center, Hampton, Va.).
Radiology, vol. 91, Sep. 1968, p. 562–567. 6 refs.
North Am., Radiol. Soc., 53rd Sci. Assembly and Ann. Meeting, Chicago, Nov. 26–Dec. 1, 1967.

The NASA Space Radiation Effects Laboratory (SREL) has the unique ability to produce both small- and large-area beams having energies from 595 MeV-30 MeV. Dose rates are available over a wide energy spectrum to meet the requirements for radiation biology experiments. All of the large-area beams are uniform and repeatable. Several investigators have used the available large-area beams to irradiate mice, rabbits and monkeys.

A68-82345
THE INFLUX OF POTASSIUM INTO *CHLORELLA PYRENOIDOSA*.
J. Barber (East Anglia, U., School of Biol. Sci., Norwich, Great Britain).
Biochimica et Biophysica Acta, vol. 163, Sep. 17, 1968, p. 141–149. 27 refs.

Using radiotracer it has been shown that under steady-state conditions the majority of the intracellular K+ in *Chlorella* exchanges by first-order kinetics. The unidirectional influx of K+, in the absence of net movement, is approximately I pmole K+ per sec.·cm.^{2} in the light but in the dark is reduced to 0.18 pmole K+ per sec.·cm.^{2}. The influx rates, particularly for illuminated cells, were temperature sensitive and seem to be under metabolic control as expected for an active process. The experiments suggest that the light-induced transport mechanism is independent of net carbon fixation and may be utilizing energy derived directly from electron transport processes. An estimate of the passive permeability coefficient for K+ movement into illuminated *Chlorella* cells gave a value of $2.0 \cdot 10^{-8}$ cm.·sec.$^{-1}$.

A68-82346
GROWTH OF MIXED CULTURES ON MIXED SUBSTRATES. 1. CONTINUOUS CULTURE.
S. K. Chian and R. I. Mateles (Mass. Inst. of Technol., Dept. of Nutr. and Food Sci., Cambridge).
Applied Microbiology, vol. 16, Sep. 1968, p. 1337–1342. 16 refs.
NASA Grant NsG-496 and Grant PHS ES 00063.

Continuous culture on mixed glucose-lactose or glucose-butyrate media inoculated with river water lead to a population composed of a pseudomonad and a coliform. The glucose was used preferentially to the other carbon source, and the utilization of the secondary carbon source was greatly reduced at high growth rates. Significant amounts of acetate were excreted even though the cultures were limited by the carbon source, rather than by oxygen or other nutrients. At high growth rates, the pseudomonad dominated the population, wheras at low and moderate growth rates the coliform was dominant. A syntrophic relationship was shown by the fact that the pseudomonad could not grow alone on the glucose-butyrate medium.

A68-82347
ELECTRONICALLY CONTROLLED CONTINUOUS CULTURE DEVICE.
William J. Eisler, Jr. and Robert B. Webb (Argonne Natl. Lab., Div. of Biol. and Med. Res., Ill.).
Applied Microbiology, vol. 16, Sep. 1968, p. 1375–1380. 9 refs.
AEC supported research.

A photocell-controlled continuous culture device, a Nephelostat, is described that maintains a wide variety of cultures of microorganisms in balanced growth. This Nephelostat controls concentrations of bacteria within ± 3% over a cell concentration range of 10^6 to 10^9 cells per ml. Growth rates are recorded so that changes in the growth rate are observed over small increments of time. Spontaneous and caffeine-induced mutation rates of two strains of *Escherichia coli* were compared under Nephelostat and chemostat conditions.

A68-82348
AUTOMATIC SAMPLE COLLECTOR FOR CONTINUOUS CULTURES.
William J. Eisler, Jr. (Argonne Natl. Lab., Div. of Biol. and Med. Res., Ill.).
Applied Microbiology, vol. 16, Sep. 1968, p 1381–1382.
AEC supported research.

An automatic sample collector is described that samples growing cultures sequentially. It can be programmed to collect at preselected intervals (usually several hours apart) for a prescribed period (usually from minutes to hours). Samples are collected serially but during intermediate time periods; when the sample is not required, it is disposed of by diverting it into a discard reservoir. This device collects culture samples on a predetermined schedule and stores them under refrigeration for study at a later time.

A68-82349
ELECTRON PARAMAGNETIC RESONANCE SPECTROSCOPY.
Bernard D. Goldstein, Oscar J. Balchum, Harry B. Demopoulos, and Phillip S. Duke (Southern Calif., U., School of Med., Depts. of Pathol. and Med., Los Angeles).
Archives of Environmental Health, vol. 17, Jul. 1968, p. 46–49. 20 refs.
Grants PHS PH 86-62-162, and PHS AP 00606-01; Gildred Found. and Natl. Center for Air Pollution Control supported research.

The air pollutant ozone is believed to exert its deleterious biological effects by the formation of free radicals. However these free radicals have not been directly measured. It has also been suggested that peroxidation of cell membrane unsaturated fatty acids is an important mechanism in ozone toxicity. Utilizing electron paramagnetic resonance technique, direct ozonization of linoleic acid produced measurable free radicals after a two hr. induction period.

A68-82350
OZONE EXPOSURE AND INTELLIGENCE TESTS.
Terry Hore (Alberta, U., Dept. of Educ. Psychol., Edmonton, Canada) and David E. Gibson (Alberta, Govt., Dept. of Health, Div. of Ind. Health Serv., Edmonton, Canada).
Archives of Environmental Health, vol. 17, Jul. 1968, p. 77–79. 15 refs.

The effect of ozone on water functioning was studied by administering intelligence tests to 99 university students. The subjects were divided into treatment (exposed to 0.2 to 0.3 p.p.m. ozone during the writing of the test), placebo, and control (not exposed to ozone) groups. After statistical adjustment had been made for the effects of the covariants (age, sex, anxiety, and initial intelligence test score) no significant difference was found between the groups. This study indicated that exposure to concentrations of 0.2 to 0.3 p.p.m. ozone over a period of 70 min. had no noticeable effect on mental functioning during the exposure period.

A68-82351
ECOLOGY, PERCEPTUAL DEVELOPMENT AND THE MULLER-LYER ILLUSION.
J. W. Berry (Sydney, U., Dept. of Psychol., Australia).
British Journal of Psychology, vol. 59, Aug. 1968, p. 205–210. 24 refs.
Canada Council and Dept. of Educ. supported research.

Two separate traditions of research into the Müller-Lyer illusion have existed for at least 70 yr.: the ecological and the developmental. To assess the ecological hypothesis, a sufficient range in visual ecology typically has been sought in cross-cultural comparisons; however, many of these comparisons have been inconclusive, especially when other ethnic variables have been held constant. These insignificant findings are considered to result from a confounding of the ecological and developmental variables. Appropriate sampling from Temne and Eskimo population (enabling, in turn, one variable to be matched while the other is varied) demonstrates this confounding within cultures and, when eliminated, the significant influence of each variable on susceptibility to the Müller–Lyer illusion. Further work, however, is needed to discover other factors which will account for variance in susceptibility between cultures.

A68-82352
A STUDY OF TWO FACTORS WHICH AFFECT AROUSAL LEVEL AND THE APPARENT DURATION OF A TEN-MINUTE INTERVAL.
R. C. B. Aitken and J. L. Gedye (Roy. AF, Inst. of Aviation Med., Farnborough, Hants, Great Britain).
British Journal of Psychology, vol. 59, Aug. 1968, p. 253–263. 27 refs.

Interview studies of aircrew suggested that the apparent duration of an interval during flight might be affected both by the demand made on the individual by his allotted task and by the amount of background distraction to which he was exposed. In a laboratory experiment, eight pilots were isolated for four intervals of 10 min. During two of the intervals the pilots were required to perform a simple tracking task, while in the other two they were not required to do anything; on one occasion for each task condition they were exposed to distracting stimulation. The palmar skin resistance was measured every one-half min. during each 10 min. interval; afterwards the subject estimated its duration and indicated how alert he had been during it. The apparent duration was increased by the presence of distraction and decreased by the performance of the task; however, the effects of distraction and performance of the task on alertness and skin conductance were

similar, both being in the direction of an increase in arousal. It was found that arousal changes could not account for more than an insignificant proportion of the observed alterations in apparent duration. It is concluded that an explanation in terms of the way in which attention is organized under the particular conditions of isolation obtaining is both consistent with the findings and may be a fruitful line for future investigation.

A68-82353
LOAD AND PUPILLARY CHANGES IN CONTINUOUS PROCESSING TASKS.

J. L. Bradshaw (Otago, U., Dept. of Psychol., Dunedin, New Zealand). British Journal of Psychology, vol. 59, Aug. 1968, p. 265–271. 11 refs.

The interaction of rate presentation, and number of transforms and possible responses was examined in connection with the effect of cognitive load upon pupillary dilation. The task involved continuous processing of auditorily presented material. The two criteria of task difficulty both contributed to raising pupillary diameters, which were further increased at the moment of button-press responding. That variations in level arousal were involved was further borne out by the tendency for certain regular changes to occur in pupillary dilation in the course of the processing tasks.

A68-82354
HEMOLYSIS AND ERYTHROPOIESIS. 4. EFFECT OF HEMOLYSATES ON THE ERYTHROPOIESIS OF NORMAL, STARVED, AND POLYCYTHEMIC RATS.

Juan Labardini, L. Sánchez-Medal, Luis Arriaga, Delifa López, and John F. Smyth (Inst. Nacl. de la Nutr., Dept. of Hematol., Mexico City, Mexico).
Journal of Laboratory and Clinical Medicine, vol. 72, Sep. 1968, p. 419–428. 37 refs.
Inter. Soc. of Hematol. 10th Congr., Stockholm, 1964.
Lab. Carnot. supported research.

Normal, starved hypertranfused rats given four to five intraperitoneal injections of isohemolysate showed significant increases in erythrocyte ^{59}Fe incroporation. Starved rats responded even to a single injection. The effect of isohemolysates was evident in all the other parameters of erythropoiesis investigated: the number of reticulocytes in the peripheral blood of starved and polycythemic rats and the number of normoblasts in bone marrow and spleen, and the ^{59}Fe spleen uptake in starved animals. Isohemolysate administration prevented the rise in serum iron secondary to starvation. A dose effect of hemolysate was demonstrated with starved rats. No response in erythrocyte ^{59}Fe incorporation was observed in starved rats given a liver homogenate and bovine albumin, and only a slight effect was seen with an amino acid mixture with a protein content equivalent to the hemolysate. The soluble fraction of iso- and hetero- (human) hemolysates was as active as the whole preparation, wheras the stroma showed no effect. Bovine hemoglobin also increased red blood cell ^{59}Fe incorporation in starved rats. The maximal effect of hemolysate on erythrocyte ^{59}Fe incorporation of the starved animals was obtained when the hemolysate preceded the radioiron by 72 hr. The results of this study indicate that hemoglobin exerts a stimulatory action on erythropoiesis.

A68-82355
EFFECT OF INCREASED OXYGEN IN THE INSPIRED AIR ON MORPHOLOGY OF SPERMATOZOA AND EPITHELIAL CELLS OF THYROID LOBULES OF MICE.

D. P. Mukherjee and S. P. Singh (Indian Vet. Res. Inst., Div. of Animal Genetics, Izatnagar).
Indian Journal of Experimental Biology, vol. 6, Jan. 1968, p. 6–8. 15 refs.

Exposure of mice at low environmental temperature (21.75° ± 4.6°C.) to a mixture of air and oxygen (3:1), prepared by elctrolysis of water, increased the area and breadth of the mid-piece of live spermatozoa. Exposure to the gaseous mixture at high environmental temperature (35.40° ± 3.07°C.) had no effect on the mensuration characteristics of spermatozoa. The height of the epithelia cells of the thyroid lobules increased at low environmental temperature. The increase, however, was less in mice exposed to a mixture of air and oxygen than in those exposed to air.

A68-82356
INVESTIGATIONS ON THE CHEMICAL NATURE OF BIOLOGICAL RADIATION DAMAGES [UNTERSUCHUNGEN UBER DIE CHEMISCHEN URSACHEN BIOLOGISCHER STRAHLENSCHADEN].

E. Fahr (Würzburg, U., Inst. für Organ. Chem., West Germany).
Biophysik, vol. 5, Aug. 12, 1968, p. 2–13. 32 refs. In German.

When aqueous solutions of uracil, uridine and uridylic acids resp. cytosine, cytidine and cutidylic acid are exposed to ultraviolet (UV) irradiation, 6-hydroxy-dihydrouracil (3) resp. 6-hydroxy-dihydrocytosine derivatives (6) are formed by addition of water to the C=C-bond. The structures of these compunds are proven by synthesis. On standing (6) are deaminated yielding (3). This means that the cytosine part of DNA can be transformed to an uracil derivative by addition of water and following deamination. These two reaction steps which are chemically proven may explain the mutations effected by UV irradiation. The dimeric uracil was systhesized chemical. The behavior of dimeric uracil is discussed. The reactions started by ionizing irradiation of nucleic acids are discussed. The irradiation products obtained derived mainly from the addition of H- and OH-radicals to the C=C-bond of the pyrimidine system. As in the UV irradiation, products of the addition of water are formed. This means that for the understanding of the mutations originated by ionizing irradiation a transformation of the cytosine part of DNA into an uracil derivative can be considered.

A68-82357
A STUDY OF RADIATION PROTECTION BY SULFUR COMPOUNDS.

S. N. Pennington and C. E. Meloan (Kan. State U., Dept. of Chem., Manhattan).
Radiation Botany, vol. 8, Aug. 1968, p. 345–353. 16 refs.

A group of sulfur containing compounds was investigated to determine if any of these compounds possessed antiradiation character as defined by their ability to protect plant tissue (*Lycopersicon esculentum*) from the indirect effects of gamma radiation. Those compounds containing the S-H group or that were able to generate this group in solution were found to afford excellent protection. The ability of these compounds to react with OH radicals was then determined by comparison of rate constant for a known reaction involving OH radicals with and without the compounds being present. The order of reactivity with OH radicals matched the protecting order found for the radiolysis of plant tissue.

A68-82358
DRUG EFFECTS ON MOTOR COORDINATION.

Nathan Watzman and Herbert Barry, III (Pittsburgh, U., School of Pharm., Dept. of Pharmacol., Pa.).
Psychopharmacologia, vol. 12, May 27, 1968, p. 414–423. 13 refs.
Grants PHS MH-06540 and NSF G-11309.

The rotarod test of motor coordination in mice was modified by increasing the rotation speed every 30 sec. until the animals fell off. This procedure yielded a stable, proficient level of performance within four brief trials; the approximately normal distribution of performance times provided an equivalent measure of

either improvement or impairment caused by drugs and permitted the use of parametric statistical tests. A total of 240 mice were assigned to 20 different groups of 12 each, adminsitered oral doses of placebo or different drugs, prior to trial 4. The use of a ratio score (performance time in trial 4 divided by the same time in trial 3) provided a measure of drug-induced changes, controlling for individual differences among animals in over-all level of performance. Two phenothiazines (chlorpromazine and perphenazine) impaired performance at low doses, with a progressively greater decrement at increasing doses (4, 8, 16 mg./kg.); two barbiturates (pentobarbital and amobarbital) showed an all-or-none effect, with no significant decrement at the lower doses (20 and 40 mg./kg.) but almost complete incapacitation at the highest dose of 80 mg./kg. Performance superior to the placebo condition was found with the two lower doses of pentobarbital and with three d-amphetamine doses (4, 8, 16 mg./kg.). An analysis of individual differences gave evidence that the animals which were inferior in prior performance were more susceptible to both improvement and impairment of performance under the influence of drugs.

A68-82359

THE EFFECT OF HYPERBARIC OXYGENATION ON CEREBROSPINAL FLUID OXYGEN.

Sidney A. Hollin, Omar E. Espinosa, Michael H. Sukoff, and Julius H. Jacobson, II (Mt. Sinai Hosp., Dept. of Surg. and Dept. of Neurosurg., New York, N. Y.).

Journal of Neurosurgery, vol. 29, Sep. 1968, p. 229–235. 40 refs.

Hyperbaric oxygenation causes an increase in cisternal cerebrospinal fluid oxygen tension to high levels which are not attainable under normobaric conditions. Changes in cisternal fluid oxygen follow that of the arterial blood but are slower and less in magnitude. Elevation of lumbar spinal fluid oxygen tension is lower and lags behind that of the cisternal fluid. The relationship of high levels of cisternal fluid pO_2 to actual brain tissue oxygenation requires further investigation.

A68-82360

THE HEMATOCRIT OF THE LOWER EXTREMITY IN MAN AT REST AND DURING EXERCISE.

O. Andrée Larsen (Bispebjerg Hosp., Dept. of Clin. Physiol., Copenhagen, Denmark).

Scandinavian Journal of Clinical and Laboratory Investigation, vol. 21, 1968, p. 305–313. 22 refs.

Kong Christian den Tiendes Fond supported research.

The aim of the present work was to study to what extent the vascular area of the leg contributes to the body hematocrit phenomenon, i.e. the fact that the total body hematocrit (hct_{body}) is about 10% lower than the large vessel hematocrit ($hct_{l.v.}$). The hematocrit of the leg (hct_{leg}) was calculated from the mean circulation times of plasma and red cells through the vascular bed of the lower extremity. These values were determined at rest and during exercise by the arteriovenous equilibration technique after injection of ^{125}I-labelled albumin and ^{51}Cr-labelled red cells into an antecubital vein and sampling from a peripheral artery and the femoral vein. In 14 normal resting subjects the average hct_{leg} was 90.2% and hct_{body} 86.9% of $hct_{l.v.}$ Hct_{leg} was significantly higher than hct_{body}. During exercise hct_{leg} was also found to be significantly lower than $hct_{l.v}$ and higher than hct_{body}, but the ratio between hct_{leg} and $hct_{l.v}$ was not significantly lower during exercise than during rest. It is concluded that the body hematocrit phenomenon is to a major part due to a larger intravascular volume of distribution for plasmas than for red cells, and that rapidly exchangeable extravascular plasma pools only existed in special areas, e.g. the liver.

A68-82361

STUDIES ON SWEAT LOSSES OF NUTRIENTS. 2. THE INFLUENCE OF AN ORAL IRON LOAD ON THE IRON CONTENT OF WHOLE BODY CELL-FREE SWEAT.

O. D. Veller (Oslo, U., Inst. of Hyg., Norway).

Scandinavian Journal of Clinical and Laboratory Investigation, vol. 21, 1968, p. 344–346.

Aktieselskapet Borregaards Forskningsfond supported research.

The objective of the study was to assess the validity of the assumption that the amount of iron excreted by the sweat glands is influenced by the plasma level. Whole muscular cell-free sweat collected in 19 healthy young men during 60 min. of profuse sweating in an environmental chamber with a hot, humid atmosphere. Before the start of the sweat experiment an oral iron load with ferrous succinate tablets was given. The mean iron concentration of the cell-free sweat collected during the experiments was 34.5 μg./100 ml. and the corresponding hourly loss about 400 μg. In spite of nearly doubled serum iron levels due to the oral iron load, it was not possible to demonstrate any significant influence on the sweat iron content compared with basic values.

A68-82362

DIETARY CONTROL IN THE METABOLIC STUDIES OF GEMINI-7 SPACE FLIGHT.

Jeanne M. Reid, Leo Lutwak, and G. Donald Whedon (NIH, Natl. Inst. of Arthritis and Metab. Disease, Bethesda, Md. and Cornell U., Graduate School of Nutr., Ithaca, N.Y.).

Journal of the American Dietetic Association, vol. 53, Oct. 1968, p. 342–347. 6 refs.

Am. Dietetic Assn., 49th Ann. Meeting, Boston, Oct. 27, 1966.

The primary objective of the metabolic balance studies of the Gemini-7 space flight was to obtain information on the possible changes in nitrogen and mineral metabolism in man during space flight. These studies required precise control of dietary intake and complete collection of all excreta during control phases prior to and following the experimental 14-day inflight phase as well as during the flight itself. The 10-day preflight control phase was conducted at the Kennedy Space Center. The four day postcontrol phase was begun on the recovery vessel, *Wasp*, immediately following the arrival of the astronauts and was completed at the Kennedy Space Center. Rigid specifications for the purchase of food were set up prior to the planning and calculation of the diets. The diets were planned to include foods selected by the astronauts from a suitable list of available items in which possible sources of variation were reduced to a minimum. The three rotating menus for each astronaut for the two control phases were calculated to contain 1.1 g. calcium daily and the other elements to be as comparable as possible during all three phases. Since accuracy is of prime importance, standardized techniques were used for weighing, preparing, cooking, and serving all food, as well as in checking plates returned to the kitchen. Reasonably accurate dietary control for metabolic studies is possible under new and difficult conditions with extensive, careful planning and intensive, detailed effort.

A68-82363

D-AMINO ACID OXIDASE INDUCTION IN THE KIDNEYS OF GERM-FREE MICE.

L. R. Lyle and J. W. Jutila (Mont. State U., Dept. of Botany and Microbiol., Bozeman).

Journal of Bacteriology, vol. 96, Sep. 1968, p. 606–608. 10 refs.

Grants PHS AI 06552-03 and PHS 2TI AI 131-06.

High levels of D-Amino acid oxidase activity were found in the kidneys of conventionally reared mice, whereas the enzyme was absent from the kidneys of most germ-free mice. Injections of D-alanine or monocontamination with *Bacillus cereus* stimulated D-amino acid oxidase activity in the kidneys of germ-free mice.

A68-82364
APPLICATION OF FOURIER ANALYSIS TO THE VISIBILITY OF GRATINGS.
F. W. Campbell and J. G. Robson (Cambridge, U., Physiol. Lab., Great Britain).
Journal of Physiology, vol. 197, Aug. 1968, p. 551–566. 11 refs.

The contrast thresholds of a variety of grating patterns were measured over a wide range of spatial frequencies. Contrast thresholds for the detection of gratings whose luminance profiles are sine, square, rectangular or saw-tooth waves can be simply related using Fourier theory. Over a wide range of spatial frequencies the contrast threshold of a grating is determined only by the amplitude of the fundamental Fourier component of its wave form. Gratings of complex wave form cannot be distinguished from sine-wave gratings until their contrast has been raised to a level at which the higher harmonic components reach their independent threshold. These findings can be explained by the existence within the nervous system of linearly operating independent mechanisms selectively sensitive to limited ranges of spatial frequencies.

A68-82365
THE RELATION OF OXYGEN INTAKE AND VELOCITY OF WALKING AND RUNNING, IN COMPETITION WALKERS.
D. R. Menier and L. G. C. E. Pugh (Natl. Institution for Med. Res., Lab. for Field Physiol., Holly Hill, London, Great Britain and Centre Pré-Olympique, Physiol. Lab., Font-Romeu, Pyrénées Ouest, France).
Journal of Physiology, vol. 197, Aug. 1968, p. 717–721. 8 refs.

The oxygen intake of four Olympic walkers was measured while walking and running at varying velocities on a treadmill at an altitude of 1,800 m. The relation between 0_2 intake and running at speeds between 8 km./hr. and 21 km./hr. was linear. The relation for walking at speeds up to 8 km./hr. followed an upward concave curve. These findings were similar to results obtained at sea level by other investigators. For walking at speeds between 8 km./hr. and 14·5 km./hr. the relation of 0_2 intake and velocity was a straight line having a slope twice that of running. Maximum 0_2 intake in walking averaged 60·0 ml./kg./min. (range 55·8–64·1 ml./kg./min.) compared with 57·4 ml./kg./min. (range 55·2–60·2 ml./kg./min.) in running. An international class long distance runner serving as a control reached a maximum 0_2 intake of 70 ml./kg./min.

A68-82366
COOPERATION OF SELECTED LIMB JOINTS IN MAINTAINING OPTIMUM TRAJECTORY OF MOVEMENT DURING TAKE-OFF [WSPOLDZIALANIE WYBRANYCH STAWOW KONCZYN W UTRZYMANIU OPTYMALNEGO TORU RUCHU W CZASIE ODBICIA].
T. Bober.
Wychowanie Fizyczne i Sport, vol. 12, no. 2, 1968, p. 31–39. 10 refs. In Polish.

The aim of the paper is to select from the complex structure of movement those elements characterizing the coordination of movement. By the term coordination one understands usually the course of the movement to its destination, which is achieved through cooperation of the nervous and muscular systems. The test was carried out on 61 individuals. Each executed a vertical jump to a maximum height with the take-off from both feet. The jumps were filmed with the observance of requirements permitting a detailed physical analysis. The deviation of the direction of take-off from the vertical, which constituted a criterion for the accuracy of the movement, was measured from the film. This characteristic was correlated with the mutual position in the hip and knee joints at the moment of the deepest squat-down, formulated into a single index. The take-off angle was also correlated with the time of delay in the upward swing of the arms in relation to the upward movement of the body during the take-off. Significant correlations were obtained in both cases. It was determined on the basis of multiple correlation and determination coefficient that the angular position in the joints of the lower extremities in 12% the accuracy of the take-off. General conclusions were drawn on the basis of the results. It appeared that the characteristics investigated proved to be diagnostic and to constitute precisely those external manifestations of movements which are a proof of coordination. Moreover, detailed conclusions pertain to the optimum position in the joints of extremities for the achievement of the best results, both as regards the accuracy of the attempt and the height of the jump.

A68-82367
THE GREAT ILLUSION.
Fletcher H. Higgison.
Optical Journal and Review of Optometry, vol. 105, Sep. 1, 1968, p. 35–40.

The problem of optical illusion was discussed. Nine illusionary figures and the illusions associated with the moon, sun and stars were presented. It was suggested that the explanation may be related to fusion and/or stereopsis or some other function where binocularity has played a part in establishing the seeing pattern.

A68-82368
EFFECT OF ANOXIA ON MECHANICAL PERFORMANCE OF ISOLATED ATRIA FORM GROUND SQUIRRELS AND RATS ACCLIMATIZED TO ALTITUDE.
Roy F. Burlington and John T. Maher (U.S. Army Res. Inst. of Environ. Med., Natick, Mass.).
Nature, vol. 219, Sep. 28, 1968, p. 1370–1371. 9 refs. organic

In order to test the hypothesis that the ability of hibernators to survive hypoxia can be associated with a functional adaptation to lowered oxygen tension (pO_2) at the tissue and/or cellular level, the effect of anoxia on the contractility of isolated atria of rats and ground squirrels was determined. Evidence that the cardiac tissue from the ground squirrel is better adapted organic function at a lowered pO_2 than that from normal rats or rats acclimatized to altitude was provided.

A68-82369
FACTORS AFFECTING CIRCADIAN PERIODICITY OF BLOOD AMINO ACIDS IN MAN.
Ralph D. Feigin, Albert S. Klainer, and William R. Beisel (U.S. Army Med. Unit, Fort Detrick, Frederick, Md.).
Metabolism, vol. 17, Sep. 1968, p. 764–775. 42 refs.

Total whole blood amino acids in normal men and all major individual blood amino acids (with the single exception of citrulline) were found to display a circadian periodicity characterized by peak values between 1200 and 2000 hr. and lowest values between 0400 and 0800. Possible underlying factors responsible for this rhythm were investigated. Increases and decreases in the total protein content of an isocaloric diet did not affect amino acid periodicity. In addition, the ingestion of a large protein load at 0800 hr., a time of rising whole blood amino acid concentration, resulted in a small but significant additional increase, wheras an identical protein load eaten at 2000 hr. did not interfere with the decrease in amino acid concentration normally seen between 2000 and 0400 hr. An acute period of physical exercise did not affect blood amino acid concentrations. A 12 hr. shift in the sleep-wakefulness cycle in normal adult males resulted in a rapid reversal of the normal circadian periodicity of blood amino acids, such that peak values were observed at 0400 hr. rather than at 1200 to 2000

hr. as seen in subjects on a normal routine. The rhythmicity of blood amino acids could be dissociated from those of body temperature, urine volume and sodium and potassium excretion. These latter observations suggested that blood amino acid periodicity may be influenced significantly by exogenous synchronizers, although it is likely that the basic rhythms are generated by unknown endogenous signals.

A68-82370
PERTURBATION APPROACH TO SPATIAL BRIGHTNESS INTERACTION IN HUMAN VISION.
Michael Davidson (Rochester, U., Dept. of Psychol., N. Y.).
Journal of the Optical Society of America, vol. 58, Sep. 1968, p. 1300–1308. 37 refs.
Grants PHS MH-16,134 and PHS NBO-3412.

The tools of Fourier analysis can be used to explain visual phenomena of spatial brightness interaction, provided that attention is confined to small perturbations of spatially uniform fields. A perturbation approach is outlined here, and a transfer function is presented which muscles appropriate for small perturbations. The transfer function was obtained from human subjects with psychophysical methods, for the case of briefly flashed, achromatic fields at photopic levels of illumination. For the frequency range of 0.005 to 0.15 cycles/min. of arc, the transfer function is roughly proportional to spatial frequency, thus reflecting, in large part, nonoptical properties of the system. A simple mechanism of lateral inhibition could underlie this transfer function.

A68-82371
STIMULUS INTENSITY AND RESPONSE EVOCATION.
G. Robert Grice (Ill., U., Urbana).
Psychological Review, vol. 75, Sep. 1968, p. 359–373. 18 refs.
Grant PHS MH 08033.

A decision model based on that of a previous delivered relating stimulus intensity to response latency is applied to conditioning and reaction time data. Points of simularity and identity between this model, Hull-Spence behavior theory, and the theory of signal detection are indicated. It is suggested that the concept of a variable, experimentally manipulable detection criterion or reaction threshold is a principle of considerable potential measured in behavior theory. The difference between within-S and between-S stimulus-intensity effects is deduced from the model. The effects of motivational, reinforcement, adaptation, and practice variables and their relations to stimulus intensity are analyzed.

A68-82372
STIMULUS MEANINGFULNESS AND PAIRED-ASSOCIATE TRANSFER: AN ENCODING VARIABILITY HYPOTHESIS.
Edwin Martin (Mich., U., Ann Arbor).
Psychological Review, vol. 75, Sep. 1968, p. 421–441. 43 refs.
Contracts AF 49(638)-1235 and AF 49(638)-1736.

The role of stimulus meaningfulness (M) in single-list and transfer situations and in proaction and retroaction paradigms is explicated with the help of an encoding-variability hypothesis, which states that analyzable nominal stimuli are variably encodable and hence may be perceived differently on different occasions. This means that in a single-list situation, parired-associate learning will appear to progress more slowly under the more variable functional stimulation of low-M nominal stimuli. It also means that in a negative transfer situation, the second task involves recoding when stimuli are low M, but unlearning when stimuli are high M. New transfer data are presented as verification, and implications for proaction and retroaction are discussed. Throughout, a major role is assigned to stimulus recognition. Also the present formulation is compared with alternative views.

A68-82373
DETERMINATION OF ORGANIC SUBSTANCES IN THE EXPIRED AIR OF MAN BY MEANS OF GAS CHROMATOGRAPHY [DIE BESTIMMUNG VON ORGANISCHEN SUBSTANZEN IN DER AUSATMUNGSLUFT DES MENSCHEN MIT HILFE DER GASCHROMATOGRAPHIE].
A. Walther (Deut. Hochschule für Körperkul., Inst. fur Sportmed., Abt. für angew. Physiol., Leipzig, East Germany).
Acta biologica et Medica Germanica, vol. 20, no. 5, 1968, p. 587–595. 20 refs. In German.

A method enabling gas chromatographic detection and quantitative determination of acetone and other volatile orgainc substances in the expired air of man (acetaldehyde, methanol and ethanol) is reported. The method is designed to give parameters which are obtainable at any time and to furnish information about intermediate metabolic processes, and thus to reflect the actual state of metabolism in the organism examined. In order to be independent of the laboratory in determining the orgainc components of the expired air, the volatile components of the latter were frozen out by means of a cooling trap. The resulting condensate was treated gas chromatographically according to the head space technique. An examination of the respiratory air condensate of 10 healthy normal persons aged 20 to 30 yr. revealed an acetone content of 0.77 to 2.70 μg./ml. which corresponds to the standard auditory stimulus than when the visual stimulus was associated with the comparison of 0.038 μg. acetone/1. of expired air. The advantage of this method is the possibility of quantitative determination of acetone and other substances contained in the body fluids without venous puncture. Since the content of acetone or formation of ketone bodies in the organism are in close relationship with the available quantity of glucose and the degree of fatty acid oxidation, the gas chromatographic determination of acetone in the expired air enables a continuous control of metabolic processes in the intact organism.

A68-82374
THE TIME ZONE AND CIRCADIAN RHYTHMS IN RELATION TO AIRCRAFT OCCUPANTS TAKING LONG-DISTANCE FLIGHTS.
Stanley R. Mohler (FAA, Office of Aviation Med., Washington, D. C.), J. Robert Dille, and H. L. Gibbons (FAA, Civil Aeromed. Inst., Oklahoma City, Okla.).
American Journal of Public Health, vol. 58, Aug. 1968, p. 1404–1409. 18 refs.
Am. Public Health Assn., 95th Ann. Meeting, Miami Beach, Oct. 25, 1967.

Air travelers traversing four or more time zones experience desynchronization of certain daily biologic rhythms. Until rephasing of the rhythms occurs relative to the solar cycle at the point of destination, some below par subjective and phychophysiologic responses result. Information is provided referencing certain of these responses and some suggested means of avoiding time zone fatigue are given.

A68-82375
OTOLITHIC INFLUENCES ON TONUS CHANGES OF THE EXTRAOCULAR MUSCLES: A STUDY ON POSITIONAL EYE DEVIATION AND NYSTAGMUS.
Jun-Ichi Suzuki, Kazuyoshi Goto, Atsushi Komatsuzaki, and Michihiko Nozue (Tokyo, U., Fac. of Med., Dept. of Otolaryngol., Japan).
Annals of Otology Rhinology and Laryngology, vol. 77, Oct. 1968, p. 959–970. 8 refs.
Grant PHS NB-06585.

The otolithic influences on tonus changes of the extraocular muscles of rabbits are studied. The head-hanging position and alcoholic intoxication are used for investigating positional nystagmus.

Alcohol-induced positional nystagmus is compared in rabbits and cats, and comments are made on cases of pathological positional nystagmus in humans. Since compensatory eye movements do not occur in the head-hanging position, otholithic influences upon the extraocular muscles are eliminated. In this latter position, both antagonists and agonists relax and contract and abrupt changes in the tonus of these muscles occur in the noncompensatory direction. In both clinical patients and experimental animals (rabbits and cats) the highest incidence of positional nystagmus was found in the head-hanging position, arguing for the specificity of this position. The nose-up position is a specific neutral position with respect to otolithic function at lease for alcohol-induced positional nystagmus. The first phase of alcohol-induced positional nystagmus in normal cats is active and is geotropic in character. It can be found only when there are functioning otolithic organs on both sides. A functioning labyrinth on one side is not sufficient for inducing normal alcohol positional nystagmus. Direction-changing positional nystagmus, encountered in cases with infratentorial lesions, is probably due to a mechanism similar to that seen in alcohol intoxication. If it is, then the nose-up or supine position should be a point of zero-level or a neutral position in which positional nystagmus is either not found or diminished.

A68-82376
CORRELATIONS BETWEEN THE INTENSITY OF ILLUMINATION AND THE FUNCTIONAL STATE OF THE CENTRAL NERVOUS SYSTEM [RELATIONEN ZWISCHEN BELEUCHTUNGSINTENSITAT UND FUNKTIONSZUSTAND DES ZNS].

K. Hect, K. Treptow, Tamara Hecht, and Marianne Poppei (German Acad. of Sci., Inst. for Cortico-visceral Pathol. and Hecht, Berlin-Buch, East Germany).

Acta Biologica et Medica Germanica, vol. 20, no. 6, 1968, p. 743–755. 49 refs. In German.

Forty male albino rats aged five to seven mo. were tested by conditioning escape (jumping test) to find out the influence of definite intensities of illumination (0.2–0.5, 15, and 1,000 lux) under otherwise constant conditions on the central nervous capacity. The results can be summarized as follows: (1) the conditional-reflectory behavior of the animals is dependent on the ambient brightness; (2) the parameters of the conditional reflex and the intensity of illumination are correlated in such a way that increasing light intensity raises the central nervous capacity; (3) the dependence of the conditional-reflectory activity on the ambient brightness in evident immediately with the change of light intensity; and (4) the mechanism of the observed phenomenon is discussed and is attributed to the interaction between the formatio reticularis and the cortex.

A68-82377
THE DEPENDENCE OF PHARMACOLOGIC EFFECTS ON THE AMBIENT BRIGHTNESS [ZUR ABHANGIGKEIT PHARMAKOLOGISCHER EFFEKTE VON DERUMGEBUNGSHELLIGKEIT].

K. Hect, K. Treptow, Marianne Poppei, and Tamara Hecht (German Acad. of Sci., Inst. for Cortico-visceral Pathol. and Therapy, Berlin-Buch, East Gemany).

Acta Biologica et Medica Germanica, vol. 20, no. 6, 1968, p. 757–772. 43 refs. In German.

Eighty albino rats aged five to six mo. were kept at constant conditions. Their central nervous activity was tested by conditioning escape (jumping test) at different defined intensities of illumination (0.2—0.5, 15, and 1,000 lux) under otherwise constant conditions. The experiments were carried out in three variants: (1) investigation of the dynamic effect (time-action relation) of 20 mg./kg. ethyl crotyl barbiturate and 7.5 mg./kg. benactyzine as a factor (time–action intensity of illumination; (2) survey investigations on the situational dependence of pharmacologic effects of the various light intensities one hr. following subcutaneous infection of caffeine (5, 10, 20 mg./kg.), ethyl crotyl barbiturate (5, 15, 30 mg./kg.), benactyzine (7.5, 15, 30 mg./kg.), chloropromazine (0.5, 1.0, 5.0 mg./kg.) and two hr. following administration of reserpine (0.1, 0.5, and 1.0 mg./kg.); and (3) investigation of the effect of caffeine (10 mg./kg.), of ethyl crotyl bartiturate (30 mg./kg.) of benactyzine (30 mg./kg.) and of chloropromazine (1.0 mg./kg.) one hr. after the injection in dependence upon the immediate change of the light situations. The results were summarized as follows: (1) the effects of darkness and brightness on the pharmacodynamics of benactyzine (7.5 mg./kg.) and ethyl crotyl barbiturate (20 mg./kg.) are diametrically opposed; (2) the drugs investigated at different doses were more or less dependent on the intensity of light; (3) whereas chloropromazine and reserpine were stable against optic influences of their surroundings, caffeine, benactyzine and ethyl crotyl barbiturate were labile; and (4) the change of light intensity during the action of a labile drug on the organism produced an immediate change of the effect. The significance of the results for pharmaceutic and pharmacologic research, for ambulant and clinical pharmacotherapy as well as for occupational medicine and medicine of traffic is pointed out.

A68-82378
POSTHYPERVENTILATION HYPOXIA: THEORETICAL CONSIDERATIONS IN MAN.

S. F. Sullivan and R. W. Patterson (Columbia U., Coll. of Physicians and Surgeons, Dept. of Anesthesiol., New York, N. Y.).

Anesthesiology, vol. 29, Sep.–Oct. 1968, p. 981–986. 14 refs.
Am. Soc. of Anesthesiol., Las Vegas, Oct. 2, 1967.
Grants NIH K3-HE-11,900, NIH GM-14419, and NIH GM 09069.

The magnitude of CO_2 washout from the body following an increase in alveolar ventilation is time-dependent. Recovery from this depletion in CO_2 content requires relative hypoventilation and is also time-dependent; this leads inevitably to alveolar hypoxia during breathing of air. The model used here predicts that, following hyperventilation (PA_{CO_2} = 20 mm. Hg.) for several hours, when spontaneous ventilation (PA_{CO_2} = 40 mm. Hg.) returns alveolar O_2 tension will be 73, 90 and 97 mm. Hg. at 10, 30 and 60 min., respectively, compared with a value of 101 mm. Hg. several hours later.

A68-82379
BASIC PRINCIPLES OF SENSORY EVALUATION.

Committee E-18 on Sensory Evaluation of Materials and Products. Philadelphia, Am. Soc. for Testing and Mater., 1968, 105 p. Many refs.
$5.75.

This book contains papers by the members of Subcommittee II on Principles of Psychophysical Test Methods of the American Society for Testing and Materials, which also sponsored the publication. The first two sections of the book cover general principles of the nature of sensory stimuli and physiology of odor, taste, vision, hearing and the intercorrelation of these senses. The final section of the book considers various principles and techniques for sensory measurement and analysis in the areas of subjective reponses, odor detection measurement of irritation, and visual appearance.

A68-82380
BETA-, GAMMA-, AND X-RADIATION SENSITIVITY OF A NUCLEAR TRACK FILM.

Donald E. Barber (Minn., U., School of Public Health, Minneapolis).

American Industrial Hygiene Association Journal, vol. 29, Jul.–Aug. 1968, p. 358–363. 7 refs.
Contract PHS PH 86-63-198.

The interference of beta-, gamma-, and x-radiation with nuclear track counting in Kodak Personal Neutron Monitoring Film, Type A, is examined for several irradiations with Pu-Be neutrons in combination with various exposures from other radiations. Neutron irradiations were 197, 1183, and 3550 mrems. Exposures to other radiations ranged from 50 mR to 5000 mrads. The data show that x-ray exposures as small as 16 m R can severely interfere with nuclear track counting in Kodak Personal Neutron Monitoring Film, Type A. Conditions under which routine nuclear track counting should not be accepted as a measure of fast neutron irradiation are indicated. It is concluded that monitoring for fast neutrons with Type A film in the presence of low-energy photons is impracticable.

A68-82381
COMMUNITY NOISE—THE INDUSTRIAL ASPECT.
Kenneth M. Morse (U. S. Steel Corp., Pittsburgh, Pa.).
American Industrial Hygiene Association Journal, vol. 29, Jul.–Aug. 1968, p. 368–380. 22 refs.
Acoust. Soc. of Am., 74th Ann. Meeting, Miami Beach, Nov. 14–17, 1967.

Often community noise control regulations are hastily developed and contain unrealistic features. Transportation, home, and other community noise sources are neglected with resulting emphasis on the contribution of industrial sources. Industry is the only segment of the total environment which has and is developing a full hearing conservation program. Evaluation of noise as an annoyance factor and one subjective response has not received adequate study for setting of meaningful criteria. Community noise control is based too often on possible effects rather than proven effects. Most studies to evaluate the subjective response to noise have been based on aircraft noise, and attempts to rate annoyance in terms of a physical measurement. Several such rating systems are discussed. Community noise regulations tend toward zoning laws with performance standards which present many pitfalls and inconsistencies. A stepwise approach to community noise control giving due consideration to all contributing sources and factors is believed necessary to the development of good regulations.

A68-82382
INVESTIGATIVE STUDIES OF PLASMA TORCH HAZARDS.
Charles H. Powell, Leon Goldman, and Marcus M. Key (Natl. Center for Urban and Ind. Health, Occupational Health Program and Children's Hosp. Res. Found., Laser Lab., Cincinnati, Ohio).
American Industrial Hygiene Association Journal, vol. 29, Jul.–Aug. 1968, p. 381–385. 14 refs.

Potential health hazards from a medium output plasma torch used in a biological laboratory were investigated, and some industrial applications of higher output plasma torches were surveyed. Exposures to intense ultraviolet radiation, noise, and noxious gases and fumes were measured. Biological experiments on animals and human skin were performed to evaluate the reaction to ultraviolet energy, and thermocouples were used to quantitate the thermal reaction of skin and eyes produced by the plasma torch.

A68-82383
THE INTERRELATIONSHIP BETWEEN THE REACTION OF ASSIMILATION OF PHOTOSTIMULATION RHYTHM AND THE PATTERN OF BACKGROUND ACTIVITY IN HUMAN EEG [O SOOTNOSHENII REAKTSII USVOENIIA RITMA FOTOSTIMULIATSII S KHARAKTEROM FONOVOI AKTIVNOSTI V EEG CHELOVEKA].
G. N. Boldyreva (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Moscow and Acad. of Med. Sci., N. N. Burdenko Inst. of Neurosurg., Moscow).
Fiziologicheskii Zhurnal SSSR, vol. 54, Mar. 1968, p. 261–269. 22 refs. In Russian.

A comparison of the reaction of assimilation with the pattern of background activity of the brain did not reveal any relation of this reaction to α-rhythm in the background electroencephalogram; no definite relationships could be also demonstrated between optimal frequency of assimilation and the frequency of α-rhythm. The amplitude of the reaction of assimilation is directly dependent on total activity of background rhythms. Correlation analysis revealed negative relationship between the reaction of assimilation and the degree of synchronization of the background rhythms. No definite relationship was found between the amplitude of the reaction of assimilation and the degree of regularity or stability of the rhythms evoked by photostimulation.

A68-82384
PECULIARITIES OF HEMOPOIETIC ACTIVITY OF THE BLOOD SERUM IN SUBJECTS TRAINED TO CHRONIC HYPOXIA [GEMOPOETICHESKAIA AKTIVNOST' SYVOROTKI KROVI U LIUDEI PRI KHRONICHESKOI GIPOKSII].
V. I. Voitkevich (USSR, Acad. of Sci., I. P. Pavlov Inst. of Physiol., Lab. of Exptl. and Clin. Hematol., Leningrad).
Fiziologicheskii Zhurnal SSSR, vol. 54, Mar. 1968, p. 350–356. 39 refs. In Russian.

It has been shown that the blood serum of almost all subjects, both trained and untrained to hypoxia, exhibits certain hemopoietic activity. At an altitude of 2,300 m. the content of hemopoiesis-stimulating factors in the serum increases only in untrained persons, whereas at 4,000 m. and higher, hemopoietic activity of the serum increases in subjects trained to hypoxia although this increase is less significant as compared to that in untrained persons. In persons returning after 20–40 days stay in the mountains, the content of hemopoietines in the serum remained increased for 1.5–2 wk.

A68-82385
GASTRIC SECRETION IN DEEP-DIVERS UNDER NORMAL CONDITIONS AND UNDER THE WATER [SEKRETSIIA ZHELUDKA U VODOLAZOV-GLUBOKOVODNIKOV V OBYCHNYKH USLOVIIAKH I POD VODOI].
S. Sh Umanskii, B. A. Kheifets-Tetel'baum, and E. E. Rozov.
Fiziologicheskii Zhurnal SSSR, vol. 54, Mar. 1968, p. 365–369. 17 refs. In Russian.

With the help of the ion-exchange resin KB-4-2p, using quinine as an indicator, studies were made on gastric secretion in 42 deep-divers under normal conditions, in decompression chamber (9 ata) and at the depth of 100–160 m. Positive effect of polyvitamins has been observed under all the conditions studied.

A68-82386
THE ROLE OF THE ADRENAL GLANDS IN CHANGES OF CATECHOLAMINE CONTENT IN ALBINO RATS AFTER PHYSICAL STRESS [ROL' NADPOCHECHNIKOV V IZMENENII SODERZHANIIA KATEKHOLAMINOV U BELYKH KRYS POSLE FIZICHESKOI NAGRUZKI].
G. IA. Breido and R. M. Reidler (USSR, Acad. of Sci., I. M. Sechnov Inst. of Evolutionary Physiol. and Biochem., Leningrad).
Fiziologicheskii Zhurnal SSSR, vol. 54, Mar. 1968, p. 370–374. 25 refs. In Russian.

Adrenalectomy in resting rats does not cause any changes in catecholamine content of the heart, while decreasing noradrenalin level in the brain. Prolonged swimming with a load increases adrenalin and noradrenalin contents in the heart and decreases noradrenalin content in the brain. After adrenalectomy, physical stress does not affect adrenalin and noradrenalin contents in the

organs studied. The data obtained indicate that additional reserves which account for the maintenance of a necessary level of catecholamines during physical stress are produced by the adrenal glands.

A68-82387
QUANTITATIVE CHARACTERISTICS OF THE FINE MOVEMENTS OF THE EYES IN FIXATION [KOLICHESTVENNYE KHARAKTERISTIKI FIKSATSIONNYKH MIKRODVIZHENII GLAZA].
N. G. Proskuriakova and A. R. Shakhnovich (USSR, Acad. of Sci., Inst. of Automation and Telemech., Moscow and Acad. of Med. Sci., N. N. Burdenko Inst. of Neurosurg., Moscow).
Biofizika, vol. 13, Jan.–Feb. 1968, p. 117–126. 7 refs. In Russian.

The object of the study was to analyze the quantitative characteristics of the fine movements of the eyes during fixation of a stationary test object, by recording the horizontal and the vertical components of the movements. The experiments were done on ten healthy subjects (20–36 yr. of age) with normal vision. The quantitative analysis showed diverse changes in the different parameters; the least variable was the range of drift of the visual axis during prolonged fixation. By its size this area corresponded to the most sensitive region of the retina, the fovea contralis. The amplitude-time characteristics of the drifts and the amplitude characteristics of the saccadic movements were significantly more variable. Interaction between these movements varied from full compensation of drifts by jerks to involuntary drifts. The invariability of the visual axis area was determined basically by the constancy of the task, the fixation of a stationary point. At the same time as the different ways to perform these tasks, the functional state of the oculomotor apparatus and the whole organism, were determined. A change in test procedures (attempt to view an imaginary point in darkness or in scattered light) resulted in an increase in drifts of the visual axis.

A68-82388
SELF EVALUATION IN PILOTS PHYSICAL TRAINING [SAMOKONTROL' V FIZICHESKOI PODGOTOVKE LETCHIKA].
E. Poruchikov.
Aviatsiia i Kosmonavtika, no. 3, Mar. 1968, p. 71–73. In Russian.

A discussion is presented on the importance of objective and subjective self-evaluation by pilots of their physiological responses during physical training. Self-evaluation by the pilots of their appetite, sleep, tolerance to stress, perspiration, pulse and respiratory rate, etc., would provide valuable additional physiological data that could be used by the doctors and physical educators in their evaluation of the physical fitness of the flying personnel.

A68-82389
THE VESTIBULAR APPARATUS AND PHYSICAL TRAINING [VESTIBULIARNYI APPARAT I EGO TRENIROVKA].
V. Volgin and S. Raskatova.
Aviatsiia i Kosmonavtika, no. 1, Jan. 1968, p. 71–72. In Russian.

A discussion is presented concerning motion sickness occurrences, the vestibular components of the process related to the activation of the central nervous system and the way to reduce the effects of vestibular stimulation by regularly performed physical exercises.

A68-82390
DIAGNOSIS IS ESTABLISHED BY A TRAINING SIMULATOR [DIAGNOZ STAVIT TRENAZHER].
V. Valuk.
Aviatsiia i Kosmonavtika, no. 1, Jan. 1968, p. 73–75. In Russian.

The use of flight simulators was recommended as a tool for medical examination of flying personnel examined for determination of their fitness for continued flying mission. The results obtained were reliable, and enlarged the knowledge of psychological behavior of flyers during the execution of their professional activities. The methods also helped to reduce the error percentage when appraising their physical fitness. Two case histories were included.

A68-82391
THE SENSORY EFFECTS OF AGING IN MAN.
J. F. Corso (N. Y., State U., Dept. of Psychol., Cortland).
Scientia, vol. 103, no. 657–676, 1968, p. 362–393. 80 refs.

In 1958, the number of civilian non-institutionalized individuals in the United States who were 65 yr. of age or older was estimated to be about 14.4 million. With an increase of approximately 1,000/day, this population is predicted to be between 21 and 23 million by 1975. There is therefore, a growing interest in the problem of aging as the average life span of the population increases. At one level of analysis, it is important for theoretical and practical reasons to understand how aging tends to affect the sensory functions in man and the extent to which such changes produce modifications of behavior. Accordingly, this review is concerned primarily with studies in experimental psychology which show a relationship between human aging and sensory processes. The major emphasis is on the empirical findings in the areas of vision, audition, gustation, olfaction, pain, touch, and vibration. Some data on selected perceptual functions are also included and it is shown that no single theory or hypothesis can account for the diversity of data currently available. The evidence indicates clearly that significant changes occur in sensory and perceptual functions as a function of aging and the implications of these changes in relation to human behavior are discussed. In effect, this paper summarizes the present state of knowledge in the area of aging and the human senses and should suggest new guidelines for future research in a relatively young and promising field.

A68-82392
EXPERIMENTAL SUBSTANTIATION OF THE MAXIMUM PERMISSIBLE CONCENTRATION OF Bi-58 (ROGOR, PHOSPHAMIDE) IN THE ATMOSPHERE [EKSPERIMENTAL'NOE OBOSNOVANIE PREDEL'NO DOPUSTIMOI KONTSENTRATSII Bi-58 (ROGOR, FOSFAMID) V ATMOSFERNOM VOZDUKHE].
F. Kaloianova, L. Ivanova, G. Dimov, and M. Mukhtarova.
Gigiena i Sanitariia, no. 6, Jun. 1968, p. 6–10. 8 refs. In Russian.

Investigation findings proved Bi-58 at a concentration of 0.005 mg./m.^{3} to be ineffective for reflex reactions of man. In a chronic poisoning test the subthreshold value of the same substance amounted 0.01 mg./m.^{3} The maximal one-time and the daily average concentration of the compound in the atmosphere are supposed to be at a level of 0.005 mg./m.^{3}.

A68-82393
SKIN-VASCULAR REACTION TO LOCAL COOLING IN MAN [KOZHNO-SOSUDISTYE REAKTSII NA LOKAL'NOE OKHLAZHDENIE CHELOVEKA V GIGIENICHESKIKH ISSLEDOVANIIAKH].
M. N. Evlampieva (USSR, Acad. of Med. Sci., A. N. Sysin Inst. of Gen. and Communal Hyg., Moscow).
Gigiena i Sanitariia, no. 6, Jun. 1968, p. 24–28. In Russian

The time of restoration of the skin temperature to normal is the shortest in the zone of thermal confort and increases in discomfort both in direction of superheating and supercooling of the body. The results of investigated pharmacological tests show the processes of constriction and subsequent dilatation of the vessels at local cooling to be regulated by the highest section of the nervous system. Consequently, the cooling test may be used for objective assessing of a thermal state of the human body.

A68-82394
VIBRATION SPECTRUM OF PERFORATORS AND FEATURES PECULIAR TO VIBRATION DISEASE IN DRILLERS [SPEKTRAL'NYI SOSTAV VIBRATSII PERFORATOROV I OSOBENNOSTI KLINIKI VIBRATSIONNOI BOLEZNI BURIL'SHCHIKOV].
N. N. Malinskaia, N. B. Metlina, and E. I. Denisov (USSR, Acad. of Med. Sci., Inst. of Labor Hyg. and Occupational Diseases, Moscow).
Gigiena i Sanitariia, no. 6, Jun. 1968, p. 28–30. In Russian.

The average vibration spectrum of perforators devoid of vibration safeguard arrangement exceeds the sanitary standards for low and medium frequencies and is almost within the standard level for high frequencies. It is the characteristic correlation of the vibration levels of various frequencies that is responsible for the specific course of the driller's disease with a long-term compensation of the vascular disturbances, absence of any pronounced symptoms of their generalization and comparatively slow development and a favorable course of the disease. The use of vibration safeguard arrangement for perforators lowers the vibration intensity to a standard sanitary level.

A68-82395
CONTROL OF BACTERIAL CONTAMINATION OF HARD SURFACES IN THE OPERATING ROOM.
Peter Dineen (Cornell U., Med. Coll., Ithaca, N. Y.).
AORN Journal, vol. 8, Sep. 1968, p. 57–60.

Studies concerned with the problem of bacteria on hard surfaces, particularly in air, floors, and walls of operating rooms are reported. In order to control bacteria in the operating room properly it is necessary to be able to detect their number and location. The detection of bacteria in the air is probably best done by the use of an air sampling machine, while those on hard surfaces are probably more accurately done by the use of the Rodac plate. Results from one of the tests suggest that a good detergent germicide adequately cleans and also removes viable bacteria. This procedure would ordinarily be performed after each operation as well as in the evening. The problem of sepsis in the operating room has not been eliminated and good cleaning and disinfection must be carried out. In the rush to get cases done and to speed up time lost between operations, there is a tendency to short cut in cleaning procedures. This, in the long run, is dangerous and self-defeating. The only way to give complete protection from one case to the next is to have an all inclusive safe technique in which every case is considered a dirty case.

A68-82396
SUPPRESSIVE EFFECT OF LIGHT ON THE FORMATION OF DNA AND ON THE INCREASE OF DEOXYTHYMIDINE MONOPHOSPHATE KINASE ACTIVITY IN *CHLORELLA PROTOTHECOIDES*
Yoshihiro Sokawa and Eiji Hase (Tokyo, U., Inst. of Appl. Microbiol. and Tokugawa Inst. for Biol. Res., Tokyo, Japan).
Plant and Cell Physiology, vol. 9, Sep. 1968, p. 461–466. 11 refs.
Min. of Educ. supported research.

The effect of light on the level of deoxythymidine monophate kinase (dTMP kinase) activity in the cells of *Chlorella protothecoides* was investigated in relation to the photoinhibition of deoxyribonucleic acid (DNA) formation. It was found that light suppresses the increase of dTMP kinase activity in the algal cells which starts in advance of active DNA synthesis, and that blue light has a stronger suppressive effect than red light.

A68-82397
APPEARANCE OF PLASTOQUINONE DURING THE GREENING OF BLEACHED CELLS OF *CHLORELLA PROTOTHECOIDES*.
Tatsuo Oku, Seiko Okayama, Ichiro Aiga, and Tsutomu Sasa (Kyushu U., Fac. of Sci., Dept. of Biol., Fukuoka, Japan).
Plant and Cell Physiology, vol. 9, Sep. 1968, p. 599–602. 11 refs.

The quinone content of green and bleached cells of *Chlorella protothecoides* was determined by silica-gel chromatography. The relation of these compounds to chlorophyll synthesis. Obiquinon-10 was found in all cells of every stage. Plastoquinone A was not found in bleached cells, but appeared after the 18 hr. log period when cells were greening. This synthesis of plastoquinone A paralleled the formation of chlorophyll. The results indicated that quinone synthesis may be a limiting factor in photosynthesis.

A68-82398
AURAL BAROTRAUMA IN NAVAL DIVERS.
G. J. A. Bayliss (Roy. Australian Navy School of Underwater Med., Edgecliff, New South Wales, Australia).
Archives of Otolaryngology, vol. 88, Aug. 1968, p. 141–147. 9 refs.

A survey of aural barotrauma among naval divers was undertaken. The percentage of trauma at different depths and during asent and descent was measured. Personal details and base line data were completed, and clinical examinations of the ear, nose and throat were carried out. Therapeutic measures were mentioned.

A68-82399
RADIATION EFFECTS ON THE INNER EAR.
James E. Gamble, E. A. Peterson, and J. Ryan Chandler (Miami, U., School of Med., Dept. of Surg., Div. of Otolaryngol., Fla.).
Archives of Otolaryngology, vol. 88, Aug. 1968, p. 156–161. 7 refs.
Am. Acad. of Ophthalmol. and Otolaryngol., 11th Ann. Meeting, Chicago, Oct. 28, 1967.

The effects of ionizing radiation on the inner ear of guinea pigs was studied by physiological and histologic means. The inner ear was found to be relatively radioresistant. The stria vascularis and the hair cells of the organ of Corti appear to be most susceptible to morphologic change and are felt to account for the moderate but definite depression of function. The complications and indications for irradiating the human labyrinth were discussed. It is a necessary mode of therapy in a variety of lesions but should not, or with caution, be used for certain less serious problems. Radiation may be useful as a research tool in the study of the physiology of the ear, and cochlear potentials may be useful in the study of the direct effects of radiation energy.

A68-82400
MECHANISM OF ACTION OF ETHYLENE GLYCOL ON MYOSIN A, MYOSIN B AND HEAVY MEROMYOSIN.
Georgy Kaldor (Pa., Woman's Med. Coll., Dept. of Physiol. and Biophys., Philadelphia).
Archives of Biochemistry and Biophysics, vol. 127, Sep. 20, 1968, p. 22–30. 24 refs.
Grants NIH 1-K3-NB-33 and NIH 06517.

Forty percent ethylene glycol (E.G.) strongly accelerated the ATPase activity of myocin A (MyA), myocin B (MyB) and heavy meromyosin in the presence of 0.5 M $K+$, $Rb+$ and NH_4+. 5 to 10 mM $Ca++$ inhibited 75 to 80% of the E.G. activation. In the same concentration E. G. increased the Vm of the $K+$ activated MyA ATPase and the Q_{10} without changing the order of magnitude of the Km (1×10^{-3} moles/L). Five to ten mM $Ca++$ depressed both the Vm and Km of the E.G. activated enzyme. In the presence of 40 vol.% E.G. MyA ATPase showed one broad optimal activity range between pH 7.5 and 9.0. The same enzyme in the presence of E.G. but in the absence of $Ca++$ became very sensitive to photooxidation and was inhibited by low concentrations of PCMB ($< 5 \times 10^{-5}$ M). In the presence of 5–10 mM $Ca++$ not only the activating effect of E.G. was depressed but also the increased sensitivity to photooxidation was reversed to a great extent. E.G. most probably interacted with some hydrophobic regions of the MyA molecule and certain histidine and/or SH groups of the active site became involved indirectly in the conformational change. The $Ca++$ effect can be explained by assuming that this ion in a concentration sufficiently high to saturate the active site acted as a stabilizer against the indirect attack of E.G. Superprecipitation and ultracentrifugal experiments indicated that 20 to 40 vol.% E.G. also weakened the physical interaction between actin and myosin regardless of the presence or absence of $Ca++$.

A68-82401
EFFECT OF ACETAZOLAMIDE ON ACUTE MOUNTAIN SICKNESS.
Stanley A. Forwand, Milton Landowne, John N. Follansbee, and James E. Hansen (U.S. Army Res. Inst. of Environ. Med., Natick, Mass.).
New England Journal of Medicine, vol. 279, Oct. 17, 1968, p. 839–845. 23 refs.
U.S. Army supported research.

The influence of acetazolamide on acute mountain sickness was tested in a double-blind study of 43 volunteers given acetazolamide or placebo, 250 mg. every 8 hr., for 32 hr. before and 40 hr. after abrupt transportation from sea level to 12,800 ft. In response to hypoxia, control subjects hyperventilated and developed mild respiratory alkalosis with increased blood pH and reduced carbon dioxide tension and bicarbonate within 8 hr. after arrival at altitude. These changes persisted over the five days of the study. Alkalosis was prevented in the acetazolamide-treated group, with a greater increase in ventilation and alveolar oxygen tension and a greater decrease in carbon dioxide tension and bicarbonate than in controls. Significant reductions in frequency and severity of the most prominent symptoms of acute mountain sickness—headache, insomnia and gastrointestinal symptoms—were observed in treated subjects. In control subjects, occurrence and severity of symptoms correlated well with carbon dioxide tension and poorly with pH or oxygen tension. The mechanism of the acetazolamide effect was not identified.

A68-82402
GLYCEMIA AND GLUCOSE TOLERANCE IN RATS SUBJECTED TO A DEFICIENT PROTEIN-CALORIE DIET [LA GLYCEMIE ET LA TOLERANCE AU GLUCOSE CHEZ LE RAT SOUMIS A UN DESEQUILIBRE DU RAPPORT PROTEINE-CALORIES DE LA RATION ALIMENTAIRE].
Jacques Gayet and Paul Lehr (Nancy, U., Fac. of Sci., Lab. of Gen. Physiol., France).
Comptes Rendus des séances de l'Academie des Sciences, vol. 267, Jul. 8, 1968, p. 206–209. 9 refs. In French.

Glycemia and tolerance to high quantities of glucose were evaluated in adult rats subjected to protein-free diets and partial inanition. The deprivation of alimentary protein induced hypoglycemia and a disturbance of the glucose metabolism over a period of 30 days. Past this period the glucose metabolism was abmost unchanged. Partial inanition only affected slightly the glucose metabolism.

A68-82403
COMPARISON OF THE THERAPEUTIC EFFICACY OF INJECTIONS OF ISOGENOUS FETAL LIVER OR BONE MARROW IN IRRADIATED MICE [EFFICACITES THERAPEUTIQUES COMPAREES DES INJECTIONS DE FOIE FOETAL OU DE MOELLE OSSEUSE ISOGENIQUES CHEZ LES SOURIS IRRADIEES].
Jean-Francois Duplan.
Comptes Rendus des Séances de l'Academie des Sciences, vol. 267, Jul. 8, 1968, p. 227–230. 11 refs. In French.

For an equal number of stem cells injected in the irradiated mice, the therapeutic effect of the fetal liver was 1.7 times greater than that of the bone marrow. This difference seemed to be due to a rapid increase in the number of stem cells originating from the fetal liver; their first mitosis would be preferentially of the stem cell type, subsequently the formation of the functional elements would be increased in proportion.

A68-82404
INCREASE IN THE SYNTHESIS OF SEROTININ IN THE RAT BRAIN STEM DURING DIFFERENTIAL DEPRIVATION OF PARADOXICAL SLEEP [AUGMENTATION DE LA SYNTHESE DE LA SEROTONINE DANS LE TRONC CEREBRAL CHEZ LE RAT APRES PRIVATION SELECTIVE DU SOMMEIL PARADOXAL].
Jean-Francois Pujol, Francis Hery, Micheline Durand, and Jacques Glowinski (Lyon, U., Fac. de Med., Lab. of Gen. and Exptl. Pathol., Rhône and France, Coll., Lab. of Gen. Neurophysiol., Paris).
Comptes Rendus des séances de l'Academie des Sciences, vol. 267, Jul. 15, 1968, p. 371–372. 6 refs. In French.

Experiments were done on rats to investigate the variations of brain serotonin metabolism during deprivation of rapid eye movement state (REM). The results showed *in vivo* and *in vitro* an increase in the concentration of H^3-serontonin originating from H^3-tryptophan, in the brain stem of rats differentially deprived of REM for 96 hr.

A68-82405
APOLLO AND THE UNIVERSE.
Edited by S. T. Butler and H. Messel (Sydney, U., Australia).
Oxford, Pergamon Press, 1968, 422 p.

This book is a compilation of lectures given at the University of Sydney's 1967 Summer Science School. The lecture topics range from the Apollo Project to modern atomic physics and cosmology. The lectures being six in number are given by specialists in these fields. The lecture on the Apollo Project also covers briefly other aspects of the American space program such as discussions of the Project Vanguard, the establishment of the National Aeronautics and Space Administration, and the mercury and Gemini Programs.

A68-82406
ACTION OF SMALL DOSES OF PENETRATING RADIATIONS ON THE CORTICOSUBCORTICAL INTERACTION [VOZDEISTVIE MALYKH DOZ PRONIKAIUSHCHEI RADIATSII NA KORKO-PODKORKOVYE VZAIMOOTNOSHENIIA].
G. A. Antropov, V. P. Godin, and A. V. Kolesnikova (F. F. Erisman Moscow Sci.-Res. Inst. of Hyg., Physiol. Lab., USSR).
Gigiena i Sanitariia, no. 7, Jul. 1968, p. 49–52. 12 refs. In Russian.

A study of the central nervous system of rabbits subjected to the action of γ-rays of Co^{60} showed general irradiation with small doses as two ber. for period of 20 hr. to produce changes in the reflex activity of the irradiated animal. Analyzing the dynamics of the values of conditional and nonconditional reflexes in relation to changes in the rhythm of cardiac contractions of respiration, it was supposed that irradiation results in the formation of a focus of pronounced excitation in subdortical regions of the cerebrum. A decrease in the values of conditional reflexes is apparently due to the effect induced by subcortical regions on the cortex.

A68-82407
RELATION OF DREAMING AND REM SLEEP: THE EFFECTS OF REM DEPRIVATION UNDER TWO CONDITIONS.
Rosalind Dymond Cartwright and Lawrence J. Monroe (Ill., U., Coll. of Med. Urbana).
Journal of Personality and Social Psychology, vol. 10, Sep. 1968, p. 69–74.
Grants NSF GS-649 and SIDMH 17-257.

To test the hypothesis that amount amount of rapid eye movement (REM) sleep time made up following deprivation is related to the type of behavior which replaces it, 16 subjects were deprived of REM sleep for the first one-half night for two nights under two different instructions: (a) to report whatever mental content was occurring spontaneously prior to the awakening; and (b) to repeat lists of digits forward and backward. On a third night an equal number of awakenings were made in non-rapid eye movement (NREM) sleep; one-half the subjects reported their own content, the other one-half repeated digits. REM deprivation content awakenings were followed by less REM time in the second one-half night than were the digit awakenings. These two conditions did affect REM time differently when applied during NREM sleep. The amount of REM compensation was negatively related to the amount of content judged to be dreams.

A68-82408
CEREBELLUM AND HYPERBARIC OXYGEN.
F. S. Rucci, M. L. Giretti, and M. La Rocca (Sassari, U., Ist. di Clin. Chir., Ist. di Fisiol. Umana, Sardegna, Italy).
Electroencephalography and Clinical Neurophysiology, vol. 25, Oct. 1968, p. 359–371. 39 refs.

This research analyzed the role of the cerebellum in the mechanism of the start and development of hyperoxic seizures in unrestrained, unanesthetized rats. In a first group of animals the behavior of the electrical activity of the cerebellum during hyperbaric oxygen (5 atm. abs. for two to four hr.) was investigated. Both oscillographic and polygraphic records of the electrical activity of the cerebellum were compared with those of the cerebral cortex and of various brain-stem structures. The cerebellum did not show pre-seizure activity and fired later than the extracerebellar formations. The voltage of the cerebellar records increased progressively in subsequent attacks but was consistently lower than that of the other structures. The cerebellar spikes were usually synchronous with those of the cerebral and subcortical sites. Thus the cerebellar activity induced by hyperbaric oxygen was not autochthonous but was propagated from the extracerebellar structures. In a second group of rats the effect of total cerebellectomy was investigated. The electrical activity of the cerebral cortex and of some brain-stem structures was analyzed in unrestrained, unanesthetized rats submitted to hyperbaric oxygen during the periods of unstabilized and stabilized deficiency. Cerebellectomy induced: (1) increase in pre-seizure activity (synchronization, isolated cortical spikes) in both groups of animals; (2) highly significant increase in the duration of the first attack both in unstabilized and in stabilized deficiency; and (3) highest incidence (100%) of the "status epilepticus" in the animals submitted to hyperbaric oxygen during the first ten days of the period of unstabilized deficiency. Thus the conclusion was reached that the cerebellum plays an inhibitory role in the development of the hyperoxic seizure. In a third group of experiments the effects of different cerebellar electrical stimuli on the hyperbaric attack were tested. Cerebellar stimulation did not block the hyperbaric seizures but provoked only slight inhibitory effects on the hyperoxic waves. Occasionally cerebellar stimulation provoked facilitatory effects.

A68-82409
ELECTRICAL STIMULATION OF THE OCULOMOTOR NUCLEUS: THE EFFECTS OF STIMULUS FREQUENCY.
Donald G. Pitts (USAF School of Aerospace Med., Ophthalmol. Branch, Phys.-Physiol. Sect., Brooks AFB, Tex.).
American Journal of Optometry and Archives of American Academy of Optometry, vol. 45, Sep. 1968, p. 563–573. 8 refs.

Procedures and methods for the study of the central control of accommodation by electrical stimulation are presented. Positive accommodation (an increase in the dioptric power of the eye) and negative accommodations (a decrease in the dioptric power of the eye) were found by brainstem stimulation. The frequency threshold for positive accommodation was about 4 c.p.s.; the frequency threshold for negative accommodation about 10 c.p.s. Frequencies of 60 and 90 c.p.s. were more efficient in producing positive accommodation while negative accommodation varied directly with the frequency up to the 120 c.p.s. limiting frequency. It is concluded that the central control of accommodation by the oculomotor nucleus depends somewhat on the stimulus frequency. Not all responses can be explained by frequency alone and a definitive theory must await further data analysis.

A68-82410
PERCEPTION OF SPACE AND TIME IN THE COSMOS [VOSPRIIATIE PROSTRANSTVA I VREMENI V KOSMOSE].
A. A. Leonov and V. I. Lebedev.
Moscow, Izdatel'stvo "Nauka", 1968, [116] p. 100 refs. In Russian.

Some psychophysiological problems of space and time perception under cosmic flights conditions were investigated. Characteristics of space flight dynamics and the role of the astronaut in the man-spacecraft system were related. The changes occurring in life conditions and the related psychophysiological mechanisms of space and time perception occurring in space were recounted. Weightlessness, the feeling of isolation in a confined space, emotional stress and other factors of space flights and their effects on time perception by man were examined. The sensations experienced by the Russian astronaut A. A. Leonov during his walk in space were described. Future plans for training astronauts' orientation functions during extended space missions and work-rest cycles organization on interplanetary flights were outlined.

A68-82411
ADAPTIVE THRESHOLD PROCEDURES: BUDTIF.
Richard A. Campbell and Elaine Z. Lasky (Case Western Reserve U., Cleveland, Ohio).
Journal of the Acoustical Society of America, vol. 44, Aug. 1968, p. 537–541. 14 refs.
NSF supported research.

Consideration of recent psychoacoustic research reveals that, independent of the general acceptance of the theory of signal detectability, threshold methodology continues to play a major role in the acquisition of psychoacoustic data. Although adaptive methods are widely used, the newer, finite-trial, adaptive methods are not—possibly owing to a misconception regarding the impossibility of obtaining psychometric function slopes and information other than threshold with such methods. The simplest of the finite-trial adaptive methods, the Block Up-and-Down, Two-Interval Forced-Choice (BUDTIF) method is investigated, and an attempt is made to show the feasibility and efficiency of obtaining such information with an adaptive method. Specifically, the variability and bias of repeated thresholds obtained by using human subjects with two-, four-, and eight-trial block sizes and from 16 to 144 per threshold were determined. Results indicate that, for a target performance level of 75%, a block of four trials leads to minimal between-threshold variability. Although between-threshold variability is indirectly related to the number of trials per threshold, if greater precision is necessary it would seem preferable to invest the subject's time in more short threshold runs than fewer long runs. An adaptive stopping rule is suggested.

A68-82412
VARIABLES THAT INFLUENCE SOUND PRESSURES GENERATED IN THE EAR CANAL BY AN AUDIOMETRIC EARPHONE.
Norman P. Erber (Central Inst. for the Deaf, St. Louis, Mo.).
Journal of the Acoustical Society of America, vol. 44, Aug. 1968, p. 555–562. 28 refs.
NIH supported research.

The influence of outer-ear configuration on the acoustic stimulus by a supra-aural earphone to a listener's tympanic membrane was investigated. A probe-tube microphone measured sound pressures generated in the ear canal by a TDH-49 earphone with constant electrical input. Acoustic and anatomical measurements obtained from the ears of Caucasian adults and children (male and female) were analyzed statistically. Mean sound levels measured in the ears of the adult male group were found to be lower than those obtained from the other three groups of ears at all eight test frequencies. Significant differences between groups were found at three of these frequencies. Variation between individuals was partly explained at specific frequencies by certain structural parameters of the ear. Implications of these results are discussed with respect to definition of international auditory standards, design of an improved artificial ear, accurate determination of the threshold of hearing sensitivity, comparisons of hearing between groups, and audiometric evaluation of patients with structurally abnormal ears.

A68-82413
TWO-IMAGE LATERALIZATION OF TONES AND CLICKS.
Ervin R. Hafter and Lloyd A. Jeffress (Tex., U., Dept. of Psychol. and Defense Res. Lab., Austin).
Journal of the Acoustical Society of America, vol. 44, Aug. 1968, p. 653–569. 15 refs.
NASA and ONR supported research.

When interaural differences of time and level are set into opposition, subjects may report a single image that is determined in its lateralization largely by the interaural level difference. Such images show a fairly large "trading-ratio." They may report hearing an image that is little affected by the difference of level, but is dependent largely upon the interaural difference of time. Such images show a very small trading-ratio. With practice, subjects can learn to hear and respond to both images, and center either at will. The present study is concerned with both images as they arise from tonal stimuli of various durations and rise-fall times, and from high-pass clicks.

A68-82414
SENSORY INTERACTION: PERCEPTION OF LOUDNESS DURING VISUAL STIMULATION.
Raymond S. Karlovich (Wis., U., Dept. of Commun. Disorders, Madison).
Journal of the Acoustical Society of America, vol. 44, Aug. 1968, p. 570–575. 23 refs.
Wis. Alumni Res. Found. supported research.

Eight subjects engaged in an alternate binaural loudness balance (ABLB) task utilizing the method of adjustment to explore the perception of loudness of a 300-msec.-duration 1-kHz auditory stimulus at 20 db. and 50 db. SL's. Conditions utilized were no visual stimulation during ABLB, visual stimulation in synchrony with the standard auditory stimulus during ABLB, and visual stimulation in sychrony with the comparison auditory stimulus during ABLB. The visual stimulus was a short-duration stroboscopic light flash. The data indicated that sensory interaction in terms of visual facilitation of auditory loudness does occur and is more apparent at higher rather SL's. The comparison stimulus was adjusted to a higher SL when the visual stimulus was associated with the standard auditory stimulus than when the visual stimulus was associated with the comparison auditory stimulus. The magnitude of this statistically significant difference was approximately 7 db. and implies that information presented to the visual sensory modality can affect the perception of the magnitude of information presented to the auditory sensory modality.

A68-82415
PURE-TONE INTENSITY DISCRIMINATION AND ENERGY DETECTION.
W. J. McGill and J. P. Goldberg (Calif., U., San Diego, La Jolla).
Journal of the Acoustical Society of America, vol. 44, Aug. 1968, p. 576–581. 15 refs.
NSF supported research.

A study of 1,000-Hz. intensity discrimination is reported in which single tones were identified as the louder or softer of two alternatives differing slightly in energy. Tones were phased locked and fixed in duration (150 msec.). Feedback was given following each judgment. Psychometric functions are presented and a masking curve is computed. The masking curve is found to be linear above 25-db. sensation level, and the slope is computed as 15/16. These results are interpreted as reflecting a form of energy discrimination similar to that proposed in noise masking.

A68-82416
EFFECTS OF DURATION AND RISE TIME OF TONE BURSTS ON EVOKED V POTENTIALS.
Shinjiro Onishi and Hallowell Davis (Central Inst. for the Deaf, St. Louis, Mo.).
Journal of the Acoustical Society of America, vol. 44, Aug. 1968, p. 582–591. 20 refs.
PHS supported research.

Tone bursts of 1,000 Hz. with linear on and off ramps and plateaus of various durations were used to evoke cortical (vertex) potentials in five adult subjects. With 30-msec. rise time, the amplitude, from N_1 peak to P_2 trough, and the latency to either the N_1 peak or P_2 trough were all independent of duration of the plateau from 0 to 300 msec. With 3-msec. rise time, the

amplitudes were progressively reduced when the plateau was shortened from 30 msec. to 10, 3, or 0 msec. With a long plateau, the amplitudes were nearly constant for rise times of 50 msec. or less. The latency of the V potential was prolonged at intensities of 45 db. (ISO) or less and also in relation to the slope of the onset ramp. With very gradual slope [300 msec. to reach 45 db. (ISO)], mean latency to N_1 was 169 msec. while with very steep slope [3 msec. to reach 85 db. (ISO)], it was 109 msec. Off responses showed similar relations but with smaller amplitudes and shorter (by 16 msec.) latencies. For evoked-response audiometry, the rise time of the test signal will not be critical if it is 30 msec. or less and the plateau is at least 30 msec. long, and any plateau of 30 msec. or longer will be acceptable.

A68-82417
AUDITORY PULSED DOPPLER DISCRIMINATION.
Irwin Pollack (Mich., U., Mental Health Res. Inst., Ann Arbor).
Journal of the Acoustical Society of America, vol. 44, Aug. 1968, p. 592–598. 11 refs.
NSF supported research.

Detection and relative discrimination thresholds were determined for auditory pulsed Doppler sequences. Doppler thresholds rival the extremely acute interval, or pitch, thresholds of the ear. Doppler threshold charges of less than one μsec./interval are readily obtained. Doppler thresholds suffer when temporal uncertainty, or jitter, is introduced, especially at high pulse frequencies. An attempt was made to obtain a pure measure of auditory interval gradient discrimination. Under experimental procedures that lessen the contribution of component variables, auditory interval gradient discrimination is relatively poor: interval gradient thresholds of about 25% compare with pulse number thresholds of about 10%, and with interpulse interval thresholds of about 0.1%.

A68-82418
NONAURAL LOUDNESS FUNCTIONS UNDER MASKING.
Alan M. Richards (U.S. Naval Submarine Med. Center, Groton, Conn.).
Journal of the Acoustical Society of America, vol. 44, Aug. 1968, p. 599–605. 19 refs.

Monaural sone functions are obtained for a no-noise condition and under five levels of masking noise using the method of fractionation. This method precludes the use of both ears in obtaining such functions as has been the case with dichotic loudness balance and other related procedures. The curves obtained are found to parallel previously found masked functions in one case, and in another to show a more rapid acceleration at low levels, but identical slopes above one sone. When the power function exponent of a 1000-Hz. tone is plotted against over-all sound-pressure level of a masking noise, a power transformation, which parallels that found for speech in noise, is obtained. Although no numerical calculations are presented, it appears that above 60 db. of noise the exponent grows as approximately the 0.16 power of the noise.

A68-82419
RELATION OF THRESHOLD SHIFT TO NOISE IN THE HUMAN EAR.
Heinz Weissing (Tech. U., Inst. für Elektro- und Bauakustik, Dresden, East Germany).
Journal of the Acoustical Society of America, vol. 44, Aug. 1968, p. 610–615. 21 refs.

Threshold shifts in the average human ear are dependent upon the physical parameters of the noise to which the ear is exposed. The influence of noise level can be described approximately by an exponential function. High-frequency noise components cause much greater threshold shifts than low-frequency components; the point of maximum effectiveness lies near 3,000 Hz. In summating the action of different noise components, critical bands of about one oct. width are effective. Noise components that excite different critical bands produce partial threshold shifts that are to some extent, independent of one another.

A68-82420
INTERRELATIONSHIPS BETWEEN THE CORTEX AND SUBCORTICAL BRAIN STRUCTURES IN THE REACTION TO HYPOXIA [VZAIMOOTNOSHENIIA KORY I PODKORKOVYKH OBRAZOVANII GOLOVNOGO MOZGA V REAKTSII NA GIPOKSIIU].
E. L. Golubeva and S. N. Khaiutin (USSR, Min. of Health, Moscow).
Fiziologicheskii Zhurnal SSSR, vol. 54, Aug. 1968, p. 884–892. 22 refs. In Russian.

In acute experiments on rabbits under urethane anesthesia, studies were made of the effect of a short-term inhalation of hypoxic mixtures on the electrical activity of the cortex and subcortical structures of the brain. Two types of reaction of the central nervous system to hypoxia were established. Inhalation of a gaesous mixture (7.5% O_2 in nitrogen) increased both the frequency and amplitude of respiratory movements and evoked regular rhythm 4.7/sec. (stress rhythm) in the reticular formation of the midbrain, hippocamp, nonspecific thalamic nuclei, posterior hypothalamus as well as in the parietal, temporal and occipital parts of the cortex. Desynchronization of electrical oscillations or stress rhythm was observed in the sensory motor zone. Electroencephalographic (EEG) changes in subcortical structures preceded those in the cortex. Inhalation of a mixture (5% O_2 in nitrogen) evoked slow, high amplitude polymorphous waves in the cortex and later on in the subcortical structures (depressive reaction). In spite of the identical EEG manifestations, painful and hypoxic reactions of the central nervous system exhibit different biological specificity.

A68-82421
THE EFFECT OF HYPOXIA AND OF THE HORMONES OF ADRENAL CORTEX ON THE ORIGINATION OF ACETYLCHOLINE CARDIAC SYNCOPE [VLIIANIE GIPOKSII I GORMONOV KORY NADPOCHECHNIKOV NA VOZNIKNOVENIE ATSETILKHOLINOVOI OSTANOVKI SERDTSA].
E. N. Berger and V. A. Boliarskaia (Ternopol Med. Inst., Dept. of Pathol. Physiol., USSR).
Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia, vol. 12, Jul.–Aug. 1968, p. 31–33. 5 refs. In Russian.

Hypoxia was induced in rats with the aid of the rebreathing method. Cardiac activity was recorded electrocardiographically. During the first stage of hypoxia when the sensitivity to acetylcholine was increased, intravenous injection of acetylcholine in a dose approaching the lethal one (for normal rats) provoked an irreversible arrest of the cardiac activity. During the second stage of hypoxia when the acetylcholine sensitivity was reduced administration of the same dose caused no arrest of the heart. Preliminary administration of hydrocortisone to animals prevented the irreversible cardiac arrest during the first stage of hypoxia. Desoxycorticosterone produced no such effect.

A68-82422
BIOELECTRIC RESPONSES TO ULTRASONICS AND THEIR MASKING WITH WHITE NOISE IN THE AUDITORY SYSTEM OF THE BAT *MYOTIS OXYGNATHUS* [BIOELEKTRICHESKIE REAKTSII NA UL'TRAZVUKI I IKH MASKIROVKA BELYM SHUMOM V SLUKHOVOI SISTEME LETUCHIKH MYSHEI *MYOTIS OXYGNATHUS*].

D. P. Matiushkin and A. G. Vasil'ev

Vestnik Leningradskogo Universiteta, no. 15, Aug. 1968, p. 94–101. 17 refs. In Russian.

The experiments with echo-locating bats have shown that a masking effect of white noise on ultrasonic signals may be diminished by a preliminary adjustment of the auditory system to the pick up of signals, by their optimal height and intensity as well as by the emission of sounds under the most favorable angle regarding the animal's head.

A68-82423
DYNAMICS OF ELECTROENCEPHALOGRAM AMPLITUDE CHANGES IN MAN DURING DROWSINESS AND LIGHT SLEEP (EEG GRAPHICAL DATA ANALYSIS) [DINAMIKA AMPLITUDNYKH IZMENENII ELEKTROENTSELOFALOGRAMMY CHELOVEKA V PROTSESSE RAYVITIIA DREMOTY I LEGKOGO SNA (DANNYE GRAFICHESKOI OBRABOTKI EEG)].

A. I. Pudovkin.

Vestnik Leningradskogo Universiteta, no. 15, Aug. 1968, p. 102–110. 14 refs. In Russian.

The method of numerical assessment of the electroencephalogram (EEG) for quantitative evaluation and compressed graphical presentation of long EEG records proposed by a previous worker was used. Amplitude changes of EEG were studied in healthy men (college students) at rest and drowsiness. Drowsiness and light sleep developed naturally in the subjects who were comfortably seated in a soundproof and warm experimental chamber. Detailed descriptions of two experiments with a non-alpha dominant subject are given. There are several figures in the paper which give compressed graphical presentation of continuous EEG recording during the course of the experiment. Limitations of the method, its efficiency and stability of the assessment are discussed. The deepening of drowsiness and ensuing sleep were characterized by an increase in the mean value of the amplitude index; awaking was followed by its sharp fall. Some material on changes of heart rate in the course of the experiment is given. Falling asleep was not characterized with any significant changes in the length of R – R intervals of EEG; awaking was followed by slight but quite distinct increase in the heart rate.

A68-82424
EFFECT OF INSULIN ON THE RATE OF GLYCINE-2C14 CONVERSION INTO SERINE, ASPARTIC AND GLUTAMIC ACIDS IN THE BRAIN AND LIVER [VLIIANIE INSULINA NA INTENSIVNOST' PREVRASHCHENIIA GLITSINA-2C14 V SERIN, ASPARTAT I GLUTAMAT MOZGA I PECHENI].

G. K. Khodzhaiova.

Vestnik Leningradskogo Universiteta, no. 15, Aug. 1968, p. 111–115. 9 refs. In Russian.

The influence of insulin on the metabolism of serine, aspartic and glutamic acids in the brain and liver of starved rats was studied after injection of glycine -C^{14}. The results obtained indicated that insulin decreases the conversion of glycine and serine to aspartic and glutamic acids and increases their conversion to final products.

A68-82425
EFFECT OF PHOTOSYNTHESIS AND ITS INHIBITION IN NITRATES REDUCTION OF *CHLORELLA* CULTURE [VLIIANIE FOTOSINTEZA I EGO INGIBIROVANIIA NA REDUKTSIIU NITRATOV KUL'TURNOI KHLORELLY].

A. M. Stepanova and A. A. Baranova.

Vestnik Leningradskogo Universiteta, no. 15, Aug. 1968, p. 134–139. 16 refs. In Russian.

Photoassimilation of nitrate and CO_2 in actively growing *Chlorella* culture was studied under normal conditions and using o-phenantrolin and 3-(3,4- dichlorophenyl)-1,1-dimethylurea inhibitors. The rate changes of these two processes during the growth of algae were observed to have a polar and periodic character. The same concentration of the inhibitors of photochemical phase of photosynthesis depressed both photosynthesis and nitrate photoreduction in the same degree.

A68-82426
SEARCHING FOR LETTERS OR CLOSED SHAPES IN SIMULATED ELECTRONIC DISPLAYS.

E. C. Poulton (Appl. Psychol. Res. Unit, Cambridge, Great Britain).

Journal of Applied Psychology, vol. 52, Oct. 1968, p. 348–356. 6 refs.
MRC supported research.

Sixteen men counted the number of bright symbols of a particular kind in a simulated electronic display presenting a total of between 19 and 59 symbols of 8 different kinds. In some displays all the symbols were bright, in others bright and dim symbols were mixed. Four sets of eight symbols were compared. Targets were missed less often from sets of capital letters than from sets of closed shapes ($p < .01$); thus the letters were the more easily discriminated from each other. The probability of missing at least one target increased approximately linearly with the number of targets present ($p < .01$). The rate of increase was approximately proportional to the total number of bright symbols displayed, and was somewhat greater when dim symbols were present also ($p < .05$). For a combined total of 57–59 bright and dim symbols, the probability of missing at least one target increased from about .03 per target when ten of the symbols were bright, to .09 when 26 were bright. Thirty-five percent of the underestimations were of size two or greater. The time taken to count the targets increased with the total number of bright symbols present ($p < .01$). Dim symbols tended to be counted as bright ($p < .01$).

A68-82427
EFFECT OF CONTROL PLACEMENT ON INFORMATION TRANSFER RATE USING BISENSORY SIGNALS.

A. D. Perriment (Monash U., Clayton, Victoria, Australia).

Journal of Applied Psychology, vol. 52, Oct. 1968, p. 357–361.

A 2 × 2 × 4 factorial experiment was designed to examine the effect which various display-control relationships had upon the rate at which subjects could transmit information from a bisensory display. Subjects were required to respond to a visual signal stimultaneously presented with an auditory signal of equal uncertainty. Responses were made by depressing push buttons. The three response-code variables examined were: (1) the code carried by each of the operating limbs; (2) the code carried by the operating digits of each hand; and (3) the degree of separation between the button pairs. The only variable significantly affecting information transfer rate was found to be the code carried by the operating limbs, although the other two variables combined with it to produce significant interactions. The results support the contention that the S-R expectancies, which the subject brings to the task, are important determinants of performance. The flexibility of the human component in man-machine systems is also illustrated.

A68-82428
TASK COHERENCE, TRAINING TIME, AND RETENTION INTERVAL EFFECTS ON SKILL RETENTION.
James C. Naylor, George E. Briggs, and Walter G. Reed (Ohio State U., Columbus).
Journal of Applied Psychology, vol. 52, Oct. 1968, p. 386–393. 9 refs.
Contract AF 33(616)-7269.

Amount of training, secondary task coherence, and length of retention interval, each at two levels, were evaluated in terms of long-term skill retention effects. The criterion task was composed of a three-dimensional tracking task (primary task) and a nine-event monitoring task (secondary task). Retention loss varied inversely with amount of training and with secondary task coherence (the latter only under the lesser amount of training) for both tasks. Absolute retention levels varied directly with the training and task coherence variables and inversely with retention interval. From these and previous data, task coherence emerges as an important variable in skill acquisition and retention.

A68-82429
STIMULUS VARIABLES IN VIGILANCE: SIGNAL DURATION AND INTENSITY.
W. G. Davenport (Newcastle, U., New South Wales, Australia).
Australian Journal of Psychology, vol. 20, Aug. 1968, p. 129–133. 8 refs.

Vigilance behavior was studied to evaluate the ability to detect short, low-intensity, aperiodically presented auditory stimuli over a period of 80 min. continuous watch-keeping. Four values of signal duration and of signal intensity were employed to assess the effect of each on signal detection efficiency. Results showed that both signal duration and signal intensity contributed significantly to the efficiency of signal detection over time, and that there were no differential effects of signal duration of intensity over time; that the detectability measure of a signal for stimuli above threshold level rose as both signal duration and signal intensity were increased; and that the intersignal interval did not influence the efficiency of signal detection. There was a significant decrement in detection performance over time. The model put forward by previous investigators extending signal detection theory to a vigilance situation was validated with portions of the experimental data.

A68-82430
THE AMINO ACID SEQUENCE OF *SCENEDESMUS FERREDOXIN*.
Koichi Sugeno and Hiroshi Matsubara (Calif., U., Space Sci. Lab., Berkeley).
Biochemical and Biophysical Research Communications, vol. 32, Sep. 30, 1968, p. 951–955. 13 refs.
NASA Grant NsG 479 and Grant NIH HE 11553-01.

The amino acid sequence of ferredoxin in the green alga, *Scenedemus* was determined. A total of 96 residues was observed. Two large peptides, one from residue 1–69 and other from 70–96 were obtained by cyanogen bromide cleavage. The total of 96 amino acids showed a molecular weight of 10,172. The structure and sequence were compared to ferredoxin of higher plants.

A68-82431
THE ANTICONVULSANT ACTION OF CARBON DIOXIDE: INTERACTION WITH RESERPINE AND INHIBITORS OF CARBONIC ANHYDRASE.
William D. Gray and Charles E. Rauh (Am. Cyanamid Co., Lederle Labs. Div., Dept. of Exptl. Pharmacol., Pear River, N. Y.)
Journal of Pharmacology and Experimental Therapeutics, vol. 163, Oct. 1968, p. 431–438. 32 refs.

The anticonvulsant actions of CO_2 and inhibitors of carbonic anhydrase show the following similarities: (1) they are antagonized by reserpine in both rats and mice; (2) action is restored by the administration of dl-dopa to reserpine-treated mice, indicating involvement of catecholamines; and (3) in rats, the antagonistic action of reserpine is surmountable by both agents. The two agents differ in their anticonvulsant effect in mice; antagonism by reserpine is insurmountable by carbonic anhydrase inhibitors, but is surmountable by CO_2. Treatment with methazolamide followed by CO_2 produces a greater anticonvulsant effect in mice and possibly also in rats than would be expected on the basis of a similar joint action. This phenomenon most probably is due to the enhancement of the anticonvulsant effect of methazolamide by the acidosis produced by equilibration with CO_2. Reserpine antagonism of the anticonvulsant action of CO_2 does not appear to be mediated either by changes in brain excitability or via action on the blood CO_2 buffer system. The results support the belief that the anticonvulsant action of carbonic anhydrase inhibitors is mediated by disequilibrium of the CO_2 buffer system.

A68-82432
MASS OCCURRENCE OF OCCUPATIONAL SKIN DISEASES IN A TEXTILE-PLANT DURING ANTICREASE PROCESSING OF TEXTILES [HROMADNY VYSKYT PROFESIONALNICH KOZNICH ONEMOCNENI V KONFEKCNIM ZAVODE PRI ZPRACOVANI LATEK NEMACKAVE UPRAVY].
Zdenek Kachlik.
Pracovni Lékarstvi, vol. 20, May 1968, p. 154–158. 9 refs. In Czech.

The anticrease processing of textiles is at present mostly performed by urea- or melamine-formaldehyde resins. In one and one-half yr. in a textile plant 63 cases of skin affections occurred (5.25% of all employees). Most cases occurred in women employed at sewing. Skin damages were localized mostly on the face, eye lids, skin on the chest and on the forearms and hands. A number of patients had eye complications (conjunctivitis with edema of the eye lids), ulcerous stomatitis and inflammation of the upper respiratory tract. The above effects were caused by crease-proofed fabrics which contain free formaldehyde that may be released from them. Through contact of the perspiring skin with textile dust, formaldehyde is released by hydrolysis, and skin and mucous membranes are irritated and damaged. Precautions are suggested which contain requirements for modification of the anti-crease processing technology by synthetic resins with formaldehyde concentration, dust rate reduction in plant, air conditioning of work places, pre-employment examinations and controls of formaldehyde concentration in fabrics before work.

A68-82433
FURTHER OBSERVATIONS OF THE ADAPTATION AND TRAINING UNDER MEXICAN CONDITIONS [DALSZE BADANIA ADEPTACJI I TRENINGU W WARUNKACH MEKSYKU].
I. Malarecki, M. Lukawska, and M. Firsowicz.
Wychowanie Fizyczne i Sport, vol. 12, no. 3, 1968, p. 29–32. 9 refs. In Polish.

The adaptation to strenuous efforts was investigated in the light of the changes of the maximum ceiling of oxygen consumption in groups of athletes after a total of five to six wk. sojourn and training in European mountain bases and in Mexico, as well as in groups which had come to Mexico from the lowlands. The results were assessed against the background of similar earlier investigations in which the period of adaption in Mexico was limited to 14 to 17 days only. It was found that maximum oxygen consumption during work after a longer period of adaptation, that is five to six wk., was still lower than the starting level at home, amounting on the average to 4.1 to 9.2% (in the earlier

investigations after 14 to 17 days of sojourn it amounted on the average to 11%). This means a better adaptation to work under the above conditions. This shows also that the period of five to six wk. is insufficient for full adaptation to endurance competitions. As regards technical sport competitions, such as weight lifting 8 to 15 days of training in Mexico was considered sufficient for the achievement of full sporting conditions.

A68-82434
MAXIMAL OXYGEN UPTAKE AND INCREASE IN THE CONCENTRATION OF LACTATE IN YOUNG MEN [MAKSYMALNE ZUZYCIE TLENU I ZMIANY STEZENIA MLECZANU WE KRWI U MLODYCH MEZCZYNN].
I. Wojcieszak and E. Walajtys.
Wychowanie Fizyczne i Sport, vol. 12, no. 3, 1968, p. 33–42. 26 refs. In Polish.

The aim of the investigation was to determine the maximal oxygen uptake by the direct method and with the use of a nomogram, as well as an attempt to determine the part of anaerobic mechanisms in the production of energy of maximal effort. Thirty students aged 18–24 yrs., performed maximal work of 1,800 to 2,200 kgm./min. on a cycloergometer. The heart rate, the ventilation of the lungs and the oxygen consumption were registered during work and over 15 min. of recovery. The concentration of lactate and pyruvate in venous blood was determined at rest and directly after work. Excess lactate and oxygen equivalent of the lactate increase and the excess lactate were calculated. It was found that there exists a considerable relationship between the maximum oxygen consumption during maximum work and that calculated according to nomogram. The determination of the maximum oxygen consumption made on the basis of the nomogram may serve as control for the determination of the maximum oxygen consumption during work. A better correlation was obtained between the directly measured respiratory oxygen debt and lactate concentration and lactate increase expressed as oxygen equivalents than between the oxygen debt and the excess lactate expressed as oxygen equivalents. The share of the changes of lactate pyruvate in the production of energy during maximal work may be found by the determination of the complete lactate increase or the complete lactate concentration after work.

A68-82435
THE EXOSMOSIS OF FREE AMINO ACIDS FROM NORMAL HUMAN SKIN.
Radu Dumitriu and Mioara Cârsteanu (Rumania, Acad. of the Socialist Rep., Inst. of Biochem. and Min. of Health, "Colentina" Center of Dermato-Venerol., Bucharest).
Revue Roumaine de Biochimie, vol. 5, no. 2, 1968, 1. 107–111. 23 refs.

The exosmosis of the free amino acids from normal human skin was investigated. The amino acids obtained by exosmosis in solution were passed through a Zerolit column, eluted, separated by chromatography and quantitatively determined by photometry. The results show that from the connective tissue of the skin, by exosmosis 12 amino acids could be separated; from the upper layers of the skin considerable amounts of methionine, histidine and cysteine respectively cystine were exosmosed. In the process of exosmosis very small amounts of glycine and proline respectively hydroxyproline passed in solution from the skin, amino acids occurring as largest amounts in the collagen molecule.

A68-82436
DNA SPECTROPHOTOMETRIC CHARACTERIZATION AFTER IRRADIATION *IN VIVO*. 2. THERMIC TRANSITION AND INFLUENCE EXERTED BY RADIOPROTECTIVE (AET) AND RADIOSENSITIZING (COACARBOXYLASE) SUBSTANCES.
Maria Furnică (Oncol. Inst., Bucharest, Rumania).
Revue Roumaine de Biochimie, vol. 5, no. 2, 1968, p. 113–120. 20 refs.

Thermic properties (Tm, $\Delta 2/3$, ΔT) of DNA extracted from liver of rats irradiated by lethal doses (900 r) or nonlethal ones (300 r) were studied, in order to render evident eventual structural changes, undergone by DNA macromolecules after irradiation *in vivo*. An increased resistance to heat action (TM = 90° C.) of DNA extracted from animals irradiated by lethal doses is found, but only in late phases of irradiation (after 10 days). Administering of cocarboxylase + irradiation with 900 r hastens the effect, increasing of Tm being found even three days after irradiation (Tm = 87.7° C.). Irradiation after administering of aminoethylisothiuronium diminishes the irradiation effects, namely DNA extracted after 10 days is less resistant to heat action (Tm = 87.5° C.). It is also found out that transition width, although equal in absolute values for the various DNA preparations, is situated in different temperature ranges in the case of DNA irradiated by lethal doses, against the one irradiated by nonlethal doses or the normal one.

A68-82437
SUPPRESSION OF BEHAVIOR BY TIMEOUT PUNISHMENT WHEN SUPPRESSION RESULTS IN LOSS OF POSITIVE REINFORCEMENT.
Arnold Kaufman and Alan Baron (Wis., U., Milwaukee).
Journal of the Experimental Analysis of Behavior, vol. 11, Sep. 1968, p. 595–607. 20 refs.
Grants NIMH 08430 and NSF GB 4004.

This investigation, using rats as subjects and punishment by timeout for responses maintained on a ratio schedule, sought to determine whether behavior would be suppressed by timeout punishment when such suppression also reduced reinforcement density or frequency. A series of experiments indicated that timeout punishment suppressed responding, with the degree of suppression increasing as a function of the duration of the timeout period. Suppressive effects were found to decrease as a function of increases in deprivation (body weight) and were eliminated when the punished response also was reinforced. It was concluded that timeout can produce aversive effects even when loss of reinforcement results. An alternative interpretation of the findings, based on the effects of extinction periods and delay of reinforcement on chained behavior, was discussed.

A68-82438
FIXED-RATIO PUNISHMENT BY TIMEOUT OF CONCURRENT VARIABLE-INTERVAL BEHAVIOR.
John R. Thomas (Inst. for Behavioral Res., Silver Spring, Md.).
Journal of the Experimental Analysis of Behavior, vol. 11, Sep. 1968, p. 609–616. 22 refs.
NASA Grant NsG-450.

Pigeons' responding was maintained by two concurrently available variable-interval reinforcement schedules. A fixed-ratio punishment schedule of timeout periods from the concurrent reinforcement schedules was arranged for responding during one of the variable-interval schedules. The greater the probability of a timeout after a response on the punished variable-interval schedule (the smaller the fixed ratio that produced timeout) the greater the decline in the relative punished response rates. Relative reinforcement rates remained invariant when relative response rates declined. Both behavioral contrast and induction effects were observed on the unpunished variable-interval schedule as a function of timeout punishment of the other schedule.

A68-82439
EFFECTS OF STRESS ON THE METABOLISM OF NOREPINEPHRINE, DOPAMINE AND SEROTONIN IN THE CENTRAL NERVOUS SYSTEM OF THE RAT. 1. MODIFICATIONS OF NOREPINEPHRINE TURNOVER.
Anne-Marie Thierry, France Javoy, Jacques Glowinski, and Seymour S. Kety (France, Coll., Lab. de Neurophysiol. Gén., Unité de Neuropharmacol. Biochim., Paris).
Journal of Pharmacology and Experimental Therapeutics, vol. 163, Sep. 1968, p. 163–171. 32 refs.
Intern. Neurochem. Soc., First Meeting, Strasbourg, Jul. 1967.
Grant NIMH MH 12017; Paris, U., Inst. Natl. de la Sante et de la Rec. Méd.; and Soc. des Usines Chim. Rhone-Poulenc supported Research.

The effect of stress on the metabolism of norepinephrine (NE) dopamine and serotonin (5-hydroxytryptamine; 5HT) in the central nervous system of the rat was examined. Estimations of turnover of NE were made by following the changes in NE specific activity after labeling the endogenous stores of NE by intracisternal injection of H^3-NE. Stress induced by mild electric shocks to the feet did not significantly affect the endogenous content of NE but did markedly increase the turnover of this amine in central NE-containing neurons, mainly in the brainstem-mesencephalon and in the spinal cord. The disappearance of H^3-dopamine in the striatum and brainstem-mesencephalon was not affected under these conditions. This stress increased the synthesis of 5HT in the brainstem-mesencephalon as seen by the greater increase of endogenous 5HT after monoamine oxidase inhibition but did not affect the dissappearance of intracisternally administered H^3-5HT. Changes in NE turnover regulation induced by electric foot shocks were studied in various conditions. There was an enhanced turnover of NE in the brainstem-mesencephalon when higher intensities of stimulation were used; this was associated with an increased accumulation of H^3-normetanephrine; no modification was seen when the frequency of stimulation was increased. NE turnover during an acute stress session was enhanced to a greater degree when rats were previously subjected to many stress sessions. The initial accumulation of H^3-NE in the brainstem-mesencephalon was decreased just after an acute stress and increase 24 hr. after the last electric shock stress session of a chronic stress treatment.

A68-82440
MECHANISM OF MONOMETHYLHYDRAZINE EXCRETION BY THE MAMMALIAN KIDNEY.
Fredric L. Coe, Robert W. Howe, and James A. Goetting (USAF School of Aerospace Med., Biosci. Div., Pharmacol.-Biochem. Branch, Brooks AFB, Tex.).
Journal of Pharmacology and Experimental Therapeutics, vol. 163, Sep. 1968, p. 216–221.

Renal pathways for excretion of monomethylhydrazine (MMH) have been studied by standard clearance methods. The renal handling of this substance is quite similar to that of hydrazine, its parent base. MMH is excreted by a combination of glomerular filtration, passive diffusion-mediated reabsorption and simulatanous tubular secretion. The secretion process has a limited capacity for MMH transfer and can be inhibited by 2,4-dinitrophenol. The percentage of the filtered load of MMH excreted is influenced by urine pH. It approximates 100% below pH 6.5 and falls to 20% above pH 7.

A68-82441
LATERAL LOCALIZATION OF 0 DEGREE- OR NEAR-0 DEGREE-ORIENTED SPEECH SIGNALS IN ANECHOIC SPACE.
Mark B. Gardner (Bell Telephone Labs., Inc., Murray Hill, N. J.).
Journal of the Acoustical Society of America, vol. 44, Sep. 1968, p. 797–802. 34 refs.
Acoust. Soc. of Am., 73rd Meeting, New York, Apr. 20, 1967.

Many studies have been made of man's ability to localize various types of sounds under various acoustic conditions. Of particular interest in loudspeaker reception is the ability to localize transient-type signals that originate at or near the intersection of the horizontal and median planes, i.e., in the region directly in front of the listener. The present study explores this ability for high quality speech signals in noise-free, anechoic space. It was found that, under such test conditions, the average error of lateral or angular localization was 1.5°. In addition, an average individual bias of 1.1° and a group bias of less than ±0.1° were also found. When the speed signals were presented over a wide range of levels from a source located among similar units displayed at various angles and distances from the observer, Zool., angular shifts as large as 5° were observed in the apparent lateral position of the source.

A68-82442
AUDITORY FLUTTER FUSION AND ENVELOPE OF SIGNAL.
F. Harbert, I. M. Young, and C. H. Wenner (Jefferson Med. Coll., Dept. of Otolaryngol., Philadelphia, Pa.).
Journal of the Acoustical Society of America, vol. 44, Sep. 1968, p. 803–806. 9 refs.
NIH supported research.

Auditory-flutter fusion (AFF) threshold measurements were made for pure tones and white noise by varying the rise and decay time. The tests were conducted with trained, normal-hearing subjects and also those with pathological ears. Off time was the major factor in determining the AFF threshold. The off time required to obtain AFF threshold was dependent upon the rise and decay time and followed a definite pattern referred to in the derived equation. There was no relationship between on time and AFF threshold. Other variables such as testing intensity level, interruption rate, and stimulus components did not provide any statistically significant alteration of AFF threshold. AFF thresholds were similar for both normals and pathologicals with and without abnormal adaption.

A68-82443
LATERALIZATION THRESHOLD OF A SIGNAL IN NOISE.
T. Houtgast and R. Plomp (Inst. for Perception RVO-TNO, Soesterberg, The Netherlands.).
Journal of the Acoustical Society of America, vol. 44, Sep. 1968, p. 807–812. 16 refs.
Haute Autorité de la Communauté Européenne du Charbon et de l'Acier supported research.

Experiments are described in which the accuracy of the perceived lateral position of a signal against a continuous background of making noise is determined. Both signal and masker consisted of octave bands of thermal noise, with the same center frequency of 500 Hz. The signal-to-noise ratio and signal duration served as parameters. The results can be understood on the statistical basis, the random fluctuations due to internal noise are found to have a standard deviation of about 80 μsec. It appeared that, as a result of the increase of the sound-pressure level, the onset part of the signal contributes more to the lateral position perceived to the ongoing part does. The relation to the precedence effect is discussed. The statistical procedure underlying the accuracy of the lateral position perceived suggests an approach relaxed pre-stress masking level difference effect based on a masking pattern in the binaural-hearing mechanism.

A68-82444
EFFECT OF SIGNAL DURATION ON DETECTION FOR GATED AND FOR CONTINUOUS NOISE.
Ann Tucker, Paul I. Williams, and Lloyd A Jeffress (Tex., U., Dept. of Psychol. and Defense Res. Lab., Austin).
Journal of the Acoustical Society of America, vol. 44, Sep. 1968, p. 813–816. 12 refs.
NASA and ONR supported research.

A series of two-alternative forced-choice experiments showed that for short durations, the detection of a tonal signal in noise when the two are gated synchronously is superior to the detection of the signal in a background of continuous noise. The experiments also showed that for gated signal and noise, there is a steady improvement in detection as the duration is shortened, provided that highly practiced observers are employed in the task. Native observers exhibit a similar trend, but their performance drops at the short durations (5 and 10 msec.) when the listening task becomes very difficult.

A68-82445
MODIFICATION OF LETHALITY AND MUTAGENESIS BY GROWTH INHIBITION OF ULTRAVIOLET-IRRADIATED ESCHERICHIA COLI STRAIN B/R.
Ruth F. Hill (Columbia U., Dept. of Radiol., Radiol. Res. Lab., New York City, N. Y.).
Journal of General Microbiology, vol. 52, part 2, Jul. 1968, p. 261–270. 26 refs.
Contract AEC AT-(30-I)-2740.

The influence of post-irradiation growth inhibition on survival and absolute yields of prototropic mutants has been studied in *Escherichia coli* B/R, u.v.-irradiated in the lag and logarithmic phases of the growth cycle. Without post-irradiation growth inhibition, survival and yields of mutants were higher for logarithmic phase cells. Post-irradiation growth inhibition reduced yields of mutants from both types of cells to similar extents and markedly increased the survival of logarthmic phase cells, both after small and large u.v. doses. In the case of lag phase cells, a survival increase mediated by post-irradiation growth inhibition could only be observed by giving a large u.v. dose or by inhibiting repair of damage occurring after plating for colony formation. Post-irradiation growth inhibition was observed to have two effects–one tending to increase survival and another tending to enhance lethality. The results indicate that observable effects of post-irradiation growth inhibition on survival and induced mutation in *E. coli* B/R and whether or not such effects are correlated depend upon a number of factors. These include: (1) relative amounts of repair occurring during growth inhibition and during subsequent growth; (2) heterogeneity of the population with respect to growth phase, intrinsic repair ability and amount of damage; and (3) relative contributions of increased repair and increased killing–both mediated by post-irradiation growth inhibition.

A68-82446
FREE AMINO ACIDS IN BLOOD OF HIBERNATING AND NON-HIBERNATING HEDGEHOGS AND GOLDEN HAMSTERS, AND IN COMMON FROGS ACCLIMATED TO DIFFERENT AMBIENT TEMPERATURES.
Rolf Kristoffersson and Saara Broberg (Helsinki, U., Dept. of Physiol. Zoo., Finland).
Annales Academiae Scientiarum Fennicae, Ser. A, IV. Biologica, 130, 1968, 22 p. 24 refs.
Natl. Res. Council for Sci. supported research.

The pattern of free amino acids in the blood serum of hedgehogs in relation to seasonal and hibernation cycles is described. Among the awake animals outside the hibernation season the group studied in spring revealed a somewhat different pattern of amino acids from that of the other two groups analyzed in the fall. The amino acid pattern of hibernating hedgehogs differed from that found in awake animals: lysine, valine, leucine isoleucine and ornithine were present in hibernating animals at relatively high levels. Spontaneous arousals during the hibernation cycle in midwinter are accompanied by an abundant increase of free amino acids in the blood serum, resulting in an amino acid pattern dissimilar from that found in hibernating animals or in awake animals outside the hibernation season. The effect of hibernation and spontaneous arousals on the amino acid pattern in the blood serum of another type of hibernator, the golden hamster, is described. In the latter species at least lysine, leucine and ornithine are present at relatively high levels during hibernation as compared with their concentrations in animals outside the hibernation season. Increase of the ambient temperature (from 5° to 20°C.) leads to a rise of about 80% in the free amino acid level in the blood plasma of the common frog.

A68-82447
MUSCLE REFLEX CHANGES UNDER EMOTIONAL STRESS.
Kurt Boman and Erkki Kivalo (Helsinki, U., Dept. of Neurol., Finland).
Annales Academiae Scientiarum Fennicae, Ser. A, V. Medica, 135, 1968, 19 p. 30 refs.
Signe och Ane Gyllenbergs Stiftelse supported research.

The effect of emotional stress on myotatic reflexes of 33 healthy students was investigated. The subjects were seated in a convenient chair and under identical quiet circumstances knee jerks were elicited by the same supramaximal mechanical stimulus with a frequency of two/min. during a period of two to three hr. The angular biophysical, movements were recorded by an electric goniometer. Fifteen subjects were examined in this way twice or more often. In the first series the basis reflex activity was recorded only, but in the second series the subjects had to perform hard mental arithmetics during a period of 30 to 45 min. after a relaxation time of about 40 to 60 min. Eighteen subjects were examined only once similar to the subjects in the second series described above. The values of the jerk amplitudes obtained under relaxed pre-stress circumstances compared with those obtained under emotional stress. During the emotional stress a marked increase in the jerk amplitudes varying between 4.5 and 13.3 degrees was observed in 16 subjects and a slight to moderate increase varying between 0.1 and 3.6 degrees in 10 subjects. A marked decrease in jerk amplitude values varying between 4.5 and 8.5 degrees was seen in four cases and a slight to moderate decrease varying between 0.3 to 2.3 degrees in three cases. It is concluded, that emotional factors can exert a marked influence on the fusimotor system, which regulates principally the excitability of the myotatic reflexes. During emotional stress also clonic reflexes, an increased number of leg oscillations and an increased angular velocity of the free swinging leg were observed. The results are discussed.

A68-82448
VENUS: ESTIMATES OF THE SURFACE TEMPERATURE AND PRESSURE FROM RADIO AND RADAR MEASUREMENTS.
A. T. Wood, Jr., J. B. Pollack (Harvard Coll. Obs., Cambridge, Mass.), and R. B. Wattson (Smithsonian Astrophys. Obs., Cambridge, Mass.).
Science, vol. 162, Oct. 4, 1968, p. 114–116. 16 refs.
NASA Grant NGR-09-015-023.

The radio brightness temperature and radar cross section spectra of Venus are in much better accord with surface boundary conditions deduced from a combination of the Mariner V results and the radar radius than those obtained by the Venera 4 space probe. The average surface temperature and pressure are approximately 750°K and 90 atm.

A68-82449
CHEMICAL ANALYSIS OF THE MOON AT THE SURVEYOR VII LANDING SITE: PRELIMINARY RESULTS.
Anthony L. Turkevich (Chicago, U., Chem. Dept. and Enrico Fermi Inst., Ill), Ernest J. Franzgrote (Jet Propulsion Lab., Pasadena, Calif.), and James H. Patterson (Argonne Natl. Lab., Chem. Div., Ill.).
Science, vol. 162, Oct. 4, 1968, p. 117–118. 7 refs.
NASA Contracts 7-1000 and NASA 951347; AEC supported research.

The alpha-scattering experiment aboard Surveyor VII has provided a chemical analysis of the moon in the area of the crater Tycho. The preliminary results indicate a chemical composition similar to that already found at two mare sites, but with a lower concentration of elements of the iron group (titanium through copper).

A68-82450
PHYSIOLOGICAL INVESTIGATIONS OF WORK LOAD WITH THE CIRCULATION CONTROLLING APPARATUS "PHYSIOMAT" [ARBEITSPHYSIOLOGISCHE BELASTUNG-SUNTERSUCHUNGEN MIT DEM KREISLAUFKONTROLL-GERAT "PHYSIOMAT"].
A. Fuchs-Schmuck and H. J. Naumann (Med. Akad. "Carl Gustav Carus", Inst. für Arbeitshyg., Dresden, East Germany).
Das Deutsche Gesundheitswesen, vol. 23, Jul. 4, 1968, p. 1280–1283. 28 refs. In German.

As has been proved by studies of work on the bicycle ergometer, the electronic circulation-controlling appliance Physiomat can also be applied on labor physiology. A fixed measuring arm is the prerequisite for a recording of the blood pressure and pulse parameters according to the Riva-Rocci-Korotkow method or oscillation method free from disturbances. Due to the indication of mean values, temporary pulse changes are not recorded. The appliance is particularly efficient if the circulator exposure does not exceed a steady state behavior.

A68-82451
RELATIONSHIP OF BEAM SUBSTRATES AND CERTAIN INTESTINAL BACTERIA TO GAS PRODUCTION IN THE DOG.
Edmund A. Richards, F. R. Steggerda, and A. Murata (Ill., U., Dept. of Physiol. and Biophysics, Urbana).
Gastroenterology, vol. 55, Oct. 1968, p. 502–509. 28 refs.
Contract USDA 6963-71.

In vivo and *in vitro* tests indicated that certain anaerobic bacteria in the small and large intestine of dogs are closely related to gas production in the presence of navy bean and soybean products. The characteristic high carbon dioxide and hydrogen content of the gas produced in the *in vitro* experiments gives support to the assumption that the gas production is closely related to fermentation by the clostridia type of bacteria. Gas production in the presence of bean homogenates was completely inhibited with antibiotic and bacteriostatic agents. After injection of gas-producing bean products into intestinal loops the numbers of anaerobic spore-forming organisms present on mucosal samples of the ileum and colon were markedly increased. The methods used in this study can be used effectively for detecting the presence of gas-producing factors in foods.

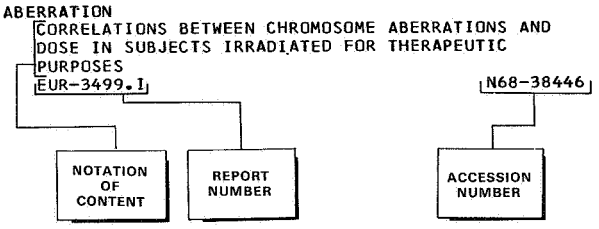
A68-82452
SOURCES OF HCl AND HF IN THE ATMOSPHERE OF VENUS.
Robert F. Mueller (NASA, Goddard Space Flight Center, Planetol. Branch, Greenbelt, Md.).
Nature, vol. 220, Oct. 5, 1968, p. 55–57. 14 refs.

Correlations between the physical conditions of Venus and the chemistry of the atmosphere and lithospere were discussed. The data were taken from measurements made from the Venera 4 and other planetary probes. Abundance data for HCl and HF were studied in an attempt to determine the sources of HCl and HF in the atmosphere. The thermodynamic relations of HCl and HF on Venus indicate some interesting features. There can be no relations between the atmospheric abundance and those of the hypothetical solar nebula. The reactive constituents are not derived by any simple degassing process, although they are, according to the hypothesis presented, closely related to the lithospheric minerals. A better approach seems to be view this relation as a two way process in which absorption is equal in importance to volatization. The extensive reaction with surface material implied by the data takes some emphasis from the role of volcanism in determining the atmospheric characteristics. The HCl and HF relations have important implications in comparative planetology, particularly in relation to the history of halogens on Earth.

Subject Index

AEROSPACE MEDICINE AND BIOLOGY / *a continuing bibliography* JANUARY 1969

Typical Subject Index Listing



A Notation of Content, rather than the title of the document, appears under each subject heading; it is listed under several headings to provide multiple access to the subject content. The accession number is located beneath and to the right of the Notation of Content, e.g., N68-12345. Under any one subject heading, the accession numbers are arranged in sequence.

A

ABIOGENESIS
ABIOGENESIS, DISCUSSING HYDROGEN, OXYGEN, CARBON, NITROGEN AND SULFUR CONVERSION INTO AMINO ACIDS FOR SIMPLE ORGANIC COMPOUNDS FORMATION A68-45397

SOVIET COLLECTION OF ARTICLES ON ABIOGENESIS AND INITIAL STAGES OF EVOLUTION OF LIFE A68-45573

LIFE ORIGIN ON EARTH, DISCUSSING GRADUAL FORMATION OF HIGHLY COMPLEX CARBONACEOUS COMPOUNDS COMPOSING MULTIMOLECULAR SYSTEMS A68-45574

MULTISTAGE GAS EVOLUTION IN EARTH CRUST AND ATMOSPHERE AND RELATION TO ORIGIN OF LIFE A68-45575

ORGANIC COMPOUNDS OF METEORITES, PREBIOLOGICAL EVOLUTION OF ORGANIC MATTER AND ORIGIN OF LIVING MATTER A68-45577

PREBIOLOGICAL EVOLUTION OF PROTEIN SUBSTANCES DEMONSTRATED BY SYNTHESIS OF COMPLEX AMINO ACID COMBINATIONS BY UV RAY EXPOSURE A68-45579

SYNTHESIS OF BIOLOGICALLY ACTIVE ORGANIC SUBSTANCES IN AQUEOUS MEDIUM UNDER ULTRASONIC WAVE ACTION RELATED TO PRIMORDIAL FORMATION OF EARTH A68-45580

ASYMMETRIC ADSORBENTS AND CATALYSTS SIMULATING ENZYME EFFECTS STUDIED FOR ROLE IN OCCURRENCE OF ORGANIC COMPOUNDS IN NATURE A68-45581

MATCHING DIFFUSION PROCESSES AND CHEMICAL REACTIONS IN STUDY OF EVOLUTION OF OPEN BIOCHEMICAL SYSTEMS A68-45582

ORGANIZATION PRINCIPLE AND SIMULATION OF ENZYMATIC PROCESSES IN COACERVATE SYSTEMS, DISCUSSING POLYMERIZATION A68-45584

INORGANIC POLYPHOSPHATES PARTICIPATION IN ORGANIC COMPOUND SYNTHESIS ON PRIMEVAL EARTH, DISCUSSING POLYPHOSPHATE ROLE IN PRIMEVAL ORGANISM METABOLISM A68-45587

ABSORBERS (MATERIALS)
AMINO ALCOHOL REGENERABLE ABSORBERS OF CARBON DIOXIDES TOXICOLOGICAL CHARACTERISTICS, DISCUSSING ABSORBING ABILITY IN RATS A68-43886

ACCELERATION PROTECTION
DRUGS FOR PROTECTION AND STIMULATION OF BIOLOGICAL FUNCTIONS OF SPACECREWS, NOTING EXPERIMENTAL RESULTS ON TRANSVERSE-ACCELERATION RESISTANCE OF ANIMALS A68-46145

ACCELERATION STRESSES (PHYSIOLOGY)
ACCELERATION EFFECTS ON CELLULAR AND SUBCELLULAR STRUCTURES ENZYME ACTIVITY IN HUMANS AND ANIMALS, NOTING CHANGES RESULTING FROM CHANGED PERMEABILITY OF MEMBRANES A68-43880

RATS SENSITIVITY TO ACCELERATIONS FOUND DEPENDENT ON EXCITATION-INHIBITION RATIO IN CENTRAL NERVOUS SYSTEM AND HYPOPHYSIAL-ADRENAL SYSTEM REACTIONS DURING ACOUSTIC EXCITATION A68-43881

TRANVERSE ACCELERATIONS EFFECT ON DOGS GASTROINTESTINAL TRACT SECRETORY ACTIVITY, NOTING CENTRAL NERVOUS SYSTEM ROLE A68-43882

POSSIBLE ARTIFICIAL GRAVITY MAGNITUDE BASED ON BIOELECTRICAL POTENTIAL OF SKELETAL MUSCLES AND CARDIAC AND RESPIRATORY ACTIVITY A68-44111

ACCELERATION FIELDS STRONGER THAN EARTH GRAVITY BIOLOGICAL EFFECT ON MATURE BODY SIZE OF ANIMALS A68-44152

AVIATOR BLACKOUT DUE TO RETINAL HYPOXIA DURING ACCELERATION STRESS, DISCUSSING PHOTOGRAPHIC OBSERVATIONS OF RETINAL ARTERY AND VEIN COLLAPSE IN OPTIC DISK REGION
IAF PAPER B-139 A68-44229

SUPERSONIC TRANSPORTATION MEDICAL PROBLEMS DUE TO HIGH SPEED, ACCELERATION AND ALTITUDE, DISCUSSING FLIGHT PATHS, PRESSURIZED CABINS SAFETY AND PASSENGER PSYCHOLOGY A68-45657

ENZYMATIC ACTIVITY OF MONOAMINOXIDASE IN ORGANS AND INTESTINES OF WHITE RATS SUBJECTED TO LATERAL ACCELERATIONS A68-45773

REACTIVITY OF ANIMALS TO CAFFEINE AND STRYCHNINE DURING TRANSVERSE ACCELERATION AFTEREFFECTS A68-45920

CUMULATIVE EFFECT OF IMPACT ACCELERATION ON PHYSIOLOGICAL FUNCTIONS OF RATS, STUDYING PARTICULARLY LUNG LESIONS A68-46113

OXYGEN METABOLISM CHANGES IN MUSCULAR AND BRAIN TISSUES OF ANIMALS EXPOSED TO PROLONGED TRANSVERSE ACCELERATIONS, EXAMINING OXYGEN CONSUMPTION AND BODY TEMPERATURE A68-46114

EXPOSURE TO ACCELERATION AND PROLONGED CONFINEMENT IN BED STUDIED FOR EFFECTS ON FUNCTIONAL STATE OF HUMAN STOMACH A68-46124

WATER-SALT METABOLISM CHANGES FROM PROLONGED CONFINEMENT IN BED FOLLOWING EXPOSURE TO ACCELERATION INDICATING DEHYDRATION AND DECALCIFICATION A68-46125

REGIONAL PULMONARY ARTERIAL-VENOUS SHUNTING IN DOGS EXPOSED TO ACCELERATION IN DIFFERENT BODY POSITIONS A68-82272

EFFECT OF CYSTAMINE AND DERIVATIVES IN MICE AND

B

C

D

E

F

G

H

I

M

N

O

P

Q

R

S

T

U

V

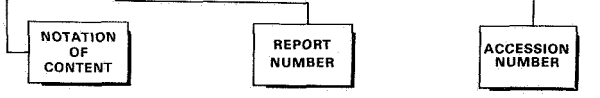
W

X

Corporate Source Index

Typical Corporate Source Index Listing

AEROSPACE MEDICAL DIV. AEROSPACE MEDICAL RESEARCH LABS. /6570TH/, WRIGHT-PATTERSON AFB, OHIO.
VISUAL FIXATION AND UNCERTAINTY EFFECTS ON HUMAN REACTION TIME AT CONTROL PANEL
AMRL-TR-65-149 N68-21110



A Notation of Content, rather than the title of the document, appears under each corporate source. The accession number is located beneath and to the right of the Notation of Content, e.g., N68-12345. Under any one corporate source, the accession numbers are arranged in sequence.

A

AERONAUTICAL RESEARCH COUNCIL /GT. BRIT./
PILOT RESPONSE DURING TSR-2 AIRCRAFT FLIGHTS THROUGH TURBULENCE
ARC-CP-997 N68-37139

AEROSPACE MEDICAL DIV. AEROSPACE MEDICAL RESEARCH LABS. /6570TH/, WRIGHT-PATTERSON AFB, OHIO.
APPLICATION OF RANQUE- HILSCH VORTEX TUBE TO AIRCREW COOLING PROBLEMS
AMRL-TR-67-124 N68-36877

AIR FORCE MISSILE DEVELOPMENT CENTER, HOLLOMAN AFB, N. MEX.
DATA PROCESSING PROCEDURES FOR ANALYSIS OF ELECTROENCEPHALOGRAPHICAL TRACINGS FROM SLEEP DEPRIVATION STUDIES
MDC-TR-67-106 N68-36442

AIR FORCE SYSTEMS COMMAND, WRIGHT-PATTERSON AFB, OHIO.
HUMAN OPERATOR PERFORMANCE ADAPTATION UNDER STRESS FOR CYBERNETIC SIMULATION
FTD-HT-67-337 N68-36484

THRESHOLD ELEMENTS IN SELECTION AND DISCRIMINATION PROCESS OF PATTERN RECOGNITION
FTD-HT-23-1044-67 N68-38337

U. S.S.R. INFORMATION SUMMARY ON WEIGHTLESSNESS IN SPACE ENVIRONMENT AND EFFECTS ON HUMANS
FTD-MT-66-157 N68-38453

MAN AND TECHNOLOGY
FTD-MT-24-328-67 N68-38478

ARMED FORCES RADIOBIOLOGY RESEARCH INST., BETHESDA, MD.
EFFECT OF PREIRRADIATION AND POSTIRRADIATION ERYTHROPOIETIC STIMULATION ON SURVIVAL FOLLOWING EXPOSURE TO HEMATOPOIETICALLY LETHAL X RAY DOSES
AFRRI-SR68-13 N68-38099

ARMY AEROMEDICAL RESEARCH UNIT, FORT RUCKER, ALA.
PERFORMANCE AND NOISE ENVIRONMENT TESTS ON PROTECTIVE HELMETS
USAARU-69-1 N68-38197

ATOMIC ENERGY OF CANADA, LTD., CHALK RIVER /ONTARIO/.
DOSE DISTRIBUTIONS NEAR ISOTROPIC POINT AND PLANE BETA SOURCES IN AIR AND WATER FOR 37 NUCLIDES CALCULATED FROM MONOENERGETIC ELECTRON DOSE DISTRIBUTIONS - TABLES
AECL-2793 N68-36760

AZTEC SCHOOL OF LANGUAGES, INC., ACTON, MASS.
GAMMA RADIATION EFFECTS ON REPRODUCTIVE SYSTEM AND EMBRYONIC DEVELOPMENT OF FROGS
NASA-TT-F-11966 N68-36318

B

BAYLOR UNIV., WACO, TEX.
EFFECTS OF STRESS ON HUMAN PERFORMANCE OF DISCRETE AND CONTINUOUS AVOIDANCE TASKS N68-36700

BROOKHAVEN NATIONAL LAB., UPTON, N. Y.
INFLUENCE OF EXTRACORPOREAL IRRADIATION OF BLOOD AND LYMPH ON LYMPHOPOIESIS AND IMMUNITY
BNL-12300 N68-36472

MAMMALIAN CELL AND MAMMAL SURVIVAL AFTER EXPOSURE TO IONIZING RADIATIONS
BNL-12581 N68-36719

C

CALIFORNIA UNIV., LIVERMORE. LAWRENCE RADIATION LAB.
SOLUTIONS OF TIME-DEPENDENT DIFFERENTIAL EQUATIONS FOR TAUTOMERIC INTERCONVERSION IN A-T AND G-C BASE PAIRS OF DNA
UCRL-50412 N68-38367

CALIFORNIA UNIV., LOS ANGELES.
REACTION TIME AND CHOICE CONFIDENCE STUDIES OF AUDITORY SIGNAL PERCEPTION IN HUMANS
N68-36808

CITY UNIV. OF NEW YORK.
AMBIGUOUS VISUAL SIGNAL DETECTION DURING IMAGE PERCEPTION
AFOSR-68-1622 N68-36400

COMMISSARIAT A L ENERGIE ATOMIQUE, SACLAY /FRANCE/.
MATHEMATICAL RELATIONS ESTABLISHED FOR ABSORBED DOSE, KERMA, AND EXPOSURE FOR ELECTRONS AND PHOTONS
CEA-R-3424 N68-36999

CONDUCTRON-MISSOURI, ST. CHARLES.
FEASIBILITY, ECONOMIC, AND MILITARY CONSIDERATIONS OF SYNTHETIC FLIGHT TRAINING SYSTEM
NAVTRADEVCEN-68-C-0108-1 N68-38435

D

DEPARTMENT OF TRANSPORTATION, WASHINGTON, D. C.
ANTIHISTAMINE COMPOUNDS EFFECTS ON PSYCHOMOTOR PERFORMANCE AND PHYSIOLOGICAL RESPONSES AT THREE SIMULATED ALTITUDE LEVELS
AM-68-15 N68-36017

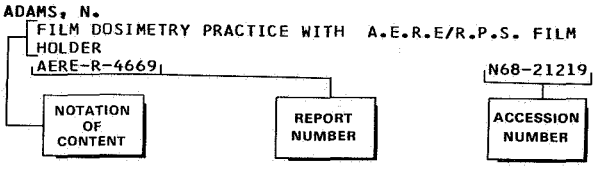
DEUTSCHE VERSUCHSANSTALT FUR LUFT- UND RAUMFAHRT, BAD GODESBERG /WEST GERMANY/.
HEMODYNAMIC MEASUREMENTS ON HUMAN SKIN CAPILLARY FLOW DURING EXPOSURE TO HIGH AND LOW ATMOSPHERIC PRESSURES
DLR-FB-68-56 N68-37988

T

W

Personal Author Index

Typical Personal Author Index Listing



A Notation of Content, rather than the title of the document, appears under each author's name. The accession number is located beneath and to the right of the Notation of Content, e.g., N68-12345. Under any one author's name, the accession numbers are arranged in sequence.

A

B

C

D

E

F

G

H

J

K

L

M

N

O

P

Q

R

S

T

U

V

W

Y

Z

Collections of NASA Documents

NASA is depositing its technical documents and bibliographic tools in eleven Federal Regional Technical Report Centers. Each Center, located in the organizations listed below, is prepared to furnish the general public such services as personal reference, inter-library loans, photocopy service, and assistance in obtaining retention copies of NASA documents.

California: University of California, Berkeley
Colorado: University of Colorado Libraries, Boulder
District of Columbia: Library of Congress
Georgia: Georgia Institute of Technology, Atlanta
Illinois: The John Crerar Library, Chicago
Massachusetts: MIT, Cambridge
Missouri: Linda Hall Library, Kansas City
New York: Columbia University, New York
Pennsylvania: Carnegie Library of Pittsburgh
Texas: Southern Methodist University, Dallas
Washington: University of Washington Library, Seattle

In addition, NASA publications are currently being forwarded to the public libraries in the cities listed below:

Alabama: Birmingham
Alaska: Anchorage
Arizona: Phoenix
Arkansas: Little Rock
California: Los Angeles, Oakland, San Diego, San Francisco
Colorado: Denver
Connecticut: Hartford, Bridgeport
Delaware: Wilmington
Florida: Miami
Louisiana: New Orleans
Maryland: Enoch Pratt Free Library, Baltimore
Massachusetts: Boston
Michigan: Detroit
Minnesota: St. Paul
Missouri: Kansas City, St. Louis
New Jersey: Trenton
New York: New York State Library, Brooklyn, Buffalo, Rochester
North Carolina: Charlotte
Ohio: Cleveland, Cincinnati, Dayton, Toledo
Oklahoma: Oklahoma City
Pennsylvania: Pittsburgh
Tennessee: Memphis
Texas: Fort Worth, San Antonio
Washington: Seattle
Wisconsin: Milwaukee

An extensive collection of NASA and NASA-sponsored scientific and technical publications available to the public for reference purposes is maintained at the Technical Information Service, American Institute of Aeronautics and Astronautics, 750 Third Avenue, New York, New York, 10017.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D. C. 20546

OFFICIAL BUSINESS

FIRST CLASS MAIL

POSTAGE AND FEES PAID
NATIONAL AERONAUTICS A
SPACE ADMINISTRATION

POSTMASTER: If Undeliverable (Section
Postal Manual) Do Not R

"The aeronautical and space activities of the United States shall be conducted so as to contribute . . . to the expansion of human knowledge of phenomena in the atmosphere and space. The Administration shall provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof."

—NATIONAL AERONAUTICS AND SPACE ACT OF 1958

NASA SCIENTIFIC AND TECHNICAL PUBLICATIONS

TECHNICAL REPORTS: Scientific and technical information considered important, complete, and a lasting contribution to existing knowledge.

TECHNICAL NOTES: Information less broad in scope but nevertheless of importance as a contribution to existing knowledge.

TECHNICAL MEMORANDUMS: Information receiving limited distribution because of preliminary data, security classification, or other reasons.

CONTRACTOR REPORTS: Scientific and technical information generated under a NASA contract or grant and considered an important contribution to existing knowledge.

TECHNICAL TRANSLATIONS: Information published in a foreign language considered to merit NASA distribution in English.

SPECIAL PUBLICATIONS: Information derived from or of value to NASA activities. Publications include conference proceedings, monographs, data compilations, handbooks, sourcebooks, and special bibliographies.

TECHNOLOGY UTILIZATION PUBLICATIONS: Information on technology used by NASA that may be of particular interest in commercial and other non-aerospace applications. Publications include Tech Briefs, Technology Utilization Reports and Notes, and Technology Surveys.

Details on the availability of these publications may be obtained from:

SCIENTIFIC AND TECHNICAL INFORMATION DIVISION

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Washington, D.C. 20546