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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

JULY 1964

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

A selection of annotated references to unclassified reports and journal articles introduced into the NASA information system during the period January 1-March 31, 1964

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. JULY 1964

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INTRODUCTION

The publication of *Aerospace Medicine and Biology* (SP-7011) by the National Aeronautics and Space Administration inaugurates a new program for the announcement of references on an area of scientific endeavor that is vital to the manned space program. Its compilation is made possible through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project of the Library of Congress (AMBBP), the American Institute of Aeronautics and Astronautics (AIAA), and NASA. Material that was previously announced in separate journals is now combined in a single bibliography for the convenience of medical and biological scientists.

The first issue of *Aerospace Medicine and Biology* contains abstracts prepared by the three contributing organizations during the period January 1–March 31, 1964. SP-7011 will be updated by supplements which will be numbered SP-7011 (01), SP-7011 (02), etc. Abstracts submitted by AMBBP and AIAA will be prepared, as in the past, from the current journal and book literature, and abstracts contributed by NASA will be based on current report literature.

Aerospace Medicine and Biology will concentrate 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 will also be included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors will receive 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.

Each entry in SP-7011 consists of a standard citation accompanied by its abstract and will appear in one of three groups, in the following order:

a. NASA entries identified by their *STAR* accession numbers (N64-10000 series).
b. AIAA entries identified by their *IAA* accession numbers (A64-10000 series); and
c. AMBBP entries identified by a number in the A64-80000 series.

In addition to the abstract section, *Aerospace Medicine and Biology* (SP-7011) also contains a subject index, a personal author index, and a corporate source index.

Aerospace Medicine and Biology (SP-7011) is a continuation of the *Aviation Medicine Bibliography* which was initiated in 1954 by the Bibliography Section of the Library of Congress. This early project was supported at various times during the past decade by the Department of the Navy, the Department of the Air Force, the Federal Aviation Agency, the Canadian Defense Research Board, and the National Aeronautics and Space Administration.

(continued)

Introduction *(con't)*

Six volumes of an annotated bibliography titled *Aerospace Medicine and Biology* were published. Information concerning volume number, period of time covered, and general availability follows.

Volume I (1952): Office of Technical Services, U.S. Department of Commerce, Washington, D.C. 20230, as PB no. 121543, at $4.00 a copy.

Volume II (1953): Aerospace Medical Association, Washington National Airport, Washington, D.C. 20001, at $5.00 a copy, postpaid in the United States and Canada.

Volume III (1954): Office of Technical Services, U.S. Department of Commerce, Washington, D.C. 20230, as PB no. 171029, at $6.00 a copy.

Volume IV (1955): Office of Technical Services, U.S. Department of Commerce, Washington, D.C. 20230, as AD 258 191, at $5.00 a copy.

Volume V (1956): Office of Technical Services, U.S. Department of Commerce, Washington, D.C. 20230, as AD 274 064, at $5.00 a copy.

Volume VI (1957): Office of Technical Services, U.S. Department of Commerce, Washington, D.C. 20230, as AD 402 638, at $5.00 a copy.

Subsequent volumes for the years 1958 through 1963 are now in preparation.

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Code ATSS-AD
Washington, D.C. 20546

Collections of NASA documents are currently on file in the organizations listed on the inside of the back cover.

(continued)

IAA Series (A63, A64)

All articles listed are available from the American Institute of Aeronautics and Astronautics, Technical Information Service. Individual and Corporate AIAA Members in the United States and Canada may borrow publications without charge. Interlibrary loan privileges are extended to the libraries of government agencies and of academic nonprofit institutions in the United States and Canada. Loan requests may be made by mail, telephone, telegram, or in person. Additional information about lending, photocopying, and reference service will be furnished on request. Address all inquiries to:

Technical Information Service
American Institute of Aeronautics and Astronautics, Inc.
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For further details please consult the *Introductions* to *STAR* and *IAA*, respectively.

LC Series (A64-80000)

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.

AVAILABILITY OF THIS BIBLIOGRAPHY

Copies of *Aerospace Medicine and Biology* (SP-7011) and its supplements can be obtained from NASA (Code ATAA-A), without charge, by NASA offices and contractors, U.S. Government agencies and their contractors, and organizations that are working in direct support of NASA programs.

Other organizations can purchase copies of the bibliography from the Office of Technical Services, U.S. Department of Commerce.

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AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography JULY 1964

STAR ENTRIES

N64-10002 Joint Publications Research Service, Washington, D.C.

PHYSIOLOGY OF THE BLOOD OF HUMANS AND ANIMALS IN HOT CLIMATES, USSR

A. Yu. Yunosov Oct. 10, 1963 11 p Transl. into ENGLISH of Conclusions and Deductions, Chapter 7, and Table of Contents of "Fiziologiya Krovi Cheloveka i Zhivotnykh v Zharkom Klimate" (Physiology of Human and Animal Blood in Hot Climates), Tashkent, Uzbek SSR, 1961

(JPRS-21405; OTS-63-31914) OTS: $0.50

The effect of high temperatures on the composition and properties of blood has been investigated, and the changes associated with seasonal temperature rises and with abrupt, multiple exposures to high temperature are summarized. Three phases occur in response to prolonged exposure to high temperature: (1) a thinning of the blood characterized by increased water content, a reduction in erythrocyte and hemoglobin content, and an increase in the volume of individual erythrocytes; (2) thickening of the blood characterized by reduced water content, and increases in density, erythrocyte count, and hemoglobin; and (3) a gradual return to initial levels. These adaptive thermoregulatory changes are accomplished primarily by the cerebral cortex. Cortical function is even more evident in the seasonal adaptation to environmental changes. Further experimental evidence for neural control is presented, including blood changes resulting from spinal-cord section, decortication of one cerebral hemisphere, and decortication of both hemispheres or drug inhibition of cortical function. M.P.G.

N64-10006 Joint Publications Research Service, Washington, D.C.

VARIOUS ASPECTS OF BURN INJURIES, USSR

Oct. 31, 1963 26 p refs Transl. into ENGLISH of five articles from Eksperim. Khirur. i Anesteziol. (USSR) no. 4, 1963

(JPRS-21680; OTS-63-41041) OTS: $0.75

CONTENTS:

1. A CYBERNETIC METHOD OF DETERMINING THE SEVERITY AND PROGNOSIS OF BURN INJURY A. A. Vishnevskiy, S. N. Braynes, M. I. Shrayber, V. L. Brailovskiy, Y. V. Kuchina et al p 1-5 (See N64-10007 01-16)

2. A COMPARATIVE STUDY OF THE EFFECT ON THE ORGANISM OF EXPERIMENTAL THERMAL INJURY AND REMOVAL OF A LARGE AREA OF SKIN N. I. Kochetygov p 6-12 refs (See N64-10008 01-16)

3. FUNCTIONAL CHARACTERIZATION OF THE COURSE OF BURN SHOCK AGAINST A BACKGROUND OF RADIATION INJURY V. A. Suvorov, B. A. Saakov, D. I. Kolotiyenko, L. G. Alenina p 13-20 refs (See N64-10009 01-16)

4. VITAMIN B_1 (THIAMIN) CONTENT OF TISSUES IN BURN SHOCK V. G. Borisov p 21-23 refs (See N64-10010 01-16)

N64-10007 Joint Publications Research Service, Washington, D.C.

A CYBERNETIC METHOD OF DETERMINING THE SEVERITY AND PROGNOSIS OF BURN INJURY

A. A. Vishnevskiy, S. N. Braynes, M. I. Shrayber, V. L. Brailovskiy, Ye. V. Kuchina et al *In its* Various Aspects of Burn Injuries, USSR 1963 p 1-5 (See N64-10006 01-16) OTS: $0.75

A cybernetic method for the objective evaluation of the severity and prognosis of a patient's condition in the presence of burn injury is presented. The algorithm used divided the items given to it, described in several discrete parameters, into two classes on the basis of criteria developed by an electronic computer in the course of instruction. The signs or symptoms picked up from the case history were used as reference data in the problem of determining the prognosis of burn injury. Each characteristic was presented in discrete from. As a result of data processing, the condition of each patient was recorded as a number containing as many digits as there were symptoms selected. Results indicate that the method permits successful prognostication from a small number of symptoms that are furnished and evaluated by the computer. R.T.K.

N64-10008 Joint Publications Research Service, Washington, D.C.

A COMPARATIVE STUDY OF THE EFFECT ON THE ORGANISM OF EXPERIMENTAL THERMAL INJURY AND REMOVAL OF A LARGE AREA OF SKIN

N. I. Kochetygov *In its* Various Aspects of Burn Injuries, USSR 1963 p 6-12 refs (See N64-10006 01-16) OTS: $0.75

A comparative study of the effect on the organism of thermal injuries and removal of a large area of skin was conducted. The experimental subjects were 70 rabbits. A comparison of experimental results showed that both thermal injury and removal of skin over an area representing 15% to 20% of the body surface ultimately lead to similar consequences. This was corroborated by data concerning the survival rate of the animals, development of emaciation, changes in number of erythrocytes and leukocytes in the peripheral blood, as well as the morphological changes in the internal organs. In experiments on rabbits with burn injury over an area that did not exceed 20% of the body surface, two types of courses of thermal trauma were

differentiated. In the first case, due to elevation of the temperature of a considerable mass of tissue, a severe physiological condition and death of the animals occurred within the first days. With the second type, the main disturbances developed later, as a result of loss of skin as an anatomical and functional organ. R.T.K.

N64-10009 Joint Publications Research Service, Washington, D.C.

FUNCTIONAL CHARACTERIZATION OF THE COURSE OF BURN SHOCK AGAINST A BACKGROUND OF RADIATION INJURY

V. A. Suvorov, B. A. Saakov, D. I. Kolotiyenko, L. G. Alenina *In its* Various Aspects of Burn Injuries. USSR 1963 p 13-20 refs (See N64-10006 01-16) OTS: $0.75

The changes in the cerebral cortex, subcortical centers, and autonomic nervous system when ionizing radiation is combined with burn injury were studied in dogs. The functional state of the cerebral cortex, the excitability of the vasomotor and respiratory centers, and that of the autonomic nervous system were recorded. Concurrently, the blood pressure and respiration rates were recorded, the blood flow rate was determined, and the morphological composition of the blood was examined. The functional disturbances that result from the effect of combined radiation and burn injuries are very different from the syndrome that develops after burn trauma of the same intensity, but without preliminary ionizing irradiation. This difference is due to a change in reactivity of the irradiated organism related to the peculiarities of the effect of penetrating radiation. The changes in reactivity were found to be due to changes in the functional state of the central nervous system, primarily that of the cerebral cortex. R.T.K.

N64-10010 Joint Publications Research Service, Washington, D.C.

VITAMIN B_1 (THIAMIN) CONTENT OF TISSUES IN BURN SHOCK

V. G. Borisov *In its* Various Aspects of Burn Injuries. USSR 1963 p 21-23 refs (See N64-10006 01-16) OTS: $0.75

The changes due to burn shock in thiamin content in tissues of experimental animals were investigated. Rabbits of both sexes were used. It was found that the vitamin B_1 level in tissues drops with burn shock; the free thiamin fraction increases significantly after a brief drop, while the bound fraction remains at a low level; and a rise in free thiamin level with low bound thiamin content is indicative of carboxylase breakdown with burn shock. R.T.K.

N64-10037 Joint Publications Research Service, Washington, D.C.

TOXICOLOGY OF CERTAIN RADIOACTIVE SUBSTANCES, USSR

A. A. Rubanovskaya Oct. 18, 1963 22 p refs Transl. into ENGLISH of two articles from Materialy po Toksikol. Radioaktivn. Veshchestv. (Moscow) 1962
(JPRS-21511; OTS-63-31967) OTS: $0.75

CONTENTS:

1. COMPOUNDS USED IN THE ELIMINATION OF RADIOACTIVE SUBSTANCES IN THE ORGANISM A. A. Rubanovskaya p 1-13 refs (See N64-10038 01-16)

2. POLYVINYL PYRROLIDONE IN AFFECTIONS WITH CERTAIN RADIOACTIVE ISOTOPES A. A. Rubanovskaya p 14-19 refs (See N64-10039 01-16)

N64-10038 Joint Publications Research Service, Washington, D.C.

COMPOUNDS USED IN THE ELIMINATION OF RADIOACTIVE SUBSTANCES IN THE ORGANISM

A. A. Rubanovskaya *In its* Toxicology of Certain Radioactive Substances. 1963 p 1-13 refs (See N64-10037 01-16) OTS: $0.75

Experiments demonstrating the effectiveness of calcium disodium diaminocyclohexanetetraacetate ($CaNa_2DCTA$) in accelerating the elimination and decreasing the tissue deposition of iron-59 is reported. In other studies, pectin was found to limit the absorption of Fe-59 into the gastrointestinal tract when the Fe-59 was administered orally with a small quantity of stable iron. M.P.G.

N64-10039 Joint Publications Research Service, Washington, D.C.

POLYVINYL PYRROLIDONE IN AFFECTIONS WITH CERTAIN RADIOACTIVE ISOTOPES

A. A. Rubanovskaya *In its* Toxicology of Certain Radioactive Substances. 1963 p 14-19 refs (See N64-10037 01-16) OTS: $0.75

The effectiveness of polyvinyl pyrrolidone (PVP) alone and in combination with other established radioprotective compounds in reducing the retention of radioisotopes in the body was investigated. PVP-100 introduced orally in rats immediately before the administration of strontium-90 decreased the absorption of the radioisotope into the gastrointestinal tract. However, simultaneous intraperitoneal and endocardial introduction of a mixture of $CaNa_2DCTA$ and PVP did not increase the elimination of intraperitoneally introduced Fe-59 over the amount eliminated as a result of $CaNa_2DCTA$ alone. M.P.G.

N64-10050 Joint Publications Research Service, Washington, D.C.

THE TECHNIQUES AND METHODS OF CONDUCTING PHYSIOTHERAPEUTIC PROCEDURES

K. F. Grishina and A. A. Komarova Nov. 5, 1963 48 p refs Transl. into ENGLISH from the book "Tekhnika i Metodika Provedeniya Fizioterapevticheskikh Protsedur", Leningrad, 1963 p 101-106, 115-118, 126-134, 160-169, 176-182, 183-191, 192-202, and Contents, 317-320
(JPRS-21725; OTS-63-41061) OTS: $1.25

The following methods of conducting electrotherapy are described: (1) electronarcosis, (2) diathermy, (3) ultrahigh frequency therapy, (4) microwave therapy, (5) aeorion therapy, and (6) ultrasonic treatment. R.T.K.

N64-10066 Joint Publications Research Service, Washington, D.C.

NEUROHUMORAL MECHANISMS OF RADIATION-INDUCED PERMEABILITY DISORDERS OF THE HISTOHEMATIC BARRIER

L. S. Shtern, M. M. Gromakovskaya, and S. Ya. Rapoport Oct. 18, 1963 30 p refs Transl. into ENGLISH of an article and the table of contents of the book "Gisto-Gematicheskiye Bar'yeri i Ioniziruyushchaya Radiatsiya", Moscow, 1963 p 17-38 and 216
(JPRS-21492; OTS-63-31958) OTS: $0.75

The role of nerve-reflex processes and homeostatic mechanisms in the changes in the permeability of the histohematic barriers associated with early radiation sickness is demonstrated. Experiments with irradiated white rats, using phosphorus-32 and iodine-131 as permeability radiotracers, are reported. Injection of various neurotropic agents (novocain, atropine, and morphine) both before and shortly after irradiation was found to eliminate or considerably reduce the permeability changes normally associated with irradiation. Shielding of the trunk, or local anesthesia of the abdominal organs with an oil solution of anesthetics also prevented the early permeability disorders. The results indicate that the permeability changes occur reflexly and are associated with a change in the afferent nerve impulses from abdominal organs. The role of the homeostatic mechanisms was demonstrated in similar experiments involving the injection of antihistimines and serotonin-liberating substances which also prevented the permeability disorders usually caused by X-irradiation. M.P.G.

N64-10067 Joint Publications Research Service, Washington, D.C.

ON SOME PROBLEMS OF BIOENERGETICS

V. N. Zholkevich Oct. 18, 1963 16 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 4, July/Aug. 1963 p 562-573

(JPRS-21501, OTS-63-31963) OTS: $0.50

This paper discusses the evaluation of respiration efficiency as a source of energy for endothermic processes of vital activity, as well as the mode of transmission of this energy in the living system. Some doubts are raised as to whether a fairly complete evaluation of the respiration efficiency is possible on the sole basis of oxidative phosphorylation. It is suggested that the energy balance composed of total energy released by tissue respiration (computed from the balance equation) and heat release might better suit the purpose. In the author's view, heat released by living tissues into the surroundings is of diverse origin, and that formed directly in the course of concomitant respiration makes but a part of total heat release. The latter is identified with the total loss of inner energy of the living system caused by the entire course of vital activity. If this be the case, the efficiency of respiration is indicated by its capacity to compensate this inevitable loss and to maintain thereby the necessary free energy level. Author

N64-10068 Joint Publications Research Service, Washington, D.C.

VALERIY BYKOVSKIY AND VALENTINA TERRESHKOVA-THE NEW COSMIC TANDEM

Florin Zaganescu Oct. 28, 1963 10 p Transl. into ENGLISH from Stiinta si Technica, v. 15, no. 7, July 1963

(JPRS-21613; OTS-63-41014) OTS: $0.50

The cosmic tandem flight of Valeriy Bykovskiy and Valentina Terreshkova is discussed. The design, construction, equipment, and organization of the Vostok 5 and the Vostok 6 spacecraft received attention along with the performance of the cosmonauts and the biotelemetry of prolonged spaceflight. Conclusions drawn from the spaceflight are that all the conditions for life and activity for a healthy man or woman, who has undergone suitable training, can be maintained for a prolonged period, and that the cosmonauts offer key assistance to the scientist in performing the complex tasks assigned to them. C.L.W.

N64-10069 Joint Publications Research Service, Washington, D.C.

STUDY OF THE MITOTIC CYCLE OF BONE MARROW CELLS IN MICE BY THE AUTORADIOGRAPHIC METHOD

A. I. Zosimovskaya Oct. 28, 1963 9 p refs Transl. into ENGLISH from Doklady Akad. Nauk SSSR (Moscow), v. 151, no. 3, 1963 p 687-690

(JPRS-21629; OTS-63-41024) OTS: $0.50

The duration of the generations of myelopoietic and erythropoietic cells separately was determined in male mice. All mice were given intravenous injections of tritiated thymidine with a specific activity of 2.5 curies per millimole, in a dose of 20 microcuries per 0.1 cc of physiological saline solution per mouse. The animals were sacrificed at various periods of time after administration, and autoradiographs of the number of labeled cells and labeled mitoses were counted. In the young myeloid cells and myelocytes the maximum quantity of the label was found one hour after the thymidine injection. In the metamyelocytes the label first appeared after 1 to 2 hours; in the stabs, after 7 to 10 hours; in the segmented neutrophils, after 18 to 22 hours. R.T.K.

N64-10117 Joint Publications Research Service, Washington, D.C.

PAIN AND ITS INFLUENCE ON THE HUMAN AND ANIMAL ORGANISM, USSR

S. M. Dionesov Oct. 28, 1963 6 p Transl. into ENGLISH of the Conclusion and Table of Contents of "Bol' i yeye Vliyaniye na Organizm Cheloveka i Zhivotnogo" Moscow, 1963 of the Conclusion and Table of Contents of "Bol' i yeye Vliyaniye na Organizm Cheloveka i Zhivotnogo" Moscow, 1963

(JPRS-21617; OTS-63-41016) OTS: $0.50

Bodily reactions to painful stimuli are reviewed. Two forms of pain reaction are distinguished: active, whereby a chain of reflex acts is directed to removing or getting away from the source of the painful stimulation; and passive, distinguished by a marked retardation of activity. The physiological changes associated with each of these pain reactions are summarized. The changes noted after pain stimulation generally fade away shortly, and the physiological activity of the organism is established on the previous prepain level. The completeness and the rate of recovery of normal activity depends on the state of the higher nervous system centers. In cases where the painful stimulation is long-lasting, a standing inhibition of a pathological nature occurs in the cerebral cortex, and lingering excitation is induced in the subcortex. Therefore, the means of reducing or eliminating pain should be regarded as therapy and studied further. M.P.G.

N64-10118 Joint Publications Research Service, Washington, D.C.

ROLE OF ENERGY METABOLISM IN RESTORATION OF IRRADIATED CELLS, USSR

L. A. Seliverstova and M. N. Meysel' Oct. 28, 1963 7 p refs Transl. into ENGLISH of an article from Dokl. Akad. Nauk SSSR (Moscow), v. 150, no. 6, 1963

(JPRS-21619; OTS-63-41017) OTS: $0.50

The recovery of the capacity for reproduction of X-irradiated *Saccharomyces vini* of the Megri 139B strain was investigated. Cultures of this yeast, which were grown in relatively anaerobic conditions and which were characterized by the fermentative type of structural and functional organization, were capable of recovery following irradiation to a considerably lesser degree than cultures of this yeast which were grown under aerobic conditions, and which were distinguished by the respiratory type. Four days after incubation, 84% of the cells of the latter type were capable of reproducing, while only 50% of the fermentative type were capable of reproducing. *Saccharomyces cerevisiae* (race XII) was irradiated and cultured to determine how regular these differences in recovery capacity were, and whether they were unique to the species of yeast studied. The recovery of the ability to reproduce (following maintenance in water) in the cells of the respiratory type was much better than in the cells of the fermentative type. After three days' incubation, restoration in the former was 79%, while in the latter it was only 35%. I.v.L.

N64-10119 Joint Publications Research Service, Washington, D.C.

THE PERMEABILITY OF THE HEMATOENCEPHALIC BARRIER TO INORGANIC PHOSPHATE IN ACUTE RADIATION SICKNESS, USSR

D. A. Chetverikov and S. V. Gasteva 8 p refs Transl. into ENGLISH of an article from Dokl. Akad. Nauk SSSR (Moscow), v. 151, no. 3, 1963 p 718-721

(JPRS-21628; OTS-63-41023) OTS: $0.50

Rats which had been exposed to whole body X-ray irradiation were used in a study of the permeability of the hematoencephalic barrier to inorganic phosphate in acute radiation sickness. The permeability of the hematoencephalic barrier to inorganic phosphate was judged by the rate of passage of labeled inorganic phosphate from the plasma into the cerebral and spinal cord tissues. As a measure of this rate, the relative specific radioactivity of the inorganic of brain and spinal cord tissue was used, representing the ratio of the specific radioactivity of brain tissue inorganic phosphate to the specific

radioactivity of blood plasma inorganic phosphate, expressed in percentages. C.L.W.

N64-10121 Joint Publications Research Service, Washington, D.C.
EFFECT OF RADIATION ON HEREDITARY MOLECULAR STRUCTURES, USSR
N. P. Dubinin Nov. 6, 1963 35 p refs Transl. into ENGLISH of the second chapter of "Molekulyarnaya Genetika i Deystviye Izlucheniy na Nasledstvennost" (Molecular Genetics and the Effect of Radiation on Heredity) Moscow, 1963
(JPRS-21754; OTS-63-41077) OTS: $1.00

Ionizing radiation, penetrating into the cell, injures the chromosomal nucleoproteins and their constituent DNA molecule. Irradiation of DNA causes a marked reduction of its viscosity, which is induced by breaks in the polymeric structural chains. The DNA molecules consist of two polynucleotide chains. If urea acts on such a two-chain molecule, it causes a break in the hydrogen bonds, and the molecule breaks down into single-chain structures. After the irradiation of such molecules, dissociated by means of urea, the break in the single-chain molecule is caused by the action of 10 to 20 ev. Also, specific changes take place in the chemical structure of the molecule. These changes are particularly important because they concern the nitrogen bases of which the code of genetic information is constituted. Ionizing radiation causes mutations in all representatives of the plant and animal kingdom and in viruses. Gamete mutations, caused by radiation, are transmitted to subsequent generations. The four main categories of gamete mutations are discussed. I.v.L.

N64-10137 North American Aviation, Inc., Downey, Calif. Space and Information Systems Div
RAPID DETECTION OF TOXIC SUBSTANCES A SURVEY [OF LITERATURE]
Theodore N. Cranford June 17, 1963 21 p refs
(SID-63-755)

A survey of the literature on detection instruments used to monitor the concentration of toxic gases and other poisonous materials in the atmosphere is presented. Author

N64-10146 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin
ON THE PROBLEM OF THE ADAPTABILITY OF HUMANS UNDER VARIOUS LOADS WITH REGARD TO MANNED SPACEFLIGHT [ZUM PROBLEM DER ANPASSUNG DES MENSCHEN AN VERSCHIEDENARTIGE BELASTUNGEN IN HINSICHT AUF DIE BEMANNTE RAUMFAHRT]
K. E. Klein, H. Brüner, D. Jovy, and H. M. Wegmann [1963] 14 p refs In GERMAN Presented at the Ann. Meeting of the Wissen-schaftliche Gesellschaft für Luft- und Raumfahrt, Munich, Oct. 8-12, 1963

The adaptation of humans to the various stresses of spaceflight are reviewed. Two methods of adaptation are discussed. One concerns long-term residence in high mountains with a physical training program; this method provides adaptation to low atmospheric pressures. The second method concerns that used by American astronauts, where physical training and space simulation are provided. Regardless of the degree of physical adaptation acquired, only a relative protection can result. Catastrophic effects of extreme changes in environmental conditions can be hindered only by technical measures. Also, various effects of space environmental conditions on man are discussed. I.v.L.

N64-10147 Technische Hochschule Darmstadt (W. Germany) Inst. fur Flugtechnik
THE STATE-OF-THE-ART OF PILOT CONTROL OF AIRCRAFT [OBER DEN WISSENSSTAND AUF DEM FORSCHUNGSGEBIET DES "REGLER MENSCH"]
Hubertus Schmidtlein [1963] 56 p 82 refs In GERMAN Presented at the Ann. Meeting of the Wiss. Ge. Luft- und Raumfahrt, Munich, Oct. 8-12, 1963

Results of an extensive literature search indicate that the investigation of humans as controllers in a pilot-aircraft system is a very complex problem. In determining the human frequency response characteristics, two difficulties are encountered. The first lies in the fact that it is possible for a human to adapt his control attitude in a stepwise manner. The second difficulty is that the control attitude of the human is not linear and that it varies appreciably with time. The frequency-response characteristics of the pilot can, therefore, only be approximated. Thus, limitations of the use of a "formula-like" correlation for the frequency response characteristics is indicated. An extensive annotated bibliography relating to human engineering is presented. I.v.L.

N64-10154 California U., Berkeley Lawrence Radiation Lab.
BIO-ORGANIC CHEMISTRY Quarterly Report, Mar.-May 1963
July 29, 1963 149 p refs
(Contract W-7405-eng-48)
(UCRL-10934) OTS: $2.50

Papers are presented which include the following areas: fertility and sterility studies in mice; planarian studies; effects of environmental complexity and training on brain chemistry in rats; photosynthetic processes; isolation of the enzyme carboxydismutase; mechanism of the photoreduction of flavin adenine mononucleotide and its analogs; preparation of some ^{14}C labeled substances; optical properties of some dye-polyanion complexes; mechanism of thymine dimerization; organic molecule production on the "prebiotic" earth; ultraviolet and infrared spectra of some *ortho*-nitroamides; electron spin resonance of crystalline chlorophyll *a*; electron paramagnetic resonance signals in biological systems; and magnetic-rotary-dispersion instrumentation. R.T.K.

N64-10169 Melpar, Inc., Falls Church, Va.
DETECTION OF EXTRATERRESTRIAL LIFE. METHOD II: OPTICAL ROTATOR DISPERSION Third Quarterly Report, 19 June 1963 to Sept. 1963
[1963] 43 p
(NASA Contract NASw-557)
(NASA CR-52073) OTS: $4.60 ph, $1.49 mf

The theoretical development behind an apparatus, designed and incorporated into a spectrophotometer, which permits premeasurement of optical rotation in media which exhibits absorption, scattering, and circular dichroism is discussed. Optical rotatory dispersion measurements were obtained on pure water, 0.15 N HCl, 0.15N NaOH, and 0.5N NaOH soluble extracts of soil. In the wavelength region from 230 to 280 mμ, both the water and acid-soluble extracts of soil exhibit negative optical rotations. The 0.15N NaOH extract of soil shows a positive optical rotation, and the 0.5N NaOH extract indicates no measurable rotation in this wavelength region. Below 240 mμ the more basic extracts exhibit negative rotation. For the basic extracts, the use of the more basic solution apparently results in a rupture of the chemical bonds responsible for the optical activity in the less basic extract. The positive rotations obtained for the less basic extracts may be caused by the nucleic acids or their derivatives. P.V.E.

N64-10190 Rochester U., N.Y. Div. of Radiology and Biophysics

IMMUNOLOGICAL REMOVAL OF CIRCULATING I^{131}-LABELED RABBIT ANTIBODY TO RAT FIBRINOGEN IN NORMAL AND TUMOR-BEARING RATS

Irving L. Spar, Ruth L. Goodland, and Mary Ann Desiderio Jan. 11, 1963 37 p refs

(Contract W-7401-eng-49)

(UR-634)

Purified I^{131} rabbit antibody to rat fibrinogen is substantially removed from circulation using goat antiserum to rabbit gamma globulin. Subsequent studies on I^{131} activity in organs of such rats show considerable immediate deposition of the radioactivity in the liver and somewhat less in the spleen; this is eliminated in 6 to 12 hours. I^{131}determinations on Murphy–Sturm tumors in such immunologically treated animals demonstrate little, if any, loss of tumor-deposited I^{131} for the first 24 hours. The bearing of these results on scintillation scanning techniques for tumors and thrombi is discussed. Author

N64-10197 Joint Publications Research Service, Washington, D.C.

SPACE MEDICINE

Fedor Dmitriyevich Gorbov and Aleksey Aleksandrovich Koreshkov Oct. 24, 1963 51 p refs Transl. into ENGLISH of a book "Kosmicheskaya Meditsina" Moscow, Znaniye Pub. House, 1963 p 3-54

(JPRS-21586; OTS-63-31997) OTS: $1.25

The history of man's desire to conquer space is reviewed from the time of the ancient Greeks to present-day Russian ventures into space. The environmental conditions to which man is subjected in space are discussed and include the following: high acceleration, weightlessness, solitude, sensory deprivation, artificial day–night schedules, cosmic rays, radiation belts, meteorites, and possible collisions of cosmic spacecraft. The selection and training of cosmonauts and the problem of providing nutrition for them in spaceflight are discussed. R.T.K.

N64-10198 Joint Publications Research Service, Washington, D.C.

CHEMICAL AND BIOLOGICAL ACTION OF ULTRASONICS

F. A. Gurevich, ed. Oct. 24, 1963 19 p refs Transl. into ENGLISH of four excerpts from book "O Khimicheskom i Biologicheskom Deystvii Ul'trazvuk", Krasnoyarsk, 1962 p 74-81, 156-163 and 206-207

(JPRS-21590; OTS-63-41001) OTS: $0.50

Conclusions from studies concerning the following areas of the chemical and biological actions of ultrasonics are presented and discussed: (1) reactions of the chemical effect of ultrasonics on water and water-soluble substances, (2) reactions of yeast cells to ultrasonic action, and (3) effect of ultrasonics and sonicated water on various biological materials. P.V.E.

N64-10201 Joint Publications Research Service, Washington, D.C.

AUTOMATIC CONTROL OF ALGAE CULTURES

Ye. A. Ivanov and I. V. Aleksandrova Oct. 28, 1963 13 p refs Transl. into ENGLISH from Usp. Sovren. Biol. (Moscow) v. 56, no. 1, 1963 p 90-97

(JPRS-21610; OTS-63-41013) OTS: $0.50

Air regeneration, based on photosynthesis of green plants, for prolonged manned flights in outer space is discussed. Such a system is an involved complex of equipment, whose control must be automatic. Automatic control of this system is discussed in terms of cultivation of one or several green plants, and in realizing, through photosynthesis, absorption of carbon dioxide from the cabin air and liberation of gaseous oxygen. C.L.W.

N64-10204 Joint Publications Research Service, Washington, D.C.

ON THE MODELING OF TEACHING PROCESSES IN AUTOMATIC SYSTEMS

Ye. V. Voloshinova and Ye. V. Shtil'man Nov. 7, 1963 20 p refs Transl. into ENGLISH from Avtomat. Regulir i Upr. (USSR), P 188-199

(JPRS-21770; OTS-63-41086) OTS: $0.50

An automatic system is called a learning system, if it finds an algorithm of action by way of automatic search, which is successful from some point of view, and is not put into the system by a person before the process of learning. Learning-automatic systems can be divided into three types: (1) automatic systems taught by humans, in which the role of the teacher is played by the human researcher; an example of this system is the pandemonium; (2) automatic systems taught automatically, where there is a separate automat-student and an automat-teacher; the replacement, for example, of a person by a teaching automat in the pandemonium is completely possible and in some respects even useful; after the completion of the learning process, the automat-teacher can be removed; (3) automatic systems with self teaching, in which there is no distinct separation into the student and teacher units, and the process of learning consists in the controlling part of the system changing, in a goal-directed manner, its laws of behavior, and finding, by way of automatic search, a successful algorithm. I.v.L.

N64-10205 Joint Publications Research Service, Washington, D.C.

DETECTORS FOR TOXIC GASES, VAPORS, AND DUST

Karlheinz Lohs Nov. 7, 1963 27 p refs Transl. into ENGLISH of parts of book "Nachiwiesgerate fur Giftige Gase, Dample, and Staube", Berlin, Deutscher Militarverlage, 1962 p 5, 57, 75, 77-78, 92-93, 111-116, 125-131, 135-139, 144-145, 157-179, 180-189, and 211-212

(JPRS-21771; OTS-63-41087) OTS: $0.75

A review of instruments used for the detection of gases, vapors, and dust is presented. Instruments of both the Soviet bloc and Allied countries are discussed. P.V.E.

N64-10206 Joint Publications Research Service, Washington, D.C.

THE PROBLEM OF THE RATE OF PROPAGATION OF ULTRASONIC WAVES IN THE BLOOD

I. R. Yevdokymov Nov. 7, 1963 6 p refs Transl. into ENGLISH from Dopovidi Akad. Nauk Ukr. RSR (Kiev), no. 7, 1963 p 927-929

(JPRS-21775; OTS-63-41089) OTS: $0.50

The rate of propagation of ultrasonic waves in the blood and blood plasma of dogs has been used to demonstrate changes of a phasic nature in the dynamics of acute radiation sickness. The phases of changes in the speed of sound in the blood of irradiated dogs are found to coincide with the periods of radiation sickness. The rate of propagation of ultrasonic waves in the blood of dogs given doses of 100 and 150 kr. was studied *in vitro*, as well as the propagation rate in *in vitro* plasma irradiated with doses of 100 and 150 kr., and in blood given a dose of 300 kr. after dilution with physiological saline. At the same time, the specific gravity of the blood and plasma was determined to calculate the adiabatic compressibility by the pyknometric method. The studies show that the changes in the speed of sound in the blood are not produced by the direct effect of ionizing radiation on the blood, and that such radiation has no direct effect on the degree of hydration of plasma proteins or the structural integrity of the red blood cells. D.E.R.

N64-10207 Joint Publications Research Service, Washington, D.C.

MORPHOLOGICAL CHANGES IN THE INTERNAL ORGANS AND SKIN FROM LOCAL ULTRASONIC IRRADIATION

S A Bershteyn Nov 7, 1963 7 p refs Transl into ENGLISH from Dopovidi Akad Nauk Ukr RSR (Kiev) no 7, 1963 p 924 927
(JPRS-21776, OTS-63-41090) OTS $0 50

The author investigated the morphological changes of the internal organs and skin of rabbits on irradiation of the lumbar region with ultrasound of 800 kc frequency, 3 w/cm^2, 1 w/cm^2, and 0 3 w/cm^2 intensity, with 15 min exposure Distinct pathomorphological changes in the internal organs were found only on irradiating with an intensity of 3 w/cm^2 and 1 w/cm^2 Irradiating with an intensity of 3 w/cm^2 and 1 w/cm^2 provokes a pronounced reaction of the blood vessels A high sensitivity to ultrasound was found in the sexual glands, where despite the remoteness from the field of irradiation, degenerative changes and a decrease in the quantity of mature forms of sexual cells are observed The peripheral nervous system does not remain intact to ultrasonic irradiation, as is indicated by the degenerative changes in the nerve elements Author

N64-10208 Joint Publications Research Service, Washington, D C
SOME ASPECTS OF SOVIET TRAINING FOR SPACE FLIGHT
Nov 12, 1963 20 p refs Transl of series of articles from Sov Kirgiziya (Frunze), Aug 6 9, 1963 p 4
(JPSR-21829, OTS-63-41121) OTS $0 50

This report contains notes of one of the trainers who prepared the cosmonauts for spaceflight Vestibulary, centrifuge, and thermal-chamber tests are discussed The training of Valentina is also discussed I v L

N64-10236 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W Germany) Inst fur Flugmedizin
ELECTROCARDIOGRAPHIC INVESTIGATIONS ON THE EFFECT OF ACCELERATION [ELEKTROKARDIOGRAPHISCHE UNTERSUCHUNGEN UNTER BESCHLEUNIGUNG-SEINWIRKUNG]
F Kniep Aug 1963 44 p refs In GERMAN
(DVL-259) Available from Verenigte Universitats- U Fach-Buchhandlungen, R -Wagner Str , Cologne, W Germany

In modern air and space travel , man is subjected to forces of acceleration which affect his circulation Changes in circulation occur, causing considerable change in electrocardiograms This anomaly was investigated by electrocardiographic tests of 22 healthy males in the centrifuge of the Institute for Flight Medicine of the DVL The maximum accelerations were 4 and 4 5 g The acceleration caused an increase in the heart rate and a leveling off of T II and T III The change in the contraction mode of the heart appeared to be the main cause of the T-change Trans by I v L

N64-10264 National Academy of Sciences, Washington, D C Space Science Board
WORKING GROUP ON NUTRITION AND FEEDING PROBLEMS Summary Report
Apr 1963 22 p

This report describes the results of discussions and inquiries into the problems of feeding and nutrition in spaceflights of various durations Author

N64-10265 National Academy of Sciences, Washington, D C Space Science Board
WORKING GROUP ON PROBLEMS OF WEIGHTLESSNESS IN SPACE FLIGHT Summary Report
Apr 1963 56 p refs

This report describes the results of discussions of the physiological effects of the weightless state which may be of importance in the development of spaceflight and contains suggestions for experimental investigations to make good the important deficiencies in present knowledge Author

N64-10266 National Academy of Sciences, Washington, D C Space Science Board
POSITION PAPER ON THEORETICAL ASPECTS OF RADIOBIOLOGY AS APPLIED TO THE SPACE PROGRAM
Aug 1963 12 p refs

The Space Science Board has undertaken to study several aspects of the space program which involve biological interests These topics are of two kinds those which concern the sustaining of man in spaceflight, and those which concern the potential contributions to biology itself which may come from the ability to conduct experimental investigations in space This report is on a subject of the latter kind and discusses, from a fundamental point of view, radiation biology in space research Author

N64-10269 Joint Publications Research Service, Washington, D C
PHILOSOPHICAL ASPECTS OF LIFE ON THE MOLECULAR LEVEL
R S Karpinskaya and Ye F Solopov Nov 8, 1963 33 p refs Transl into ENGLISH from Voprosy Filosofii (Moscow) v 17, no 8, 1963 p 104-114 and 143-154
(JPRS-21806, OTS-63-41107) OTS $1 00

A discussion is given concerning the structure and function of living matter on the molecular level, and the correlation between forms of motion and forms of matter in nature C L W

N64-10270 Joint Publications Research Service, Washington, D C
PROGRAMMING SOCIAL RESEARCH AND A DESCRIPTION OF CYBERNETIC MODELS
I V Novik Nov 8, 1963 34 p refs Transl into ENGLISH from Voprosy Filosofii (Moscow) v 17, no 8, 1963 p 92 103
(JPRS-21807, OTS-63-41108) OTS $1 50

The basic types of cybernetic models are examined, and an attempt is made to disclose their gnoseological peculiarities Author

N64-10293 National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif
A THIOL-ACTIVATED AMINOPEPTIDASE OF THE PITUITARY
Stanley Ellis Repr from Biochem and Biophys Res Commun , v 12, no 6, 1963 p 452 456 refs
(NASA RP-55)

It has been shown that, besides the common manganese activated aminopeptidase of the pituitary, pituitary extracts also contain a thiol-activated aminopeptidase which is inhibited by sulfhydryl reagents This enzyme has been found to hydrolyze the amino acid naphthylamides in the following descending order arginine, lysine, phenylalanine, leucine, alanine, and tyrosine L-phenylalanine-p-nitroanilide and acetyl-L-phenyl and benzoyl-DL-arginyl-p-nitroanilide were not hydrolyzed by the enzyme, indicating that it is an aminopeptidase Also, the addition of octapeptide disulfides and glucagon inhibited the action of the enzyme D E R

N64-10302 National Aeronautics and Space Administration, Washington, D C
BIOASTRONAUTICS
Eugene B Konecci Repr from Astronautics, Nov 1962 p 104 109
(A63-10206)

The Biotechnology and Human Research Program of NASA is discussed, and a review of several Government- and company-funded life-sciences programs is presented A review is also presented of space-suit development, particularly Soviet space suits P V E

N64-10326 Joint Publications Research Service, Washington, D.C.

COMPARISON OF THE HARMFUL EFFECT OF FAST NEUTRONS AND X-RAYS ON MOUSE TESTES

M. D. Pomerantseva and L. K. Ramayya. Oct. 21, 1963. 8 p. refs. Transl. into ENGLISH of an article from Doklady Akad. Nauk SSSR (Moscow), v. 150, no. 6, 1963. p. 1370-1372. (JPRS-21521; OTS-63-31973) OTS: $0.50.

X-irradiation doses of 20, 50, 100, 200, 300, 400, 600, 800 and 1600 r and fast neutron doses of 17, 34, 57, 114, 171, and 228 rads were used, and changes in weight and histologic picture were used as indices of the degree of radiation damage. Maximum reduction in testes weight occurred 28 days after irradiation for both X- and neutron-radiation. Dose dependence was evident only at the lower doses where a linear relationship was found between the degree of weight reduction and the log of the dose of radiation. Histologic examination revealed that the most immature germinal cells were the first affected by radiation, followed by a gradual decrease in the other germinal cells, until a maximum reduction in spermatozoa occurred on the 28th day after irradiation. After the point of maximum reduction of each type of cell, gradual restoration began. These data indicate that the relative biological effectiveness of fast neutrons decreases with increasing dose of radiation, so that, in doses causing a reduction in testicular weight of 50%, the relative biological effectiveness is about 3.5. M.P.G.

N64-10327 Joint Publications Research Service, Washington, D.C.

THE EFFECT OF COSMIC FACTORS ON THE BLOOD SYSTEM

N. A. Shul'ts. Nov. 14, 1963. 15 p. refs. Transl. into ENGLISH of an article from Probl. Gematol. i Pereliv. Krovi (Moscow), v. 8, no. 3, Mar. 1963. p. 20-26. (JPRS-21864; OTS-63-41136) OTS: $0.50.

The effects of solar radiation and other solar phenomena occurring in times of increased solar activity on the human blood and circulatory system are discussed. It has been found that the frequency of cerebrospinal meningitis is connected with the incidence of sunspots. The relationships between eclampsia and pre-eclampsia and geomagnetic disturbances, between the stability of colloidal solutions and solar activity, between the incidence of solar flares and the number of leukocytes in the blood, and the effect of cosmic radiation intensity of the incidence of leukopenia are also discussed. D.E.R.

N64-10328 Joint Publications Research Service, Washington, D.C.

DEVELOPMENT OF BIOLOGICAL SCIENCES AND PROSPECTS FOR DEVELOPMENT OF RADIOBIOLOGY

Ye. I. Vorob'yev and L. V. Funshteyn. Nov. 14, 1963. 8 p. Transl. into ENGLISH of an article from Med. Radiol. (Moscow), v. 8, no. 9, Sept. 1963. p. 3-7. (JPRS-21868; OTS-63-41138) OTS: $0.50.

Attention is given to the development of research on the effect of irradiations on organisms, on finding means of recognizing and treating radiation injuries, and on problems of biophysics and radiation genetics. C.L.W.

N64-10329 Joint Publications Research Service, Washington, D.C.

THE ROLE OF BIOPHYSICS, CHEMISTRY AND CYTOLOGY IN THE DEVELOPMENT OF MEDICINE

V. G. Yeliseyev. Nov. 21, 1963. 10 p. Transl. into ENGLISH of an article form Terap. Arkh. (Moscow) v. 35, no. 8, 1963. p. 3-9. (JPRS-21966; OTS-63-41186) OTS: $0.50.

The main tasks of these sciences should be considered the determination of the nature of the phenomena of life; the demonstration of the biological principles of development of the organic world; study of physics and chemistry of the living; the development of various means of controlling vital processes, particularly metabolism, heredity, and directed changes in organisms. J.E.T.

N64-10371* Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena

A BIBLIOGRAPHY OF EXOBIOLOGY

Michael H. Briggs, Gregg Mamikunian, and John P. Revill, comp. [1962] 109 p. refs.

(NASA CR-52484) OTS: $9.10 ph, $3.74 mf.

A selected bibliography of exobiology, covering the following topics, is presented: (1) literature on the existence of life outside the earth; (2) the origin and development of life; (3) the chemical and physical properties of the atmospheres and surfaces of the planets and the moon; and (4) the origin of the solar system and the incidence of extrasolar planets. R.T.K.

N64-10383 Joint Publications Research Service, Washington, D.C.

SOVIET STUDIES ON REACTIONS TO ACCELERATION

N. I. Arlashchenko, B. B. Bokhov, V. Ye. Busygin, N. A. Volokhova, Yu. G. Grigor'yev et al. Nov. 19, 1963. 17 p. refs. Transl. into ENGLISH of two articles from Byull. Ekspt. Biol. i Med. (Moscow), v. 56, no. 8, Aug. 1963. p. 28-37. (JPRS-21908; OTS-63-41158) OTS: $0.50.

Two studies on reactions to acceleration are presented. In the first study, the reactions of people in a slowly rotating chamber (MVK-1), the first Soviet apparatus for studying the body reaction to the long-term effect of Coriolis accelerations, were investigated. No significant changes in the thresholds of the sensory and somatic reflexes under investigation were noted; however, changes were found in skin temperature, and more distinct disorders were observed in coordination. In the second study, an inquiry was made into the chief indices of external respiration in man during the action of accelerations (up to 15 g) directed along the dorso-thoracic axis at an angle of 65° to the longitudinal axis of the human body. A definite regularity was established in the changes of the indices studied with various accelerations. Definite stages were noted in the development of individual reactions; this regularity reflected the essence of the general biological laws concerning body adaptation to new environmental conditions. R.T.K.

N64-10385 Joint Publications Research Service, Washington, D.C.

THE APPLICATION OF REFLEXOMETRIC AND TREMOMETRIC METHODS IN OCCUPATIONAL PSYCHOLOGY

G. Gereb. Nov. 21, 1963. 15 p. refs. Transl. into ENGLISH from Voprosy Psikhologii (Moscow), no. 4, 1963. p. 135-142. (JPRS-21974; OTS-63-41189) OTS: $0.50.

The dynamics of the condition of fatigue during the work week were investigated. The data were collected with the aid of special instruments, the reflexometer and the tremometer, designed to measure the time of a motor reaction and the amount of finger tremor, respectively. Correlation between the values obtained by using both apparatus and methods of investigation are reported; and curves which reflect the course of the development of fatigue as a function of time are presented. Results indicate that data can be obtained for determining the specific conditions and degree of fatigue by applying the methods described. R.T.K.

N64-10386 Joint Publications Research Service, Washington, D.C.

STUDIES OF RADIATION IN SANITATION

A. S. Zykova, Ye. L. Telushkina, G. P. Yefremova, V. P. Rublevskiy, and G. I. Sidorenko Nov. 21, 1963 21 p refs Transl. in ENGLISH of four articles from Gigiena i Sanit. (Moscow), v. 28, no. 9, Sept. 1963 p 5-11, 97-98, 101-103 and 124-125
(JPRS-21975; OTS-63-41190) OTS: $0.50

Data are given on the dynamics of radioactive precipitations and that of radioactive content of the atmospheric air in Moscow during the period from 1957 to 1961, and the use of the combined effects of gamma radiation and chlorine for sterilization of water is studied. The maximal concentrations of radioactive substances in the atmospheric air were noted in March 1958 and amounted to $1.0 \cdot 10^{-14}$ curies per liter. In 1957, 1047 millicuries of long-life beta active substances fell per square kilometer of ground surface in the investigated district; in 1958, 998 millicuries per kilometer; in 1960, 45.88 millicuries per kilometer; and in 1961, 220 millicuries per kilometer. Radiochemical analysis revealed the atmospheric precipitates to contain strontium 90, cesium 137, and cerium 144. The use of the combined effect of chlorination and gamma irradiation for water sterilization was found to be highly effective. With the combined effect, a quantity of chlorine amounting to one-third of the chlorine demand of the water and one-tenth of the dose of gamma radiation necessary for producing 100-percent sterilization when chlorine or gamma radiation is used separately is adequate for achieving the sterilizing effect. C.L.W.

N64-10388 Joint Publications Research Service, Washington, D.C.
CEREBRAL HYPOXIA IN RESPONSE TO GRAVITY EFFECTS WHILE BREATHING OXYGEN
Ye. A. Kovalenko, V. L. Popkov, and I. N. Chernyakov Nov. 21, 1963 13 p refs Transl. into ENGLISH from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 7, no. 5, Sept.-Oct. 1963 p 9-15
(JPRS-21984; OTS-63-41199) OTS: $0.50

The polarographic method was used to determine oxygen intensity (pO_2) in the brain cortex of dogs which were undergoing rotation in a centrifuge. The pO_2 value recorded prior to rotation was assumed to be 100 percent. With air respiration overloadings of 8, 10, and 12 g in the transverse direction, lasting up to 3 minutes, produced a pO_2 drop in cellular tissues of dogs, averaging 85.9, 77.6, and 60 percent, respectively. With oxygen breathing overloading caused a smaller pO_2 decrease in cerebral tissues, equaling 107, 98, and 93 percent, respectively. Furthermore, the animals showed greater resistance to overloading, and their cardiac activity demonstrated a tendency toward normalization. Forced oxygen breathing resulted in a higher positive effect, which could be seen distinctly only with overloading up to 10 g. It is presumed that cerebral hypoxia seen under the effect of overloadings is not the only factor in the pathogenesis of disorders produced by accelerating forces. Author

N64-10389 Joint Publications Research Service, Washington, D.C.
SOME DISTRIBUTION CHARACTERISTICS OF Sr^{90} IN THE SKELETON OF DOGS AFTER SINGLE AND LONG-TERM ADMINISTRATIONS
A. A. Yusupov Nov. 21, 1963 5 p refs Transl. into ENGLISH from Akad. Nauk Uz. SSR, Uzbeksk Biol. Zh. (Tashkent), v. 7, no. 4, 1963 p 35-36
(JPRS-21997; OTS-63-41212) OTS: $0.50

The autoradiographs indicated substantial differences in the distribution of Sr^{90} in various skeletal bones. Both after a single administration and after long-term administration, this element is unequally distributed in various parts of the mandible. The isotope was found in the incisors in larger quantity than in the premolars and molars, and is firmly fixed in the dentine of the teeth, whereas it is almost absent in the enamel. In the vertebrae and sternum in both experimental variants, Sr^{90} was distributed comparatively uniformly. In the ribs, a uniform distribution was recorded after long-term administration. In the long bones (tibia, humerus, femur, and others), both after single and long-term administration, a relatively high content is found in the epiphyses. P.V.E.

N64-10390 Joint Publications Research Service, Washington, D.C.
APPARATUS FOR REMOVAL OF DENTAL CALCULUS WITH ULTRASOUND
A. A. Kolosov, et al Nov. 21, 1963 11 p Transl. into ENGLISH from Med. Prom. SSSR (Moscow), v. 17, no. 9, Sept. 1963 p 53-58
(JPRS-21998; OTS-63-41213) OTS: $0.50

A stomatological apparatus developed for the removal of dental calculus with ultrasound is described. The removal of film, supragingival, and subgingival calculus from the teeth is accomplished by means of light contact with an ultrasonic tip against the tooth surface being treated. The apparatus operates without abrasive suspensions, only water is used. A magnetostrictive method of obtaining ultrasonic waves is used for the removal of dental calculus. P.V.E.

N64-10391 Joint Publications Research Service, Washington, D.C.
THE EFFECT OF TRAINING FOR HYPOXIA ON THE COURSE OF BURN SICKNESS
G. S. Fenster Nov. 21, 1963 7 p refs Transl. into ENGLISH from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 7, no. 5, Sept./Oct. 1963 p 40-43
(JPRS-21999; OTS-63-41214) OTS: $0.50

The effect of training for oxygen deficiency in white rats immediately after the infliction of a severe burn is discussed. For the purpose of training for oxygen deficiency, the burned animals were "raised" in an altitude chamber to an "altitude" of 5,000 to 6,000 meters every day for 10 days, beginning with the second to fourth day after the burn, for 3 hours a day. Conclusions reached as a result of the study include: (1) hypoxia used for the training of burned rats in the first 10 days after a severe burn gives a pronounced therapeutic effect, considerably reduces the mortality of the animals in burn sickness, and delays the development of anemia; and (2) three factors possibly play a part in the mechanism of the therapeutic-prophylactic effect of training for hypoxia: (a) the antianemic effect of hypoxia, (b) increase in the suprarenal function under the influence of hypoxia, and (c) increase in the resistance of oxidative enzymes to unfavorable conditions after training of the animals under conditions of hypoxia. P.V.E.

N64-10392 Joint Publications Research Service, Washington, D.C.
THE EFFECT OF SEX HORMONES ON THE COURSE OF ACUTE RADIATION SICKNESS
S. A. Davydova Nov. 21, 1963 8 p refs Transl. into ENGLISH from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 7, no. 5, Sept.-Oct. 1963 p 45-48
(JPRS-22000; OTS-63-41215) OTS: $0.50

The comparative protective and therapeutic action of sex hormones—estrogens (folliculin, diethylstilbestrol, synestrol, dimestrol, ethyinylestradiol, octestrol) and androgens (testosterone and methyltestosterone)—was studied in experiments on 1181 mice and 555 rats, irradiated with gamma rays (Co^{60}) in doses of 650 to 700 r ($LD_{75\ to\ 100}$). The prophylactic effect of sex hormones was selective with respect to the species and sex of the animals; it was weak with poor reproduction. The protective effect (a rise of the survival by 18 to 26.5

percent) was revealed only in experiments on mice with some estrogens (folliculin and diethylstibestrol) and the specified androgens, given 5 to 10 days before the irradiation. Administration of female and male sex hormones to treat the irradiated mice proved to be unsuccessful or even aggravated the development of acute radiation sickness. Author

N64-10393 Joint Publications Research Service, Washington, D.C.
CHARACTERISTICS OF THE COURSE OF SHOCK CAUSED BY COMPRESSION OF SOFT TISSUE UNDER CONDITIONS OF ACUTE RADIATION INJURY
B. I. Krivoruchko Nov. 21, 1963 6 p refs Transl. into ENGLISH from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 7, no. 5, Sept.-Oct. 1963 p 72-73
(JPRS-22001; OTS-63-41216) OTS: $0.50

Experiments performed to determine the characteristics of traumatic shock under conditions of acute radiation injury are discussed. Compression of the soft tissues of the thighs of rabbits was produced by the application of a tourniquet for four hours. The behavior of the animals, blood pressure, EKG, pressor vascular reflexes, the adenosine triphosphoric acid, creatine phosphate, inorganic phosphorus and lactic acid contents in the brain, respiration, body temperature and longevity was studied. The resistance to injury in the irradiated animals was less than in the control rabbits. In the control experiments severe shock developed mainly after the compression was stopped; in the irradiated rabbits, even during the period of compression, a marked fall in the blood pressure was observed, with depression of the bioelectric activity of the cerebral cortex and death. Of ten animals irradiated, four died during the compression period. It is concluded that under conditions of acute radiation injury, shock from soft tissue compression frequently occurs during the period of compression and has a more severe course. P.V.E.

N64-10407 Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
NORFOLK-PENINSULA AREA (ARMS-II) Civil Effects Study [Oct. 16-29, 1961]
R. B. Guillou Oak Ridge, Tenn., AEC, Div. of Tech. Inform., Dec. 6, 1961 22 p refs
(CEX-6164)

An Aerial Radiological Measuring Survey (ARMS) of the Norfolk-Peninsula area was made as part of a nationwide program to measure present environmental levels of gamma radiation. Aerial measurements of ground radioactivity were everywhere consistent with what was expected, considering the geology of the area. Most of the area has a low radioactivity and the surficial materials are mostly sands and gravels, which are commonly weakly radioactive. The western part of the area is slightly more radioactive, which would be expected from the older sedimentary rocks of the coastal plain exposed there in valleys. Artificial radionuclides are probably present in only small quantities because the maximum background gamma radioactivity in many places is less than 200 counts/sec. Author

N64-10408 Oak Ridge National Lab., Tenn.
GENERAL CORRELATIVE STUDIES – OPERATION BREN
J. A. Auxier, F. F. Haywood, and L. W. Gilley May 1963 40 p refs
(CEX-6203) OTS: $1.00

A summary of the utilization of the Health Physics Research Reactor and a Co^{60} source during Operation BREN has been prepared, and the pertinent meteorological data has been tabulated. Normalization factors for air dose, as it depends on air density and reactor power level, are obtained as a function of source height; typical dose vs. distance curves are presented. For a source height of 1125 ft and with the detector at the surface of the ground, the relaxation length in air is 230 yards for neutrons from the reactor, 311 yards for gamma radiation from the reactor (including gamma rays from inelastic interactions by neutrons in air), and 256 yards for the gamma rays from Co^{60}. These reduce to 181, 245, and 200 yards, respectively, at 760 mm Hg pressure and 0° C. Author

N64-10428 Atomic Energy Commission, Idaho Falls, Idaho. Idaho Operations Office
STANDARD HEALTH AND SAFETY REQUIREMENTS
Sept. 1963 285 p refs
(ID Manual 0500-1; IDO-12028)

Standard health and safety requirements are given for the benefit of all personnel at the Nuclear Reactor Test Site (NRTS). The published guide includes the following topics: (1) organization and program; (2) plant design and layout; (3) production, maintenance, construction, and demolition; (4) permanent equipment and facilities; (5) guarding and operating machinery; (6) materials handling and storage; (7) electrical hazards; (8) chemical hazards; (9) fire protection and prevention; (10) flammable liquids; (11) hand and portable power tools; (12) motor vehicle operations; (13) personal protective equipment; (14) industrial hygiene; (15) construction and materials-handling equipment; (16) occupational medicine; (17) health physics; (18) nuclear safety outside reactors; and (19) an annex covering topics on a safety and accident-prevention program. R.T.K.

N64-10430 Atomic Energy Commission, N.Y. Div. of Tech. Information
ATLAS ON THE PATHOLOGICAL ANATOMY OF ACUTE RADIATION SICKNESS IN EXPERIMENT
L. V. Funshtein May 1963 224 p refs Transl. from Publ. "Atlas Patologicheskai Anatomii Ostroi Luchevoi Bolezin V. Eksperimente", Leningrad, State Pub. House for Med. Lit., 1961 p 1-218
(AEC-tr-5630) OTS: $3.00

An atlas showing the changes in various parts of rabbits subjected to internal and external radiation is presented. The following periods of irradiation and convalescence are covered: (1) external irradiation—morphological changes occurred (a) in death during irradiation, (b) up to two days after irradiation, (c) three to seven days after irradiation, (d) the second week after irradiation, and (e) the third week after irradiation; (2) internal irradiation—morphological changes occurred (a) the fourth day of irradiation, (b) the fifth to seventh days of irradiation, (c) the second week of irradiation, (d) the third week of irradiation, and (e) the fourth week of irradiation. P.V.E.

N64-10432 Federal Aviation Agency Oklahoma City, Okla. Civil Aero-medical Research Inst.
ANNOTATED BIBLIOGRAPHY OF RECENTLY TRANSLATED MATERIAL. I. Technical Publication No. I
William E. Collins, Jerry V. Tobias, Mary Jane Capps, and Mary Ellen Allen, Comp. Aug. 1963 11 p 26 refs

An annotated bibliography of translations of foreign-language research articles is presented. The 26 listed entries are concerned with studies of voluntary nystagmus, vestibular nystagmus, EEG and vestibular stimulation, and effects of coriolis accelerations. Author

N64-10433 Royal Norwegian Air Force, Blindern Inst. of Aviation Medicine
SEPARATION OF NORMAL HEMOGLOBINS IN PILOTS
B. Bugge-Asperheim [1962] 5 p refs
(Rept. 63-2)

An investigation into whether the effects of mild hypoxia, often present in Air Force pilots, could be strong enough to cause a change in the hemoglobin fractions usually present in adult blood is discussed. Blood samples were examined from 8 cargo pilots and, as a control, from 14 fighter pilots. The results showed that neither an A-R-Hb fraction above 1.0 percent nor a pathological Hb F fraction were detected in the blood from the 22 pilots. Also, abnormal amounts of the Hb A fraction or the minor components Hb A_1 and Hb A_2 were not found. P.V.E.

N64-10444 Human Sciences Research, Inc., Arlington, Va.
LABORATORY STUDIES OF THE ABILITY OF OBSERVERS TO PERFORM THREE VISUAL TASKS REQUIRED OF PILOTS IN APPROACH AND LANDING
W. S. Vaughn, Jr., Wallace F. Rollins, and Terrence S. Luce Apr. 1963 111 p refs
(Contract FAA/BRD-401)
(HSR-RR-63/7-MK-X)

CONTENTS:
1. LABORATORY STUDIES OF THE ABILITY OF OBSERVERS TO PERFORM THREE VISUAL TASKS REQUIRED OF PILOTS IN APPROACH AND LANDING Final Report W. S. Vaughan, Jr., W. F. Rollins, and T. S. Luce 25 p refs (See N64-10445 01-14)
2. ABILITY OF OBSERVERS TO ADJUST GEOMETRIC FORMS AND LINEAR STIMULI TO VARIOUS SLANT ANGLES (APPENDIX A) N. W. Weissman, R. G. Kassebaum, and W. S. Vaughan, Jr. 28 p refs (See N64-10446 01-14)
3. ABILITY OF OBSERVERS TO ALIGN WITH LINEAR STIMULI (APPENDIX B) T. S. Luce, R. G. Kassebaum, and W. S. Vaughan, Jr. 30 p refs (See N64-10447 01-14)
4. ABILITY OF OBSERVERS TO ADJUST LINEAR STIMULI TO A HORIZONTAL ORIENTATION (APPENDIX C) W. F. Rollins and W. S. Vaughan, Jr. 32 p ref (See N64-10448 01-14)

N64-10445 Human Sciences Research, Inc., Arlington, Va.
LABORATORY STUDIES OF THE ABILITY OF OBSERVERS TO PERFORM THREE VISUAL TASKS REQUIRED OF PILOTS IN APPROACH AND LANDING Final Report
W. S. Vaughan, Jr., Wallace F. Rollins, and Terrence S. Luce *In its* Lab. Studies of the Ability of Observers to Perform 3 Visual Tasks Required of Pilots in Approach and Landing Apr. 1963 25 p refs (See N64-10444 01-14)

A series of laboratory studies was conducted to describe the ability of adult human subjects to perform visual tasks representative of those performed by pilots during final approach and landing. Ability to perform visual tasks was related to variations in lighting design parameters. Results of these studies can be used as preliminary design guides for airport and heliport lighting systems. Author

N64-10446 Human Sciences Research, Inc., Arlington, Va.
ABILITY OF OBSERVERS TO ADJUST GEOMETRIC FORMS AND LINEAR STIMULI TO VARIOUS SLANT ANGLES (APPENDIX A)
N. W. Weissman, R. G. Kassebaum, and W. S. Vaughan, Jr. May 1962 *In its* Lab. Studies of the Ability of Observers to Perform 3 Visual Tasks Required of Pilots in Approach and Landing Apr. 1963 28 p refs (See N64-10444 01-14)
(HSR-RR-61/13-MK-X)

Two experiments were conducted to determine if any of six basic geometric designs (square, triangle, hexagon, circle, trapezoid, and rectangle) yield differential information regarding angular change. No significant differences were found. As a consequence, a third experiment was conducted to study subject sensitivity to angular change on the basis of the distance between elements (points) of top and bottom borders. The results of this experiment suggest that separations between the two point sources of 9 to 49 minutes of visual angle yield most accurate judgments of slant. Separations between point sources of less than 9, or greater than 49, yield less accuracy in estimating slant. Author

N64-10447 Human Sciences Research, Inc., Arlington, Va.
ABILITY OF OBSERVERS TO ALIGN WITH LINEAR STIMULI (APPENDIX B)
Terrence S. Luce, R. G. Kassebaum, and W. S. Vaughan, Jr. Dec. 1962 *In its* Lab. Studies of the Ability of Observers to Perform 3 Visual Tasks Required of Pilots in Approach and Landing Apr. 1963 30 p refs (See N64-10444 01-14)
(HSR-RR-62/9-MK-X)

In the first experiment, two point sources of illumination separated by a range of distances were used as stimuli, and the subject's task was to align himself with the directional orientation of the pair of "dots." In the second experiment, solid lines of different lengths were used as stimuli and the subject's task was to align himself with the directional orientation of the line. Both experiments were conducted in a completely darkened room with the stimuli illuminated by an ultraviolet light. Results indicate that ability to align oneself with a line or with an imaginary line defined by two dots is a monotonic function of the length of the line and of the degree of separation between the two dots. Variability of alignment responses decreased sharply as the separation between dots was increased from 2.7 to 9.1 minutes of visual angle. A sharp decrease in variability of alignment performance accompanied an increase in the length of line from 2.7 to 18.1 minutes of visual angle. Author

N64-10448 Human Sciences Research, Inc., Arlington, Va.
ABILITY OF OBSERVERS TO ADJUST LINEAR STIMULI TO A HORIZONTAL ORIENTATION (APPENDIX C)
Wallace F. Rollins and W. S. Vaughan, Jr. Feb. 1963 *In its* Lab. Studies of the Ability of Observers to Perform 3 Visual Tasks Required of Pilots in Approach and Landing Apr. 1963 32 p ref (See N64-10444 01-14)
(HSR-RR-63/2-MK-X)

Two laboratory experiments were conducted to assess human performance in adjusting linear stimuli to a horizontal position. In the first experiment, solid lines of various lengths were used as stimuli and, in the second experiment, the stimuli were pairs of "dots" separated by various intervals. In both studies the subject's task was to adjust the stimulus to a horizontal position. The experiments were conducted in a completely darkened room with the stimuli illuminated by an ultraviolet light. Results indicate that ability to adjust linear stimuli to the horizontal is a function of stimulus extent. Response variability decreased as line length increased to 132.6 minutes of visual angle. Variability increased, then decreased again to its former level when longer line stimuli were presented. As the separation between dots increased, variability decreased to a minimum at a separation of 221.4 minutes of visual angle. When the separation was increased beyond this point, variability increased significantly. Author

N64-10453 Joint Publications Research Service, Washington, D.C.
TRANSLATIONS FROM DOKLADY AKEDEMII NAUK SSSR (REPORTS OF THE ACADEMY OF SCIENCES USSR) (RADIOBIOLOGY)
L. A. Kashchenko, Ye. D. Babskiy, A. L. Baranovskiy, G. Z. Ganyelin, L. S. Ul'yaninskiy el al Mar. 11, 1963 18 p refs Transl. into ENGLISH from Doklady Akad. Nauk SSSR (Moscow), v. 147, no. 1, 1962 p 217-220 and 255-258
(JPRS-18045; OTS-63-21290) OTS: $0.50

Two topics are discussed. In the first, the radiation injury mechanism in mouse ovaries is investigated by irradiating the

ovaries of sexually mature mice. In the second, electrical stimulation of the heart by means of radiofrequency impulse transmission and by induction is investigated. A discussion of results as well as a complete bibliography is included for each topic. J.E.T.

N64-10456 Joint Publications Research Service, Washington, D.C.

REMOVING RADIOACTIVE ISOTOPES FROM ORGANISMS

V. S. Balabukha, L. M. Razbitnaya, N. O. Razumovskiy, and L. I. Tikhonova Apr. 18, 1963 15 p refs Transl. into ENGLISH from book "Problemiy Vyvedeniya Iz Organizma Dolgozhivushchikh Radioaktivnykh Izotopov" Moscow, State Publ. House for Atomic Sci. and Technol., 1962 p 5-12 and 166-167

(JPRS-18775; OTS-63-21608) OTS: $0.50

The increase in environmental radioactivity due to fallout of radioactive isotopes is cited, and the types of radioactive elements encountered and their potential danger to the human organism are reviewed. Two types of chemical substances may be utilized to protect against these isotopes: (1) compounds of large molecular size and poor solubility which are capable of sorption of radioisotopes in the gastrointestinal tract, thus preventing the transport of the isotopes into the blood stream; and (2) low-molecular-weight organic compounds which form stable complexes with the isotopes in the blood, do not enter into any metabolic reaction, penetrate the kidney barrier, and are rapidly eliminated in the urine. Since the isotopes considered are representatives of different periodic groups and possess different physicochemical properties, the radioprotective compounds must be specific for individual radioisotopes. M.P.G.

N64-10465 European Atomic Energy Community, Brussels (Belgium)

MOBILE DECONTAMINATION UNIT OF PERSONS [STATION MOBILE DE DECONTAMINATION DES PERSONNES]

M. Collet, L. Musso and P. Recht Aug. 1963 29 p refs In FRENCH; ENGLISH summary

(EUR-407.f)

Available from Belgian American Bank and Trust Co., N.Y., account no. 121.86: 40 Bel. Fr.

The present report describes a mobile decontamination unit. This vehicle has been constructed for action at any point in Europe at which a nuclear incident may occur. A description is also given of the equipment designed for the decontamination of persons, and there are details of the unit's ability to operate for long periods without refueling. Author

N64-10476 Joint Publications Research Service, Washington, D.C.

PRODUCTION BASES FOR THE DEVELOPMENT OF UNICELLULAR ALGAE

N. P. Arutyunyan Feb. 1, 1963 15 p refs Transl. into ENGLISH from Izv. Akad. Nauk Arm SSR, Bil. Nauki (Yerevan), v. 15, no. 11, Nov. 1962 p 85-93

(JPRS-17433; OTS-63-21044) OTS: $0.50

A discussion is given concerning the mass cultivation of unicellular green algae to obtain protein-rich biomasses. These biomasses are to be used in the same way as meat, in effect, as the raw material for human food, for physiologically active materials, and therapeutically valuable preparations. All the conditions upon which the production of unicellular algae depends are investigated in an attempt to develop objective methods and to make use of the least expensive material-technical means. C.L.W.

N64-10501 Joint Publications Research Service, Washington, D.C.

TELEVISION MICROSCOPY IN BIOLOGY AND MEDICINE, REVIEW OF THE LITERATURE

P. Zykov and L. G. Bakinova Mar. 22, 1963 7 p refs Transl. into ENGLISH from Lab. Delo (Moscow), no. 1, 1963 p 3-5

(JPRS-18229; OTS-63-21392) OTS: $0.50

Any television microscope can be classified into either of two groups, according to the lighting used, (1) with projection of the image onto the transmission tube, and (2) based on the principle of the scanning beam. In the latter case, the image is reproduced as a result of the optical scanning of the object by a moving beam of light. A tremendous advantage of ultraviolet television microscopy is the feasibility of direct observation on the television screen of details of cell structure that are not visible to the naked eye using the conventional microscope. It has been proposed that a device, containing a metal plate coated with a semiconductor layer, which at the same time serves as the target for a vidicon tube, be mounted in the electron microscope in lieu of the screen. The potential relief formed on the semiconductor coating by the projection of the image of the specimen is converted to an electrical signal, which is amplified by a conventional television channel. P.V.E.

N64-10503 Joint Publications Research Service, Washington, D.C.

MEDICINE AND THE COSMOS

V. Vasilevskiy and Yu. Fedotov Apr. 9, 1963 13 p refs Transl. into ENGLISH from Molodoi Kommunist (USSR), no. 12; Dec. 1962 p 45-50

(JPRS-18627; OTS-63-21547) OTS: $0.50

The effects on man of noise and vibration, acceleration and weightlessness, and human biological rhythms during spaceflights are discussed. P.V.E.

N64-10504 Joint Publications Research Service, Washington, D.C.

MANGANESE OXIDES, THEIR COMPARATIVE TOXICITY, HYGIENIC SIGNIFICANCE AND CLINICAL PICTURE OF THE CHRONIC EFFECT OF MANGANESE

N. V. Lazarev and E. N. Levina, ed. Apr. 15, 1963 40 p refs Transl. into ENGLISH of portions of a book "Okisly Margantsa, Sravnitel'nava Ikh Toksichnost', Gigiyenicheskoye Znacheniye i Klinika Khronicheskogo Vozdeystyiya Margantsa", Leningrad, 1962 p 2-6, 14-18, 108-130, and 153-163

(JPRS-18698; OTS-63-21574) OTS: $1.00

In vitro experiments have demonstrated that the solubility of the various manganese oxides in the blood varies from 3 to 8 milligrams percent. Manganous oxide is the most soluble, but manganese dioxide is retained longer in the circulatory system. The experiments have shown that the toxicity of the manganese oxides increases directly with the higher valence states of the manganese ion, trivalent and tetravalent. *In vivo* experiments show that all the oxides are more toxic when administered endotracheally than when given by inhalation of aerosols. Pneumoconiosis can be produced in the lungs by all the oxides, but the more virulent forms are produced by the higher oxides, with Mn in the trivalent or tetravalent states. Since the physicochemical properties of these compounds are similar, it is proposed that the valence state of the metal is primarily responsible for the different toxicities. D.E.R.

N64-10505 Joint Publications Research Service, Washington, D.C.

SOVIET BOOK ON HUMAN ENGINEERING, OUTLINE

Orest Aleksandrovich Sidorov Apr. 18, 1963 17 p refs Transl. into ENGLISH of the foreword, introd., and table of contents of book "Fiziologicheskiye Faktory Cheloveka Opredelyayushchiye Komponovku Posta Upravleniya Mashinoy," Moscow, State Sci.—Tech. Pub. House for the Dept. of Defense, 1962 p 3-12 and 360-363

(JPRS-18772; OTS-63-21607) OTS: $0.50

An attempt was made to systemize and generalize assorted data on the physiology, psychology, and hygiene of human labor, mainly as it is involved in the operation of machinery. A brief survey is given of the basic questions of anatomy, physiology, and psychology, along with general and well-verified data from literature and practice on designing control equipment for machinery. Practical methods are cited for designing the control site for different types of machinery and installations and for drawing up standard plans, and principal recommendations are developed for protecting the normal health of the operator under various environmental conditions (sanitary conditions); the physiological and psychological effects of such conditions on man are shown. C.L.W.

N64-10506 Joint Publications Research Service, Washington, D.C.
THE MODELING OF THOUGHT PROCESSES
V. M. Glushkov Apr. 24, 1963 21 p refs Transl. into ENGLISH from Priroda (Moscow), no. 2, 1963 p 3-13
(JPRS-18873; OTS-63-21662) OTS: $0.50

In discussing the modeling of thought processes, the following areas are discussed: (1) a model of the brain, (2) algorithms and coding, (3) possibility of automating scientific creativity, (4) modeling of processes for discrimination of forms, and (5) testing of machine instructions. P.V.E.

N64-10513 Joint Publications Research Service, Washington, D.C.
HERALD OF THE ACADEMY OF MEDICAL SCIENCES USSR, VOLUME 18, NUMBER 8, 1963 [VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR]
Oct. 21, 1963 145 p refs Transl. into ENGLISH
(JPRS-21526; OTS-63-31975) OTS: $2.75

CONTENTS:

1. SOME RESULTS AND TASKS IN THE FIELD OF SPACE RADIOBIOLOGY P. P. Saksonov, V. V. Antipov, and N. N. Dobrov p 16-26 refs (See N64-10514 01-16)

N64-10514 Joint Publications Research Service, Washington, D.C.
SOME RESULTS AND TASKS IN THE FIELD OF SPACE RADIOBIOLOGY
P. P. Saksonov, V. V. Antipov, and N. N. Dobrov *In its* Herald of the Acad. of Med. Sci. USSR, v. 18, no. 8, 1963 p 16-26 refs (See N64-10513 01-16)

The work demonstrates that, when there are no flashes in the sun's chromosphere, short-term flights along the orbits lying below radiation belts of the Earth do not present any hazards for man. However, in protracted cosmic flights along orbits traversing periglobal radiation belts and, particularly, during solar outbursts generating protons, cosmic radiation is one of the main difficulties standing in the way of man's mastering cosmic space. In this connection, the first and foremost problems to be considered are those of determining the relative biological efficiency of individual components in cosmic radiation, the study of the effect of cosmic radiation on the biological set of factors in cosmic flight, the search for principles and adequate means of physical and pharmacological protection of man and for the entire biological complex, along with the elaboration of methods for physical and biological dosimetry, etc. Author

N64-10515 Joint Publications Research Service, Washington, D.C.
REPORTS ON VARIOUS SOVIET MEDICAL CONFERENCES IN 1962
V. M. Deryabina et al. Nov. 13, 1963 37 p Transl. into ENGLISH of 6 articles from Vopr. Kurortol., Fizioterapii i Lecheb. Fiz. Kul't. (Moscow), no. 4, 1963; and Zdravookhr. Tadzhikistana, (Dushanbe), no. 3, 1963
(JPRS-21836; OTS-63-41126) OTS: $1.00

CONTENTS:

1. CONFERENCE ON INTERNAL USE OF MINERAL WATER IN ALIMENTARY AND METABOLIC DISEASES V. M. Deryabina and A. G. Saakyan p 1-10

2. SECOND SCIENTIFIC CONFERENCE ON PROBLEMS OF CLIMATOPATHOLOGY OF CARDIOVASCULAR DISEASES B. I. Soybel' p 10-15

3. THE ALMA-ATA SOCIETY OF SPECIALISTS IN HEALTH RESORTS AND PHYSIOTHERAPY G. P. Turamsheva p 16-18

4. SYMPOSIUM ON SURGICAL TREATMENT OF A CORONARY DISEASE K. T. Tadzhiyev p 19-25

5. QUESTIONS OF PHYSIOLOGY AND PATHOLOGY IN HIGH-ALTITUDE AREAS, USSR K. Yu. Akhmedov and O. G. Lorents p 26-30 (See N64-10516 01-16)

6. SCIENTIFIC SESSION OF THE DUSHANBE INSTITUTE OF EPIDEMIOLOGY AND HYGIENE M. Ya. Rasulov and L. G. Rapoport p 31-34

N64-10516 Joint Publications Research Service, Washington, D.C.
QUESTIONS OF PHYSIOLOGY AND PATHOLOGY IN HIGH-ALTITUDE AREAS, USSR
K. Yu. Akhmedov and O. G. Lorents *In its* Rept. of Various Sov. Med. Confs. in 1962 p 26-30 (See N64-10515 01-16) OTS: $1.00

Brief descriptions of each of several papers presented at a conference devoted to questions of physiology and pathology in high-altitude areas are presented. The purpose of the conference was an exchange of opinions on the study of the actions of high-altitude factors on organisms and generalizations of work conducted in this area. P.V.E.

N64-10517 Joint Publications Research Service, Washington, D.C.
NEW DATA ON CHANGES IN THE CELL SUBSTANCE FROM INJURY AND EXCITATION
D. L. Rozental' and A. S. Troshin Nov. 18, 1963 20 p refs Transl. into ENGLISH from Tsitologiya (USSR), v. 5, no. 4, p 365-378
(JPRS-21894; OTS-63-41150) OTS: $0.50

A review of data on changes in the cell substance after reversible injury and spreading excitation is presented. The experimental material presented, on the whole, confirms the basic principles of the theory of paranecrosis, and makes it possible to more completely characterize the changes in cell substance underlying the tissue reaction to external influences. A comparison of the changes in substance and function made on single nerve fibers has shown that conduction of the nerve impulse may not be accompanied by the same changes in substance as reversible injury. As the result of additional information concerning the increase in stainability by the nonprotein components of the cell and data on the diffusion of light attesting to the occurrence of aggregation of supermolecular complexes under different effects, it is clear that changes in the configuration, not only of the proteins themselves but also of combinations of proteins with one another and other cell substances, underlie paranecrosis. P.V.E.

N64-10526 Rome Air Development Center, Griffiss AFB, N.Y.
PROCEEDINGS OF SYMPOSIUM ON HUMAN FACTOR ASPECTS OF PHOTO INTERPRETATION [NOV. 7-8, 1962]
Sept. 1963 143 p refs
(RADC-TDR-63-324; AD-422432)

CONTENTS:

1. THE AUTOMATION OF PHOTO INTERPRETER FUNCTIONS L. D. Sinnamon, Jr. p 3-4 (See N64-10527 01-14)

2. HUMAN FACTOR PROBLEMS: OBJECTIVES AND APPROACHES S. Mac Leod p 5-7 (See N64-10528 01-14)

3. MEASUREMENT AND EVALUATION OF GROUND RESOLUTION R. N. Cook and F. B. Meeker (Minneapolis-Honeywell Regulator Co.) p 9 25 (See N64-10529 01-14)

4. QUALITY CATEGORIZATION OF AERIAL PHOTOGRAPHY P. G. Roetling (Cornell Aeron. Lab., Inc.) p 26-41 (See N64-10530 01-14)

5. PSYCHOPHYSICAL ASPECTS OF IMAGE QUALITY R. Sadacca and A. I. Schwartz (Army Personnel Res. Office) p 42-52 (See N64-10531 01-14)

6. A STUDY OF IMAGE QUALITIES AND SPEEDED INTRINSIC TARGET RECOGNITION S. H. Winterstein (IBM Corp.) p 53-59 ref (See N64-10532 01-14)

7. FACTORS AFFECTING CHANGE DISCRIMINATION C. Kraft and C. L. Klingberg p 61-85 (See N64-10533 01-14)

8. RESEARCH ON THE RELATIONSHIP BETWEEN TIME AND PI PERFORMANCE E. I. Chalmers and H. D. Lerner (Appl. Psychology Corp.) p 87-108 (See N64-10534 01-14)

9. APPLICATION OF RAPID PRESENTATION TECHNIQUES IN PHOTO INTERPRETATION R. L. Krumm, R. E. Graves, and A. J. Farina (RCA) p 109-121 refs (See N64-10535 01-14)

10. PHOTO INTERPRETATION COURSES TAUGHT AT SHEPPARD AFB, TEXAS R. E. Millspaugh (Tech. Training School (3750th)) p 123-126 (See N64-10536 01-14)

11. OTHER HUMAN FACTORS PROBLEM AREAS REQUIRING STUDY S. Mac Leod p 127-128

N64-10527 Rome Air Development Center, Griffiss AFB, N.Y.

THE AUTOMATION OF PHOTO INTERPRETER FUNCTIONS

Lynwood D. Sinnamon, Jr. *In its* Proc. of Symp. on Human Factor Aspects of Photo Interpretation [Nov. 7-8, 1962] Sept. 1963 p 3-4 (See N64-10526 01-14)

Background information is presented regarding the contribution of automation to photo interpretation. Projects in optical processing, enhancement, textural analysis, etc., are discussed. Author

N64-10528 Rome Air Development Center, Griffiss AFB, N.Y.

HUMAN FACTOR PROBLEMS: OBJECTIVES AND APPROACHES

Shelton Mac Leod *In its* Proc. of Symp. on Human Factor Aspects of Photo Interpretation [Nov. 7-8, 1962] Sept. 1963 p 5-7 (See N64-10526 01-14)

Several key human factor problems in photo interpretation are depicted, along with required objectives and approaches. The need for an optimal integration of man and machine phases of the interpretation process is discussed with reference to four major classes of research toward more efficient interpreter performance. Specific criteria of realism and applicability are discussed. Author

N64-10529 Minneapolis-Honeywell Regulator Co., Duarte, Calif.

MEASUREMENT AND EVALUATION OF GROUND RESOLUTION

Robert N. Cook and Fred B. Meeker *In* Rome Air Develop. Center, Griffiss AFB, N.Y. Proc. of Symp. on Human Factor Aspects of Photo Interpretation [Nov. 7-8, 1962] Sept. 1963 p 9-25 (See N64-10526 01-14)

A study is described which will undertake the analysis of photo interpretation performance as a function of photographic ground resolution and contrast. Interpreter performance is to be measured in terms of accuracy, speed, and features used in identification. Twenty-nine types of targets are to be investigated in both real and simulated aerial photography. Results of the study should facilitate prediction of minimum levels of PI performance for photos having a given image quality. Concerning reconnaissance mission planning, the results will show what ground resolution and contrast (neglecting grain effects) are necessary to provide X level of accuracy and Y level of speed in target identification. Author

N64-10530 Cornell Aeronautical Lab., Buffalo, N.Y.

QUALITY CATEGORIZATION OF AERIAL PHOTOGRAPHY

Paul G. Roetling *In* Rome Air Develop. Center, Griffiss AFB, N.Y. Proc. of Symp. on Human Factor Aspects of Photo Interpretation [Nov. 7-8, 1962] Sept. 1963 p 26-41 (See N64-10526 01-14)

A study is in progress to determine a "summary measure" of image quality. The measure will relate physically measurable quantities in the image to photo interpreter performance. A program is described in which real aerial photography is selected and photographically modified to achieve a range of "qualities." These modified photographs are then used in a series of tests in which photo interpreters perform realistic interpretation tasks. The results of the tests will be used to derive a summary measure of image quality. Author

N64-10531 Army Personnel Research Office, Washington, D.C.

PSCHOPHYSICAL ASPECTS OF IMAGE QUALITY

Robert Sadacca and Alfred I. Schwartz *In* Rome Air Develop. Center, Griffiss AFB, N.Y. Proc. of Symp. on Human Factor Aspects of Photo Interpretation [Nov. 7-8, 1962] Sept. 1963 p 42-52 ref (See N64-10526 01-14)

A study is being made to evaluate relationships between psychophysical judgments of image quality and physical image variables. Relationships will also be established between their judgments and actual interpreter performance. The general hypothesis is that viewers are able to judge efficiently the overall quality of imagery, and thereby shortcut the need in the Army tactical setting for measurement devices and the application of weighting formulas in assessing image quality. Author

N64-10532 International Business Machines Corp., Owego, N.Y.

A STUDY OF IMAGE QUALITIES AND SPEEDED INTRINSIC TARGET RECOGNITION

Samuel H. Winterstein *In* Rome Air Develop. Center, Griffiss AFB, N.Y. Proc. of Symp. On Human Factor Aspects of Photo Interpretation [Nov. 7-8, 1962] Sept. 1963 p 53-59 ref (See N64-10526 01-14)

A brief summary is presented of an experimental Image Quality Independent Research and Development program designed to determine the relationships between image quality and military target recognition performance. An explanation is given of the methodology employed and the investigations conducted during the program. The major results are described and the present status of the effort is indicated. Author

N64-10533 Boeing Co., Seattle, Wash.

FACTORS AFFECTING CHANGE DISCRIMINATION

Conrad Kraft and C. L. Klingberg *In* Rome Air Develop. Center, Griffiss AFB, N.Y. Proc. of Symp. on Human Factor Aspects of Photo Interpretation [Nov. 7-8, 1962] Sept. 1963 p 61-85 (See N64-10526 01-14)

A background research program is described which is relevant to current research on photographic change discrimination. The objectives of the present investigation are to determine the effects of selected presentation variables on the detection and identification of changes in comparative-cover photo pairs. In particular, the relative advantages of a side-by-side versus an apparent motion mode of display is being investigated. A detailed description of the research design is presented and preliminary findings are described. Author

N64-10534 Applied Psychology Corp., Arlington, Va.

RESEARCH ON THE RELATIONSHIP BETWEEN TIME AND PI PERFORMANCE

E. L. Chalmers and H. D. Lerner *In* Rome Air Develop. Center, Griffiss AFB, N.Y. Proc. of Symp. on Human Factor Aspects

of Photo Interpretation [Nov. 7-8, 1962] Sept. 1963 p 87-108 (See N64-10526 01-14)

The present research program is concerned with the development of improved techniques related to temporal aspects of photo interpretation. Two primary variables (exposure time and work-rest cycles) will be studied independently, together with five secondary variables (scale, resolution, contrast, target density, and target detail). Anticipated research results will have implications for inflight interpretation, optimum work output, effective duty cycles, and training and man-machine assignments. Author

N64-10535 Radio Corp. of America, Bethesda, Md.
APPLICATION OF RAPID PRESENTATION TECHNIQUES IN PHOTO INTERPRETATION
R. L. Krumm, R. E. Graves, and A. J. Farina *In* Rome Air Develop. Center, Griffiss AFB, N.Y. Proc. of Symp. on Human Factor Aspects of Photo Interpretation [Nov. 7-8, 1962] Sept. 1963 p 109-121 refs (See N64-10526 01-14)

A research program is described which attempts to develop and evaluate rapid recognition techniques for the purpose of increasing the speed with which interpreters can perform flash or real-time identification of high priority targets and data from sensor recordings. It is anticipated that optimal techniques may be a function of such image quality parameters as scale resolution, contrast and complexity as well as the target signature, per se. Target signatures, having a functional relationship to the target, are being developed with consideration for several variables. The research design includes repeated presentations of stimulus material at decreasing exposure rates and under conditions involving differential reinforcement. Author

N64-10536 Technical Training School (3750th), Sheppard AFB, Tex. Dept. of Intelligence Training
PHOTO INTERPRETATION COURSES TAUGHT AT SHEPPARD AFB, TEXAS
Robert E. Millspaugh *In* Rome Air Develop. Center, Griffiss AFB, N.Y. Proc. of Symp. on Human Factor Aspects of Photo Interpretation [Nov. 7-8, 1962] Sept. 1963 p 123-126 (See N64-10526 01-14)

Intelligence photo-radar training courses for USAF officers and airmen are presented. The main course is outlined and some remarks relative to the selection and testing of students are made. Author

N64-10551 Naval Research Lab., Washington, D.C. Chemistry Div.
A STUDY OF THE FEASIBILITY OF OXYGEN PRODUCTION BY ALGAE FOR NUCLEAR SUBMARINES
P. J. Hannan, R. L. Shuler, and C. Patouillet Aug. 12, 1963 23 p refs
(NRL-5954; AD-420927)

The feasibility of this method has been investigated in the laboratory by measuring the growth rate and the oxygen production of the Sorokin strain of *Chlorella pyrenoidosa* under various conditions of culture. The results obtained with a small pilot plant containing 6200 ml of algal suspension have been evaluated; the effects of light intensity, rate of stirring, rate of carbon dioxide supply, and other variables were part of this study. Oxygen production increases with light intensity, but the oxygen produced per watt of electrical energy expended is constant over a wide range of light intensities. The amount of electrical energy required to provide enough oxygen for one man is between 30 and 50 kw, depending on the design of the gas exchanger. This high requirement makes the process prohibitive at present, but the development of more efficient high-intensity light sources could change the outlook. The dependability of the algal system in providing a constant supply of oxygen has been assured by this study; also, the volume requirements of the algal system are competitive with existing systems for carbon dioxide removal and oxygen production. Author

N64-10553 Michigan U., Ann Arbor Inst. of Science and Tech.
IMPLICATIONS OF SHORT-TERM MEMORY FOR A GENERAL THEORY OF MEMORY Memorandum of Project Michigan
Arthur W. Melton Oct. 1963 39 p refs
(Contract DA-36-039-SC-78801)
(Rept. 2900-410-R; AD-422425)

A number of current issues in learning theory are restated as issues about the formation, storage, and retrieval of memory traces, and the major issue is identified as the question whether short-term memory and long-term memory are points on a continuum, or a dichotomy. Then this major issue is examined in the light of data from recent studies in which the recall of single to-be-remembered alphanumeric items followed a single or very few repetitions. Finally, the issue is examined in the light of new data that relate the slope of the short-term forgetting curve to the number of elements or recoded "chunks" in the to-be-remembered unit. Also new data are presented that confirm and extend Hebb's finding that there is a specific accumulative strengthening effect of repetitions in the "immediate" memory situation involving to-be-remembered units beyond the span of immediate memory of human subjects. It is concluded that a continuum, rather than a dichotomy, is involved in short-term and long-term memory. Author

N64-10557 Naval Research Lab., Washington, D.C. Chemistry Div.
SOME FACTORS AFFECTING THE OXYGEN PRODUCTION BY ALGAE IN A SMALL CULTURE UNIT
R. L. Shuler Sept. 12, 1963 13 p refs
(NRL-5979; AD-421904)

The performance of an algal culture unit having a 3/4-inch annular culture chamber has been evaluated in terms of its oxygen-producing capabilities. The oxygen production of cultures containing 0.5, 0.6, 0.7, and 1.0 percent of cells was determined at several light intensities. For a given light intensity, the rate of oxygen output was essentially the same for each cell density, indicating that all the cultures were in the linear phase of growth. The experimental results led to the conclusion that, for cultures in the linear phase of growth, the rate of oxygen evolution is a logarithmic function of light intensity. Author

N64-10558 School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.
A METHOD FOR SELECTING AN ORAL HYGIENE TECHNIC FOR USE IN SPACE CABIN SIMULATOR FLIGHTS
Clarence M. Mc Call, Jr., Lucian Szmyd, Bryce O. Hartman, Billy E. Welch, and Richard E. Mc Kenzie Jan. 1963 12 p refs
(SAM-TDR-62-110; AD-403092)

Five oral hygiene techniques were evaluated for use in the USAF space cabin simulator and, ultimately, in actual space missions. The control technique consisted of the use of toothbrush, dentifrice, dental floss, and water rinse. The oral hygiene methods evaluated were: (1) chewing gum only; (2) toothbrush only; (3) toothbrush and dental floss; and (4) toothbrush and water rinse. Each method was tested for ten days. By use of both objective and subjective measurements, the toothbrush and dental floss method was proved to be as effective as the accepted use of toothbrush, dentifrice, dental floss, and water rinse in maintaining good oral hygiene. The degree to which good oral hygiene is maintained depends on the individual. Author

N64-10561 Joint Publications Research Service, Washington, D.C.
TRANSLATIONS FROM VESTNIK RENTGENOLOGII I RADIOLOGII [MOSCOW] VOL. 37, NO. V, 1963
Feb. 8, 1963 25 p refs Transl. into ENGLISH of three articles

p 49–54, 55–60, 60–63
(JPRS-17533; OTS-63-20181) OTS: $0.75

CONTENTS:
1. SOME PROBLEMS OF WORK ORGANIZATION AND RADIATION SAFETY IN X-RAY CLINICS V. P. Vikturina and V. I. Gordon p 1–7 refs
2. EKS-60 ELECTROKYMOGRAPH I. K. Tabarovskiy, I. M. Gofman, and A. N. Pomel'tsov p 8–16
3. GENERAL-PURPOSE CAPACITOR DOSIMETER FOR X-RAY AND GAMMA-RADIATION A. N. Krongauz, I. M. Parshin, V. R. Broksh, Yu. D. Gromov, and V. F. Yakunin p 17–22

N64-10564 Joint Publications Research Service, Washington, D.C.
TRANSLATIONS FROM OKISLY MARGANTSA, (MANGANESE OXIDES)
N. V. Lazarev and E. N. Levina, ed. Feb. 11, 1963 26 p refs Transl. into ENGLISH of four selections Leningrad, State Med. Press, 1962 p 3–6, 14–18, 108–110, 153–164
(JPRS-17557, OTS-63-21091) OTS: $0.75

In connection with industrial processes which involve toxic metals, attention was devoted to the prevalence of occupational manganese poisoning and to the hygienic importance of manganese oxides in certain production processes. A series of special hygienic, clinical, and experimental toxicological investigations were carried out. Working conditions under new production processes using manganese were studied. The clinical study of workers in various industries made it possible to detect the presence of a toxic influence of manganese in differing occupational groups. A comparative study was made of the influence of the four oxides containing manganese in the form of bivalent, trivalent, and tetravalent metal under both short- and long-term action on the organism of animals. Also a study was conducted of the pathological, anatomic, and histological changes in certain internal organs and internal secretion glands when poisoned by various manganese oxides. The higher manganese oxides, those containing manganese in the trivalent and tetravalent states, were found to have the greater toxic effect. C.L.W.

N64-10566 Joint Publications Research Service, Washington, D.C.
THE NUCLEOTIDE CODE AND REGULATION OF PROTEIN SYNTHESIS IN THE CELL
I. B. Zbarskiy Feb. 26, 1963 35 p refs Transl. into ENGLISH of an Article from Usp. Sovrem. Biol. (Moscow), v. 54, no. 3 (6), 1962 p 265–284
(JPRS-17811; OTS-63-21200) OTS: $1.00

Data are presented that describe problems of molecular biology associated with the biosynthesis of nucleic acids and proteins. Results were obtained mainly on systems of bacteria and bacterial viruses. The organized cell (animal and plant) is both structurally and metabolically more complicated than the simpler systems; however, indications of the existence of M-RNA in animal cells have been obtained, and it is felt that it is the template for the biosynthesis of a specific protein. R.T.K.

N64-10575 Joint Publications Research Service, Washington, D.C.
SOVIET RESEARCH IN RADIATION CONTROL
Petr Nikolayevich Kodochigov Apr. 4, 1963 14 p refs Transl. into ENGLISH of parts of a book "O Prakticheskikh Voprosakh Dozimetrii Ioniziruyuschchikh Izlucheniy", Moscow, USSR Acad. of Sci. Publ. House, 1962 p 23–26, 74–77, 78
(JPRS-18522; OTS-63-21506) OTS: $0.50

Radiation control in connection with professional exposure is reviewed. It is indicated that the idea of the maximum safe dose of exposure of man to ionized irradiation is not altogether successful. During the course of the last twenty years, the dose size has been repeatedly lowered. Formulas are presented for calculating (1) the maximum safe quantity of radioisotopes in the human organism, and (2) the maximum safe concentration of radioactive matter in the air and water. I.v.L.

N64-10592 Joint Publications Research Service, Washington, D.C.
TRAINING RADIO ENGINEERS
I. G. Klyatskin and Ye. P. Dement'yev July 2, 1963 13 p Transl. into ENGLISH of 2 articles from Radio Tekhnika (Moscow), v. 18, no. 5, May 1963 p 66–71
(JPRS-19999; OTS-63-31189) OTS: $0.50

The first stage in training radio engineers should be theoretical training in the following areas: (1) linear electronic circuits; (2) fundamentals of radioelectronics; (3) technical electrodynamics; and (4) electronic systems. The second stage of training should be the radio engineering courses. The principal purpose of these courses should be the designing of installations with direct simulation. The laboratory study held in conjunction with these courses should have the character of either industrial assignments (for example, testing of equipment), or creative work. In general these courses should train the student for independent work. Also, ways and means of improving the training of radio engineers is discussed. I.v.L.

N64-10593 Joint Publications Research Service, Washington, D.C.
RADIOACTIVE CARBON IN HYDROBIOLOGICAL RESEARCH
Yu. I. Sorokin Aug. 13, 1963 7 p Transl. into ENGLISH of an article from Vestn. Akad. Nauk SSSR (Moscow), no. 6, 1963 p 69–71
(JPRS 20614; OTS 63-31515) OTS: $0.50

The use of carbon-14 as a radioactive tracer for the quantitative evaluation of the biological productivity of waterborne bodies is an invaluable aid in tracing the photosynthetic steps of phytoplankton, the synthesis of organic substances and their conversion into food products. It is possible to follow such processes quantitatively, using C^{14}, with an accuracy to within 1×10^{-5}mg. The conclusion is that the radiocarbon method can assist the solution of hydrobiological and hydrochemical problems, particularly the origin of water humus and its trophic role. D.E.R.

N64-10595 Joint Publications Research Service, Washington, D.C.
DEVELOPMENT OF AFFERENT AND EFFECTOR INNERVATION OF SOMATIC MUSCULATURE
A. A. Klishov Oct. 11, 1963 21 p refs Transl. into ENGLISH of an article from Arkh. Anat., Gistol. i Embriol. (Leningrad), v. 44, no. 2, Feb. 1963 p 93–102
(JPRS-21415; OTS-63-31921) OTS: $0.50

A survey of the literature devoted to a special study of the development of somatic musculature innervation is presented. The following topics are discussed: (1) the nature of the first movements of animal and human embryos; (2) the development of motor nerve endings (motor plates); (3) the development of sensory nerve endings (neuromuscular spindles and Vater-Pacini corpuscles); and (4) the appearance of heterochronia in the development of afferent and efferent innervation of skeletal musculature R.T.K.

N64-10596 Joint Publications Research Service, Washington, D.C.
EFFECTS OF IRRADIATION AND DRUGS ON METABOLISM
M. F. Lipkan (Kiev Inst. for Advanced Training of Physicians) et al Oct. 16, 1963 17 p refs Transl. into ENGLISH from Ukr. Biokhim. Zh. (Kiev), v. 35, no. 4, 1963 p 514–518 and 542–547

(JPRS-21472; OTS-63-31948) OTS: $0.50

The nucleic acid (RNA and DNA) content in the tissues of rats and guinea pigs, irradiated and treated with an antiradiation check complex, was investigated. The tissues studied were the mucous membrane of the small intestines, liver, and spleen. The complex consisted of halascorbine, vitamin B_{12}, and streptomycin. Results indicate that: (1) the nucleic acid metabolism does not fully return to normal during the period of attenuation of the reactions produced by irradiation; (2) the nucleic acid content in the walls of the small intestines becomes normalized earlier than in the liver and spleen; and (3) the introduction of the complex produces a substantial overall normalizing effect with respect to the nucleic acid content. Also, the effect of ipraside on the nitrogen metabolism of the rabbit brain was investigated. Results are as follows: (1) the subcutaneous injection of ipraside in doses of 100 mg/kg of body weight does not alter the ammonia nitrogen or the amide nitrogen content of the proteins for 17 hrs; the glutamine level in the brain decreased by 30% as compared to that of normal animals; (2) a rise in the acetylcholine level in the brain does not affect the content of the nitrogen-metabolism investigated fractions; (3) intracisternal introduction of glutamic acid lowers the brain ammonia level, raises the glutamine content that was lowered by the ipraside, and reduces it to the level observed in the control animals. I.v.L.

N64-10597 Joint Publications Research Service, Washington, D.C.

ACCLIMATIZATION OF MAN TO THE NORTH AND SOUTH

I. A. Arnol'di. Oct. 17, 1963. 62 p. Transl. into ENGLISH of the book "Akklimatizatsiya Cheloveka na Severe i Yuge", Moscow, State Publ. House for Med. Lit., 1962. p 1-17.

(JPRS-21481; OTS-63-31954) OTS: $1.75

Brief information is given on hygiene, living conditions, and diet which must be taken into consideration for preventing harmful effects from the unusual conditions of extreme hot and extreme cold climates. P.V.E.

N64-10599 Joint Publications Research Service, Washington, D.C.

OUTER SPACE AND LIFE

A. A. Imshenetskiy. Nov. 22, 1963. 12 p. Transl. into ENGLISH from Vestnik Akad. Nauk SSSR (Moscow), no. 9, Sept. 1963. p 23-29.

(JPRS-22015; OTS-63-41224) OTS: $0.50

The majority of biologists believe that heterotrophic bacteria, if not the first kind of life, in any case occurred before the autotrophs. Therefore, a search for microorganisms on other planets should begin with attempts to detect heterotrophic bacteria by creating, in the instruments sent up, conditions for the reproduction of as large a number as possible of species which utilize organic matter. The second stage should be connected with a search for chemoautotrophic microorganisms which oxidize hydrogen, methane, ammonia, sulfur, iron, etc., because, according to existing data, these elements and compounds frequently exist in considerable quantities on various planets. The third stage should consist of a search for photosynthesizing bacteria which carry out anaerobic photosynthesis. Methods for detecting life, such as nephelometry and manometry are discussed. Also, investigations in which conditions existing in outer space are reproduced in laboratories, and a study of the effect of these conditions on various living organisms are discussed. I.v.L.

N64-10600 Joint Publications Research Service, Washington, D.C.

OUR EXPERIENCE IN REVIVING AN ORGANISM FROM A STATE OF CLINICAL DEATH

K. Stoyanov et al. (Higher Mil.-Med. Inst., Bulgaria). Nov. 29, 1963. 9 p. Transl. into ENGLISH from Khirurgiya (Sofia), no. 9, Sept. 1963. p 10-14.

(JPRS-22013; OTS-63-41222) OTS: $0.50

Clinical death in patients supervened predominantly during operations on the lungs and heart. For the resuscitation of patients the following measures were employed: controlled respiration, massage of the heart, intra-arterial blood transfusions, intravenous transfusions (blood, glucose, antishock fluids, analeptics, etc.), intracardiac injections (adrenaline, noradrenaline, calcium chlorate), defibrillation, and stimulation of the heart with the aid of a pulser. As a result of reanimation, out of 45 clinical observations 20 patients recovered completely, 17 patients recovered partially, 3 resuscitated patients had manifestations of decerebration, whereas in 5 cases the reanimation complex was of no avail. Subsequently, 3 resuscitated patients succumbed to the principal affection. Based upon the experience gained in recent years, the authors consider cardiac massage, controlled respiration, adequate blood substitution, and defibrillation as the principle means of reanimation. Author

N64-10616 Rochester U., N.Y.

THE TRANSFER OF STRONTIUM-90 THROUGH MILK TO SUCKLING MONKEYS AND RATS

B. J. Hopkins, S. A. Goksel, and L. W. Tuttle. Dec. 11, 1963. 20 p. refs.

(Contract W-7401-eng-49)

(UR-635)

Three rhesus monkeys were given 500 microcuries of Sr^{90} orally in 30 daily doses. Seven days after the last dose, they contained 10.37 ±0.24, 14.80 ±0.48 and 20.45 ±0.63 microcuries of Sr^{90} or from 2 to 4 percent of the total dose given to the mothers. Long-term retention of the milk-transferred Sr^{90} was measured through 600 days' postweaning. Rats of the Long-Evans strain were injected intravenously with 382 microcuries on day 17 postconception. A body burden of more than 1.3 microcuries was retained from the milk on day 14 postbirth when offspring body burden was at a maximum. This was in addition to 1.49 microcuries due to placental transfer that was present at birth. Long-term retention in rats was measured through 300 days' postweaning. The slopes of the retention curves of strontium for weanling animals are similar in monkeys and rats. Author

N64-10621 Library of Congress, Washington, D.C. Science Technology Div.

AEROSPACE MEDICINE. ABSTRACTS OF CURRENT LITERATURE

Arnold J. Jacobius and Roman Kenk, ed. Repr. from Aerospace Med., v. 34, no. 11, Nov. 1963. p 121-132.

(Supported by NASA)

Abstracts of articles appearing in current literature dealing with aerospace medicine are presented under the following headings: (1) general aspects, (2) biology, (3) general physiology, (4) neuro and sensory physiology, (5) psychology and psychiatry, (6) environmental physiology and psychology, (7) personnel, (8) medical problems and pharmacology, (9) toxicology, (10) safety, survival, and rescue, and (11) man-machine integration and life-support systems. P.V.E.

N64-10629 Joint Publications Research Service, Washington, D.C.

TELEMETRY PROBLEMS AT THE SECOND ALL-UNION CONFERENCE ON THE USE OF RADIOELECTRONICS IN BIOLOGY AND MEDICINE

R. A. Kapitanov. Feb. 15, 1963. 8 p. Transl. into ENGLISH of an article from Med. Prom. SSSR (Moscow), v. 16, no. 11, 1962. p 62-64.

(JPRS-17672; OTS-63-21144) OTS: $0.50

Telemetry problems to be solved in the course of medical and biological investigations are discussed. These problems

are as follows: (1) the placement of the pickups, (2) the efficient setup of multichannel systems for the simultaneous transmission of information from several subjects (concentrated or scattered), (3) the rapid processing and evaluation of the biological information received, (4) the creation of a feedback from the investigator to the subject under investigation, and (5) the unification and standardization of telemetric apparatus units. I.v.L.

N64-10643 Joint Publications Research Service, Washington, D.C.

HISTORY, NATURE, AND THEORY OF ASTROBIOLOGY

K. A. Lyubarskiy Apr. 16, 1963 19 p refs Transl. into ENGLISH of two chapters of a book "Ocherki po Astrobiologii", Moscow, 1962 p 5-11, 104-111

(JPRS-18724; OTS-63-21584) OTS: $0.50

The possibility of extraterrestrial life and the multiplicity of inhabited worlds are discussed. The history and nature of the problems are studied, including a review of the hypotheses pertaining to extraterrestrial life formulated through the work of various investigators, and followed by some general theoretical questions. C.L.W.

N64-10647 Joint Publications Research Service, Washington, D.C.

THEORETICAL ASPECTS OF THE CHEMICAL PROTECTION OF MAMMALS FROM IONIZING RADIATION

E. Ya. Grayevskiy Apr. 26, 1963 27 p refs Transl. into ENGLISH of an article from Zh. Obshch. Biol. (Moscow), v. 24, no. 1, 1963 p 3-22

(JPRS-18918; OTS-63-21688) OTS: $0.75

Chemical protection of mammals from the harmful consequences of ionizing radiation is investigated from a theoretical point of view. Radiation protective substances are discussed along with manifestations and criteria of the protective effects and operation of the protective substances. Two mechanisms of protection associated with the intervention of the initial (physicochemical) stages of radiation injury have been accepted. The first mechanism involves a decrease in radiosensitivity as a result of a decrease in oxygen tension in the organism, and the second mechanism involves an abatement of radiation injury as a result of a chemical combination of the protector and the components of intracellular structures. C.L.W.

N64-10650 Joint Publications Research Service, Washington, D.C.

AUTOMATS, LIFE, AND CONSCIOUSNESS

Todor Pavlov May 16, 1963 14 p Transl. into ENGLISH of an article from Nauchn. Dokl. Vysshey Shkoly Filosofskiye Nauki (Moscow), no. 1, 1963 p 49-57

(JPRS-19231; OTS-63-21834) OTS: $0.50

The possibility of man, with the aid of science, creating a live being which would manifest all signs of a live being, including sensation, experience, emotion, and will is discussed. In this report, it is concluded that science, in principle, may one day create (especially after mastering space and atomic energy) live, artificial human beings. This task will not be solved by cybernetics, physical, and chemical means and methods alone without the necessary aid of the biological and social sciences, including the communist scientific world outlook, Marxism-Leninism, and dialectical materialism. I.v.L.

N64-10658 Joint Publications Research Service, Washington, D.C.

THE ALGORITHMIC STRUCTURE OF ACTIVE TOUCH

June 5, 1963 19 p refs Transl. into ENGLISH of an article from Voprosy Psikhologii (Moscow), no. 1, 1963 p 67-79

(JPRS-19565; OTS-63-21985) OTS: $0.50

The macromovements of active touch are considered to be a form of scanning, allowing the concepts of cybernetics to be used for a theoretical analysis of the structure of active touch. The processes occurring in the brain during touch are regarded as information handling processes, in accordance with particular algorithms; the problem was reduced to the discovery of these algorithms. The structure of information handling processes in active touch is discussed as follows: (1) the problem of search for the object of perception—the solution of the problems of adjusting the algorithms and matching of the coordinate system of the hand with the object; (2) investigative movements of the feeling hand—the discrimination of the parts of the object surface which can be described by simple functions to determine their boundaries and characteristics; (3) the problem of recognition—identification of the perceived object with an object perceived earlier. R.T.K.

N64-10664 Joint Publications Research Service, Washington, D.C.

HISTOCHEMICAL CHARACTERIZATION OF THE DISTRIBUTION OF RIBONUCLEIC (RNA) AND DEOXYRIBONUCLEIC (DNA) ACIDS IN THE TESTICLES OF RATS AFTER GAMMA-IRRADIATION WITH Co^{60}

A. K. Mirakhmedov Nov. 22, 1963 7 p refs Transl. into ENGLISH of an article from Akad. Nauk UzSSR, Uzbeksk. Biol. Zh (Tashkent), v. 7, no. 4, 1963 p 55-58

(JPRS-22017; OTS-63-41226) OTS: $0.50

The results of an investigation of the effect of gamma irradiation on the histological and histochemical structures of the sex glands of white male rats, exposed to single whole body irradiation with a total dose of 400 r, are discussed. Results include the following: (1) the weight decrease of the testicles increased with irradiation duration; (2) the minimum weight of the testicles was noted two months after the beginning of irradiation; (3) histological examination of the testicles one day after irradiation showed a dilatation of the blood vessels, accumulation of lymphocytes in the blood vessel lumina, and slight hemorrhages in various parts of the sections; (4) a reduction in the RNA and DNA content was observed, most noticeably two months after the beginning of irradiation; and (5) degenerative changes, to the point of disappearance of the germinal epithelium and depletion of the tubules, were noted on the 60th day after irradiation. P.V.E.

N64-10666 Rochester U., N.Y. Div. of Radiation Chemistry and Toxicology

THE FUNCTIONAL SIGNIFICANCE OF SULFHYDRYL GROUPS IN THE CELL MEMBRANE

Aser Rothstein and Robert I. Weed Nov. 29, 1963 39 p refs (Contract W-7401-eng-49; Grant HE-06241-02)

(UR-633) OTS: $1.00

Evaluation of the functional significance of sulfhydryl groups in the cell membrane depends in part on certain unpredictable properties of protein sulfhydryl groups. These include: (1) problems of specificity related to sulfhydryl reacting reagents used to determine sulfhydryl content, (2) relative reactivity of the sulfhydryl groups themselves, (3) existence of functionally unresponsive sulfhydryl groups, along with those essential for the physiological activity under study. In studies of membranes, problems of distribution and permeation of the sulfhydryl reagents provide additional complications. Author

N64-10682 Joint Publications Research Service, Washington, D.C.

TRANSLATIONS FROM BOL'SHAYA MEDITSINSKAYA ENTSIKLOPEDIYA (GREAT MEDICAL ENCYCLOPEDIA) [MOSCOW], NO. 27, 1962

V. Parin et al 6 Feb. 1963 13 p refs Transl. into ENGLISH p 829–838
(JPRS-17497; OTS-63-21060) OTS: $1.00

Applications of radio engineering and electronics methods to scientific and practical medicine are discussed. The utilization of radioelectronics in medicine is proceeding basically along the following lines: (1) in scientific research for the development of medical science and public health practice, (2) in labor hygiene for the prevention of occupational diseases, (3) in the diagnosis of various diseases, (4) in the treatment of diseases and restitution of lost functions, and (5) in the mechanization of labor for servicing patients and for automation of the production of medical materials and drugs. P.V.E.

N64-10683 Joint Publications Research Service, Washington, D.C.
TRANSLATIONS FROM SOVETSKAYA MEDITSINA [MOSCOW] VOL. 26, NO. 10, 1962
B. V. Petrovskiy et al 6 Feb. 1963 28 p refs Transl. into ENGLISH of four articles p 3–13; 42–45; 110–114
(JPRS-17498; OTS-63-21086) OTS: $0.75

CONTENTS:
1. ELECTRIC SLEEP AS A METHOD OF NEUROTROPIC TREATMENT OF ESSENTIAL HYPERTENSION G. V. Sergeyev p 15–19 (See N64-10684 02-16)

N64-10684 Joint Publications Research Service, Washington, D.C.
ELECTRIC SLEEP AS A METHOD OF NEUROTROPIC TREATMENT OF ESSENTIAL HYPERTENSION
G. Y. Sergeyev *In its* Transl. from Sov. Med., Moscow, v. 26, no. 10, 1962 6 Feb. 1963 p 15-19 (See N64-10683 02-16)

The effectiveness of electric sleep treatments given to 211 patients with essential hypertension and definite signs of neurosis and sleep disorders was characterized by restoration of the ability to work, normalization of sleep, and pronounced reduction in blood pressure. P.V.E.

N64-10690 Joint Publications Research Service, Washington, D.C.
BIONICS, THE ENGINEERING ART OF NATURE
V. Bel'kevich, E. Vende, and I. Vil'-Vil'yams 6 Feb. 1963 17 p Transl. into ENGLISH of an article from Tekhn. Molodezhi (Moscow), no. 9, Sep. 1962 p 36–38
(JPRS-17500; OTS-63-21062) OTS: $0.50

The development and the applications of the principles of bionics, a branch of the science of engineering cybernetics, are discussed. The aim of bionics is the utilization of knowledge of biological processes and methods for solving engineering tasks. R.T.K.

N64-10694 Joint Publications Research Service, Washington, D.C.
BIOCHEMICAL ASPECTS OF THE RADIATION METHOD OF FOOD PRESERVATION
L. V. Metlitskiy 7 Feb. 1963 39 p refs Transl. into ENGLISH of an article from Izvest. Akad. Nauk SSSR (Moscow), no. 6, 1962 p 869–884
(JPRS-17530; OTS-63-21078) OTS: $1.00

The complexity of using ionizing radiation to preserve food products is discussed. It is indicated that irradiation may serve to protect the product from one category of losses but contribute to another category at the same time. For example, irradiation may inhibit germination in potato tubers but weaken their resistance to microorganisms. Conditions favoring the preservation of color and vitamins in irradiated meat may not preserve the taste and odor of the meat, and may even have a negative effect on bacteria eradication. However, with irradiation it is possible to produce changes in food which cannot be produced in any other way, for example, the inhibition of activity in some enzymes with simultaneous stimulation of activity in others. This is not only of theoretical interest but may contribute to the development of new and improved methods for storing food products. I.v.L.

N64-10695 Joint Publications Research Service, Washington, D.C.
CENTRAL PROBLEMS IN ENGINEERING PSYCHOLOGY
V. P. Zinchenko and D. Yu. Panov 8 Feb. 1963 23 p refs Transl. into ENGLISH of an article from Voprosy Psikhologii (Moscow), no. 5, 1962 p 15–30
(JPRS-17544; OTS-63-21087) OTS: $0.75

A description of some of the specific features of the operator's activity in a control system is presented, and, on the basis of this description, a number of problems in engineering psychology are formulated. The activity of the operator with physical control models which replace the real controlled objects is taken as the subject of engineering psychology. The central problem of this science is to determine the requirements imposed on the models constructed, taking into account, to the maximum degree, the functional characteristics and capabilities of the operator. P.V.E.

N64-10703 Joint Publications Research Service, Washington, D.C.
SOME HUMAN PHYSIOLOGICAL REACTIONS UNDER CONDITIONS OF ALTERNATING OVERLOADS AND WEIGHTLESSNESS
I. I. Kas'yan *In its* Transl. from Izvest. Akad. Nauk SSSR (News of the Acad. of Sci. USSR) [Moscow] no. 6, 1962 12 Feb. 1963 p 24–40 refs (See N64-10702 02-01)

Human physiological responses were studied on special airplanes which reproduced short-term weightlessness (up to 45 seconds) when carrying out parabolic flights. It was found that changes in the basic indices of the function of the cardiovascular and respiratory systems during alternating action of overloads and weightlessness were short termed and of a reversible character. Thus, upon the action of overloads up to 3.5 units, some regular reflex changes of cardiac activity were observed. Under the conditions of short-termed weightlessness, there was a tendency of the cardiovascular indices to return to the initial level. Individual peculiarities of human physiological response to the alternating influence of increased and decreased gravitation were determined. Author

N64-10713 Joint Publications Research Service, Washington, D.C.
A COMPLEX STUDY OF ELECTROPHYSIOLOGICAL, HISTOCHEMICAL, AND CYTOMORPHOLOGICAL INDICES OF BRAIN NEURON EXCITATION
A. B. Kogan 19 Feb. 1963 10 p refs Transl. into ENGLISH from Doklady Akad. Nauk SSR (Moscow), v. 147, no. 4, 1962 p 985–988
(JPRS-17717; OTS-63-21167) OTS: $0.50

Efforts to analyze brain activity by synthesizing information obtained by physiological, biochemical, and structural-morphological techniques are reported. A device is described which, when chronically implanted in the brain of an animal, can simultaneously excite the brain cells, record the potential, and cold fix the neural structures. At the chosen moment in the final experiment, the metabolic and chemical transformations in the neurons are arrested by passing refrigerant through the device. Subsequent histochemical and electron microscopic studies of the cells can be compared with the electrophysiological characteristics of the tissues at the moment of fixation. Definite metabolic shifts, as indicated by succindehydrase activity, ribonucleic-acid distribution and other standand tests, were demonstrated in the excited neurons. M.P.G.

N64-10723 Joint Publications Research Service, Washington, D.C.
TRANSLATIONS FROM PATHOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL NAYA TERAPIYA (PATHOLOGICAL PHYSIOLOGY AND EXPERIMENTAL THERAPY) [MOSCOW] VOL. 6, NO. 6, 1962
26 Feb. 1963 39 p refs Transl. into ENGLISH of four articles p 3-10; 44-56
(JPRS-17819; OTS-63-21206) OTS: $1.00

CONTENTS:

1. THE POSSIBILITY OF MODELING CERTAIN CONGENITAL DISEASES I. A. Piontkovskiy p 1-14 refs
2. TREATMENT OF ACUTE RADIATION SICKNESS BY THE METHOD OF TRANSPLANTING COLD-PRESERVED HOMOLOGOUS BONE MARROW V. A. Revis p 15-24 refs
3. EXPERIENCE OF USING S, BETA-AMINOETHYLISOTHIOURONIUM IN THE PROPHYLAXIS OF EXPERIMENTAL ACUTE RADIATION SICKNESS V. A. Razarenova p 25-31 refs
4. CHARACTERISTICS OF HETEROHEMOTRANSFUSION REACTIONS IN IRRADIATED RATS R. F. Yuris p 32-36 refs

N64-10742 Joint Publications Research Service, Washington, D.C.
DIGITAL COMPUTER RECOGNITION OF VISUAL IMAGES
M. A. Ayzerman 14 Mar. 1963 15 p Transl. into ENGLISH of an article from Nauka i Zhizn' (Moscow), no. 12, Dec. 1962
(JPRS-18126; OTS-63-21322) OTS: $0.50

The mechanism of learning to recognize visual images was studied in order to develop the simplest possible methods for the reproduction of this process on general-purpose digital computers. A hypothesis, the compactness hypothesis, was formulated, and algorithms were proposed for the solution of the learning process. Experiments were conducted on a general-purpose digital computer in order to verify the compactness hypothesis and the algorithms. R.T.K.

N64-10744 Joint Publications Research Service, Washington, D.C.
CLINICO-MORPHOLOGICAL CHARACTERISTICS OF CHRONIC RADIATION SICKNESS INDUCED EXPERIMENTALLY BY MEANS OF EXTERNAL IRRADIATION
N. N. Garvey, Ye. M. Politova, and G. N. Yelpat'yevskaya 15 Mar. 1963 13 p Transl. into ENGLISH from Gigiyena Truda i Profess. Zabolevaniya (Moscow), v. 7, no. 12, 1962 p 26-33 Presented at the Conf. of the Acad. Council of the Sci. Res. Inst. of the Min. of Health RSFSR, May 1960
(JPRS-18153; OTS-63-21332) OTS: $0.50

Rats were subjected to 0.5 to 1 r of gamma radiation daily for 6 months. Within 2 to 4 months, chronic radiation sickness developed, and upon further exposure, the second and even third stages of sickness developed. Upon cessation of exposure, those rats surviving after 5 to 8 months showed comparative restoration. The earliest external symptoms of sickness appeared in the nervous system, followed by instabilities in the peripheral blood system, marked plethora of the parenchymatous organs, and hematological changes including the inhibition of hemopoiesis, bone marrow degradation, and hematopoietic dystrophy. Dilation of pulmonary blood vessels and corresponding constriction of the alveoli were observed. The formation of clusters of plasma cells around the vessels of the skin, liver, brain, and gastrointestinal organs was also observed. D.E.R.

N64-10751 Joint Publications Research Service, Washington, D.C.
TRANSLATIONS FROM NAUCHNYYE DOKLADY VYSSHEY SHKOLY: FILOSOFSKIYE NAUKI (HIGHER SCHOOL SCHOLARLY PAPERS: PHILOSOPHICAL SCIENCES) [MOSCOW] NO. 5, 1962
B. M. Kedrov and M. A. Logvin 19 Mar. 1963 27 p refs Transl. into ENGLISH of two articles p 42-49
(JPRS-18208; OTS-63-21356) OTS: $0.75

CONTENTS:

1. THE INTERRELATIONSHIP BETWEEN TWO ASPECTS OF COGNITION B. M. Kedrov p 1-13
2. THE PHYSIOLOGICAL BASIS OF CONSCIOUSNESS IN THE LIGHT OF MOST RECENT RESEARCH ON BRAIN ACTIVITY M. A. Logvin p 14-24 refs

N64-10752 Joint Publications Research Service, Washington, D.C.
THE RESISTANCE OF INSECTS TO ULTRA-LOW TEMPERATURES
L. K. Lozina-Lozinskiy 19 Mar. 1963 7 p refs Transl. into ENGLISH of an article from Doklady Akad. Nauk SSSR (Moscow), v. 147, no. 5, 1962 p 1247-1249
(JPRS-18218; OTS-63-21361) OTS: $0.50

The pupae of *Saturnia pyri*, eggs of the Asiatic locust, and corn borer caterpillars were subjected to various rates of freezing and low temperature ranges to −196° C. Slow chilling increases the survival rate of the insects, but certain zones must be traversed rapidly. The rate of warming is not essentially important. Low-temperature resistance is possible due to the ability of the tissues and cells with normal water content to survive freezing and the total cessation of metabolism. Vitrification was absent during the experiments. Tables of experimental results are included. J.E.T

N64-10756 Joint Publications Research Service, Washington, D.C.
TRANSLATIONS ON HIGHER NERVOUS ACTIVITY
25 Mar. 1963 56 p refs Transl. into ENGLISH of four articles from Zhur. Vysshey Nervnoy Deystel'nosti im. I. P. Pavlov (Moscow), v. 12, no. 6, Nov.-Dec. 1962 p 985-1010; 1085-1096
(JPRS-18315; OTS-63-21399) OTS: $1.50

CONTENTS:

1. INTERACTION OF ANALYSORS DURING FLIGHT ON BOARD AIRCRAFT AND SPACE VEHICLES V. V. Baranovskiy, M.D. Yemel'yanov, and A. G. Kuznetsov p 35-45 refs (See N64-10757 02-16)

N64-10757 Joint Publications Research Service, Washington, D.C.
INTERACTION OF ANALYSORS DURING FLIGHT ON BOARD AIRCRAFT AND SPACE VEHICLES
V. V. Baranovskiy, M. D. Yemel'yanov, and A. G. Kuznetsov *In its* Transl. on Higher Nervous Activity 25 Mar. 1963 p 35-45 refs (See N64-10756 02-16)

Human activity during flight of spacecraft and aircraft involves the receipt and processing of large and varying amounts of information by the central nervous system. To analyze these processes, experiments have been conducted to elucidate the physiological laws of interaction of the optic, vestibular, and motor senses during flight conditions. EEG, pulse, blood pressure, respiration rate, motor reactions, and skeletal muscle biopotential were recorded during rotation while the subjects were in two positions—one firmly anchored, and the other with unstable support. The results indicate that all three sensory systems participate in the general sense of proprioception, and that when one system is suppressed, the subject loses at least part of his spatial orientation sense. D.E.R.

N64-10759 Joint Publications Research Service, Washington, D.C.
BIONICS

L. P. Krayzmer 26 Mar. 1963 114 p refs Transl. into ENGLISH of a book "Bionika", Moscow, State Power Publishing House, 1962 p 4-72
(JPRS-18372; OTS-63-21427) OTS: $2.50

The following topics are discussed: (1) neurons and nerve networks and their technical simulation, (2) mechanisms for coding and storing information, (3) self-organizing and cybernetic devices, and (4) analyzers and perceptors. R.T.K.

N64-10769 Joint Publications Research Service, Washington, D.C.
CYTOCHEMISTRY OF BLOOD GLYCOGEN IN MAMMALS AFTER SINGLE WHOLE-BODY X-IRRADIATION
A. L. Shabadash and Yu. B. Kheyfets (Acad. Sci. Armenian SSR) 1 Apr. 1963 21 p refs Transl. into ENGLISH from Arkh. Anat., Gistol. i Embriol. (Moscow), v. 43, no. 12, Dec. 1962 p 29-35
(JPRS-18479; OTS-63-21470) OTS: $0.50

Experiments on white male albino rats subjected to a single irradiation of 800 r indicated that: (1) 10 to 13 minutes after irradiation there is a loss of glycogen by the neutrophils and thrombocytes; (2) the decrease in glycogen content is at a maximum 1 to 3 hours after exposure, during the phase of progressive leukocytosis and neutrophilosis; (3) disintegration of the polysaccharide progresses from the central, circumnuclear zones to the periphery of the cells; (4) 6 hours after irradiation, the peripheral blood is found to contain many destroyed neutrophils with only traces of glycogen; (5) after 24 hours there is a pronounced leukopenia, despite the development of new generations of cells with moderately high glycogen content approximating the normal; and (6) cytochemical impairment of glycogen metabolism caused by irradiation precedes morphologically-apparent injury to neutrophil nuclei and cytoplasm. P.V.E

N64-10780 Joint Publications Research Service, Washington, D.C.
TRANSLATIONS ON VIBRATION DISEASE AND THERMAL DEHYDRATION
5 Apr. 1963 24 p refs Transl. into ENGLISH of three articles from Gigiyena Truda i Profess. Zabolevaniia (Moscow), no. 1, Jan. 1963 p 4-13; 36-41
(JPRS-18576; OTS-63-21519) OTS: $0.75

CONTENTS:

1. MATERIALS ON THE PATHOGENESIS OF VIBRATION DISEASES Ye. Ts. Andreyeva-Galanina and N. I. Karpova 1-7 refs (See N64-10781 02-16)

2. APPLICATIONS OF VIBRATION STIMULATOR FOR DETECTING CERTAIN FUNCTIONAL SHIFTS IN WORKERS EXPERIENCING VIBRATIONS EFFECTS UNDER INDUSTRIAL CONDITIONS Z. M. Butkovskaya and Yu. S. Koryukayev p 8-14 refs (See N64-10782 02-16)

3. WATER AND SALT EXCHANGE IN THERMAL DEHYDRATION L. Gets p 15-21 refs (See N64-10783 02-16)

N64-10781 Joint Publications Research Service, Washington, D.C.
MATERIALS ON THE PATHOGENESIS OF VIBRATION DISEASE
Ye. Ts. Andreyeva-Galanina and N. I. Karpova *In its* Transl. on Vibrations Disease and Thermal Dehydration 5 Apr. 1963 p 1-7 refs (See N64-10780 02-16) OTS: $0.75

An experiment was designed to discover the morphological changes occurring in various sections of the nervous system under the action of local vibration. The experiments were carried out on rabbits, whose right hind paws were subjected to the action of vibrations at a frequency of 40 cps, and an amplitude of 1.35 mm. The greatest changes were noted in the plantar and tibial distal section of the nerves. Marked changes were also noted in the Schwann cells. In the nerve sheaths, a large number of macrophages, polyblasts, and fibroblasts, filled with disintegrating myelin and clumps of axons, were discovered. Morphological changes were observed in the intervertebral sensory ganglia; microscopic examination of the spinal column revealed reactive changes in the nerve cells of the anterior, lateral, and posterior horns of the cerebral gray matter. Morphological changes were also found in the white matter of the spinal column. R.T.K.

N64-10782 Joint Publications Research Service, Washington, D.C.
APPLICATION OF VIBRATION STIMULATOR FOR DETECTING CERTAIN FUNCTIONAL SHIFTS IN WORKERS EXPERIENCING VIBRATION EFFECTS UNDER INDUSTRIAL CONDITIONS
Z. M. Butkovskaya and Yu. S. Koryukayev *In its* Transl. on Vibration Disease and Thermal Dehydration 5 Apr. 1963 p 8-14 refs (See N64-10780 02-16) OTS: $0.75

A vibrational load (stimulus) was used as a functional test in polyclinical examination of concrete molders who are subjected in their work to the action of vibration. Changes that occur in the neuromuscular, central nervous, and cardiovascular systems as a result of the vibrational stimulus were studied. Among the subjects there were groups of patients with a clinical diagnosis of vibration disease, with functional disorders of the nervous system, with conditional diagnosis of vibration disease, and subjects who were healthy. Results indicated that the character of the responsive reaction to a vibration stimulus depends on the original condition of the organism. R.T.K.

N64-10783 Joint Publications Research Service, Washington, D.C.
WATER AND SALT EXCHANGE IN THERMAL DEHYDRATION
L. Gets *In its* Transl. on Vibration Disease and Thermal Dehydration 5 Apr. 1963 p 15-21 refs (See N64-10780 02-16) OTS: $0.75

Changes in the concentration of the chloride anion of sodium and potassium, and of the carbon dioxide anion in blood plasma during thermal dehydration were studied. An investigation was also made of the hematocrit value, the extracellular fluid, and the amount of circulating plasma. The results indicate: (1) at high air temperature and a body weight loss of 1% to 2%, perspiration is due mainly to water loss from both the extracellular extravascular spaces and the extracellular intravascular spaces (plasma), and to a small extent from the water of the erythrocytes; and (2) in spite of the decrease in the amount of circulating plasma, the salt concentration in the plasma does not change, although changes have been observed in the ion ratio between the erythrocytes and the plasma. R.T.K.

N64-10786 Joint Publications Research Service, Washington, D.C.
TRANSLATIONS FROM VOPROSY PSIKHOLOGII (PROBLEMS OF PSYCHOLOGY) [MOSCOW] NO. 5, SEPTEMBER-
16 Apr. 1963 65 p refs Transl. into ENGLISH of four articles p 15-30; 75-83; 107-112; 184-189
(JPRS-18719; OTS-63-21580) OTS: $1.75

CONTENTS:

1. CRUCIAL PROBLEMS IN ENGINEERING PSYCHOLOGY V. P. Zinchenko and D. Yu. Panov p 1-24 refs (See N64-10787 02-16)

2. A MATHEMATICAL ANALYSIS OF RECTILINEAR FORMS PERCEIVED VISUALLY V. S. Ivanov p 25-37 refs (See N64-10788 02-11)

3. ON THE SUBJECT OF SOCIAL PSYCHOLOGY B. D. Parygin p 38-50 refs

4. A CONFERENCE ON PSYCHOLOGICAL PROBLEMS OF CYBERNETICS N. I. Mayzel' and L. U. Fatkin p 51-62

N64-10787 Joint Publications Research Service, Washington, D.C.
CRUCIAL PROBLEMS IN ENGINEERING PSYCHOLOGY
V. P. Zinchenko and D. Yu. Panov *In its* Transl. from Voprosy Psikhologii (Prob. of Psychology) [Moscow] no. 5, Sep.-Oct. 1962 16 Apr. 1963 p 1-24 refs (See N64-10786 02-16) OTS: $1.75

An attempt was made to differentiate specific problems found in engineering psychology, which to a considerable degree make it different from the traditional psychology of labor. The solution of problems in engineering psychology demands (1) a wide range of research that will bring in specialists competent in the most diversified areas of knowledge, and (2) the concentration of efforts of many specialists in this field. Many of the problems mentioned are not new. Considerable experience in solving similar problems arising in connection with an analysis of human actions with real objects has accumulated in psychology of labor, in general psychology, physiology, hygiene, anthropology, and other human sciences. C.L.W.

N64-10797 Joint Publications Research Service, Washington, D.C.
RESPIRATION AND CONVERSION OF ENERGY IN THE LIVING CELL
Kotel'nikova *In its* Studies in Biophys. 23 Apr. 1963 p 21-33 (See N64-10795 02-01) OTS: $1.00

Topics discussed with respect to the primary transformations of energy in a living cell which occur during respiration are: (1) sources of energy for living beings, (2) respiration and anaerobic processes of glycolysis and fermentation, (3) energy accumulator—adenosintriphosphoric acid, (4) method of oxidation of nutrient substances in the cell, (5) respiratory chain and oxidation phosphorolysis, and (6) the role of mitochondria. P.V.E.

N64-10798 Joint Publications Research Service, Washington, D.C.
INSULIN AND ULTRASOUND
I. Ye. El'piner and L. I. Stekol'nikov *In its* Studies in Biophys. 23 Apr. 1963 p 34-37 (See N64-10795 02-01) OTS: $1.00

Results of studying the structure and hormonal activity of insulin treated with ultrasonic radiation in the presence of various gases (oxygen, argon, and hydrogen) are discussed. As a result of ultrasonic treatment of an insulin solution in the presence of oxygen, histidine instead of phenylalanine is discovered at the B- end of the insulin chain, which indicates the separation from the chain of fine peptides, apparently consisting of four aminoacid bases: phenylalanine, valine, asparagin, and glutamin. Results of experiments conducted on rabbits revealed a unique reaction on the part of the animals to insulin subjected to ultrasonic radiation in oxygen. The intramuscular introduction of the treated insulin in rabbits resulted in an increase rather than a decrease in the blood-sugar level. This increase in the blood-sugar content is caused by fine peptides which appear in an insulin solution treated by ultrasonic radiation in the presence of oxygen. P.V.E.

N64-10807 Joint Publications Research Service, Washington, D.C.
TRANSLATIONS FROM MEDITSINSKAYA RADIOLOGIYA (MEDICAL RADIOLOGY) [MOSCOW] NO. 1, JANUARY 1963
25 Mar. 1963 40 p refs Transl. into ENGLISH of five articles p 24-32; 36-46; 62-64
(JPRS-18904; OTS-63-21676) OTS: $1.25

CONTENTS.

1. PREOPERATIVE IRRADIATION OF MAMMARY CANCER VIA INTERSTITIAL ADMINISTRATION OF RADIOACTIVE COLLOIDAL GOLD A. V. Kantin, L. A. Kachur, V. I. Lapchenkov, and K. N. Chochia p 1-14 refs

2. DETERMINATION OF THE FUNCTIONAL STATE OF THE THYROID BY MEANS OF A DIAGNOSTIC SCINTILLATION APPARATUS OF THE DSU-61 TYPE V. N. Slavnov and T. P. Sivachenko p 15-19 refs

3. SOME RESULTS OF THE ELABORATION OF THE PROBLEM OF RADIOBIOLOGY IN PUBLIC HEALTH INSTITUTIONS IN 1961 Ye. I. Vorob'yev and L. V. Funshteyn p 20-29 refs

4. THE EFFECT OF PROLONGED INTERNAL IRRADIATION WITH RADIOACTIVE ZINC ON THE BIOELECTRIC ACTIVITY OF THE BRAIN OF RABBITS V. G. Ovakimov p 30-32

5. THE THERAPEUTIC EFFECT OF PURIFIED PROPERDIN IN ACUTE RADIATION SICKNESS OF MICE V. Ya. Vissarionova and I.L. Chertkov p 33-37 refs

N64-10814 Joint Publications Research Service, Washington, D.C.
A COMPARATIVE ANALYSIS OF PSYCHIC CONTROL AND REGULATION IN AUTOMATA
L. M. Bekker May 1963 17 p Transl. into ENGLISH from Voprosy Filosofii (Moscow), no. 2, 1963 p 70-81
(JPRS-19100; OTS-63-21782) OTS: $0.50

The discovery of a relationship between the structural system and the functional principle of information circulation in an objective adaptive or transforming (by labor) effort of man, and the operations of automatic systems, reveals the real possibility of making a concrete analysis of these systems. The goal of such an analysis is to establish the specific character of the programing and regulating function of psychic processes as information signals in comparison with the regulating function of information signals controlling the dynamics of working operations in automatic systems. This report presents such an analysis. This analysis shows that the difference between all phenomenologically known characteristics of psychic control and the characteristics of regulation in automatic systems actually stems from differences in the methods under which those signals of information, which carry out the process of control, are organized. I.v.L.

N64-10850 Joint Publications Research Service, Washington, D.C.
SOME PROBLEMS IN THE ANALYSIS OF THE ELECTROGASTROGRAM AND ITS VARIANTS IN HEALTHY PERSONS DURING DIGESTION
I. G. Krasil'nikov and Yu. I. Fishzon-Ryss (Main Mil. Hosp., Moscow) 19 Nov. 1963 12 p refs Transl. into ENGLISH from Terap. Arkh. (Moscow), v. 35, no. 8, 1963 p 56-62
(JPRS-21925; OTS-63-41171) OTS: $0.50

Electrogastrograms of 59 healthy people aged from 19 to 25 were taken with the electrogastrograph EGS-3. It was shown that there are three variants of electrogastrogram in healthy people: normokynetic, hyperkynetic, and hypokynetic. The most frequent and typical for healthy people is the normokynetic variant, which was present in 66.1% of the cases. In this variant, most of the electrogastrogram waves had the amplitude varying between 0.2 to 0.4 and a frequency of approximately 3 per minute. The electrogastrogram may be influenced by the biocurrents of the hollow abdominal organs near the stomach, neuropsychological and emotional factors, and certain chronic toxic factors (smoking). All these factors should be taken into account for correct interpretation of the wave received. Author

N64-10852 Joint Publications Research Service, Washington, D.C.
MAN AND TECHNOLOGY
F. D. Gorbov 21 Nov. 1963 22 p ref Transl. into ENGLISH from Voprosy Psikhologii (Moscow), no. 4, 1963 p 153-158
(JPRS-21976; OTS-63-41191) OTS: $0.75

A review is presented of a book entitled "Man and Technology. Outlines of Engineering Psychology." P.V.E.

N64-10854 Joint Publications Research Service, Washington, D.C.

MECHANISM OF THE INTERACTION OF FREE RADICALS FORMED FROM INHIBITORS OF RADICAL PROCESSES—WITH PROTEIN SH-GROUPS

A. I. Agatova, L. S. Vartanyan, and N. M. Emanuel' (Acad. Sci. USSR) *In its* Interaction of Free Radicals 21 Nov. 1963 p 1-6 refs Transl. into ENGLISH from Doklady Akad Nauk SSSR (Moscow), v. 150, no. 3, 1963 p 547-550 (See N64-10853 02-01) OTS: $0.50

The effect of free radical release from inhibitors on the enzyme, LDH (lactatedehydrogenase), was examined. A rabbit-muscle LDH preparation was used, and SH-groups were determined by amperometric titration in buffers. Using PG (propylgallate) as the inhibitor, it was found that accelerated consumption of SH-groups forming S-S bonds occurred in the presence of oxidizing PG. The addition of PG oxidation products to the protein molecules did not occur. R.T.K.

N64-10856 Joint Publications Research Service, Washington, D.C.

TRANSLATIONS ON BIOCHEMISTRY

S. N. Aleksandrov et al 22 Nov. 1963 24 p refs Transl. into ENGLISH from Doklady Akad. Nauk SSSR (Moscow), v. 150, no. 3, 1963 p 665-679

(JPRS-22022; OTS-63-41228) OTS: $0.75

CONTENTS:

1. COMPARATIVE EVALUATION OF THE PROTECTIVE EFFECTIVENESS OF MERCAMINE (BETA-MERCAPTOETHYLAMINE) DURING SINGLE AND FRACTIONATED IRRADATION S. N. Aleksandrov (Central Sci. Res. Inst. of Med. Radiol.) p 1-4 refs

2. MECHANISM OF RADIOBIOLOGICAL LABILIZATION OF HEMOGLOBIN Ye. A. Bauman p 5-8 refs

3. EFFECT OF SOMATOTROPIC HORMONE OF ANTERIOR HYPOPHYSIS ON BONE UNDER IRRADIATION CONDITIONS Ye. A. Ivanova (Acad. of Sci. USSR) p 9-13 refs

4. FREQUENCY OF DEVELOPMENT OF LUNG ADENOMAS IN MICE AS RELATED TO THE DOSE OF EXTERNAL GAMMA-IRRADIATION R. V. Smirnov (Central Sci. Res. Inst. of Med. Radiol.) p 14-16 refs

5. POST-BURNING CHANGES IN PROTEIN AND NUCLEIC ACID METABOLISM IN ANIMAL ORGANISMS T. L. Zayets and T. A. Borisova (Acad. of Med. Sci. USSR) p 17-21 refs

N64-10866 Joint Pubications Research Service, Washington, D.C.

TRANSLATIONS FROM BOL'SHAYA MEDITSINSKAYA ENTSIKLOPEDIYA (GREAT MEDICAL ENCYCLOPEDIA) [MOSCOW] VOLUME 27

N. P. Dubinin et al 28 Mar. 1963 86 p refs Transl. into ENGLISH of selected articles Columns 699-721; 770-824 (JPRS-18414; OTS-63-21446) OTS: $2.25

Translations are given of the following articles: (1) radiation genetics, (2) radiation hygiene, (3) radiation conditions, (4) radiation injuries in combat, (5) radiobiology, (6) radioisotopic diagnosis, (7) radioisotope laboratory, (8) radiological units, (9) medical radiology, (10) radar, (11) clinical radiometer, and (12) radiometric instruments. R.T.K.

N64-10867 Joint Publications Research Service, Washington, D.C.

TRANSLATIONS FROM FIZIOLOGICHNYY ZHURNAL (PHYSIOLOGY JOURNAL) [KIEV] NO. 1, JANUARY-FEBRUARY 1963

M. F. Sirotina and M. P. Adamenko 23 Apr. 1963 refs Transl. into ENGLISH of two articles p 77-88

(JPRS-18855; OTS-63-21652) OTS: $0.75

In the first article it was reported that short-term (10 to 15 m) submersion of aqualung divers in the sea lead to changes in the composition of the peripheral blood. In the majority of subjects, there was an increase in the number of leukocytes, red cells, reticulocytes, a slight increase in the number of thrombocytes, and accelerated sedimentation rate of the red cells. The observed changes in the number of formed elements of the blood were concluded to be manifestations of a redistribution reaction. Submersion of the aqualung divers to depths of 7 to 10 m was accompanied by neutral phylic reaction of the white cells; submersion to depths of 20 to 35 m showed a predominant lymphocytic reaction. The second article discussed the restoration of circulation and respiration in dogs after long periods of clinical death due to electric trauma. A new variant of the method of artificial circulation using a donor and a single autojector pump was utilized. The chief conclusion was that the time of the restoration of respiration cannot invariably be used to predict the success of revival. C.L.W.

N64-10909 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

PILOTED SIMULATOR STUDIES PERTAINING TO THE LOW-SPEED LONGITUDINAL HANDLING QUALITIES OF A SUPERSONIC TRANSPORT AIRPLANE

Richard S. Bray *In* Am. Inst. of Aeron. and Astronautics AIAA Simulation for Aerospace Flight Conf., a Vol. of Tech. Papers Presented 26-28 Aug. 1963 Columbus, Ohio [1963] p 35-43 (See N64-10908 02-01)

Factors considered in the tests included speed-thrust stability, static stability, control sensitivity, and cockpit location relative to the landing gear. This study of the approach and landing task was conducted with a fixed-cockpit simulator which provides the pilot with a realistic view of the runway during the concluding portion of the approach. Evaluations in terms of pilot opinion and measured landing performance are presented, and significant experiences with the simulation technique are discussed. Author

N64-10934 North Carolina U., Chapel Hill School of Medicine

IRRADIATION AND THE NERVOUS SYSTEM

Charles D. Van Cleave N.Y., Rowman and Littlefield, Inc., 1963 433 p refs

(Sponsored by AEC) Available from Rowman and Littlefield, Inc., $9.75

Information on the effects of irradiation on the nervous system is presented in historical context, in order to relate current functional and behavioral concepts to older works which emphasized the clinical applications of irradiation. Topics discussed include: (1) effects of roentgen and radium radiation on the central nervous system (CNS) of experimental animals; (2) effects of therapeutic doses of X-rays and radium on the CNS of man; (3) effects of ionizing radiation on autonomic and peripheral nervous tissue in man and animals; (4) effects of ionizing radiation on the developing nervous system; (5) effects of massive high-intensity doses of ionizing radiation on the CNS of animals; (6) effects of whole-body exposures to ionizing radiation on the CNS of man; (7) effects of particle radiation on the CNS; (8) neurochemistry, electron microscopy, and the hematoencephalic barrier; (9) effects of radiation on sensory receptors; (10) functional changes in the nervous system resulting from irradiation; and (11) behavioral responses to ionizing radiation. M.P.G.

N64-10935 Atomic Energy Commission, Washington, D.C.

BIOLOGICAL EFFECTS OF EXTERNAL X AND GAMMA RADIATION, PART I

Raymond E. Zirkle, ed. (Chicago U.) New York, Mc Graw-Hill, 1954 554 p refs

(Natl. Nuclear Energy Ser., Manhattan Proj. Tech. Sect., Div. IV, v. 22B)

A collection of papers is presented reporting radiobiological work done under the Manhattan Project. The topics include: (1) the effects of long-continued total-body gamma radiation on mice, guinea pigs, and rabbits; (2) the effects of total-body X-irradiation on rabbits; (3) the effects of total-body X-irradiation on a preexisting induced anemia in rabbits; (4) heparinemia—an anticoagulant in the blood of dogs with hemorrhagic tendency after total-body exposure to X-rays; (5) electrophoretic study of the effects of X-rays on the plasma protein pattern in dogs; (6) effects of X-rays on the activity of enzymes; (7) effects of X-rays on tissue metabolism; (8) effects of X-rays on the metabolism of the small intestine and its permeability to glucose; (9) effects of X-rays on immunity; (10) radiation-induced changes in the UV absorption spectra of urine; (11) the effectiveness of drugs in preventing or alleviating X-ray damage; and (12) methods of exposure of animals to X-rays. M.P.G.

N64-10936 Rochester U., N.Y., School of Medicine and Dentistry

BIOLOGICAL EFFECTS OF EXTERNAL RADIATION (NATIONAL NUCLEAR ENERGY SERIES, MANHATTAN PROJECT TECHNICAL SECTION, DIVISION VI – VOLUME 2)

Henry A. Blair, ed. N.Y., Mc Graw-Hill Book Co., Inc., 1954 526 p refs

(Sponsored by AEC) Available from Mc Graw Hill Book Co., Inc., $7.00

The major part of the work on the biological effects of external radiation, performed during the war under the Manhattan Project and the Atomic Energy Commission, is included in this volume. The experiments were planned with the objectives of obtaining a description of the lethality and the pathological and genetic effects of both acute and chronic radiation, and of developing clinical criteria for detection of minimal effects of radiation in exposed personnel. The effects of single doses of whole-body X-radiation, chronic X-radiation, and fractionated doses of fast neutrons are discussed in separate parts, and each chapter is supplemented by references to parallel investigations. M.P.G.

N64-10989 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

EFFECT OF DIURNAL FREEZE-THAWING ON SURVIVAL AND GROWTH OF SELECTED BACTERIA

R. S. Young, P. Deal, J. Bell and J. Allen Repr. from Nature, v. 199, no. 4898 14 Sep. 1963 p 1078–1079 refs Presented at the COSPAR Symp. on Extraterrestrial Life. Warsaw, 10 Jun. 1963

Survival and growth of microorganisms are investigated in terms of the effect of repeated diurnal freeze thawing. Experiments are reported which demonstrate the ability of some organisms to survive and grow well under freeze–thaw cycles typical of day–night conditions at the equator of the planet Mars in summer. C.L.W

N64-11004 Joint Publications Research Service, Washington, D.C.

THE CONDITION AND THE PERSPECTIVES OF UTILIZATION OF COMMUNICATION, SIGNALING, AND TELEMETRY IN THE THERAPEUTIC PROCESS

R. A. Kapitanov .8 Feb. 1963 12 p refs Transl. into ENGLISH of an article from Sov. Zdravookhr. (Moscow), v. 21, no. 10, 1962 p 52–58

(JPRS-17534; OTS-63-20182) OTS: $0.50

A discussion is presented of the benefits of using various means of communication and telemetry in hospitals. Among these benefits are the improvement of the standard of medical service, the reduction of work waste, and the use of specialized telemetric systems for the control of conditions of seriously ill patients. R.T.K.

N64-11023 Joint Publications Research Service, Washington, D.C.

THE SIGNIFICANCE OF PLASMA CELLS IN ANTIBODY FORMATION PROCESS DURING IONIZING RADIATION

L. G. Kovtunovich and A. Yu. Rubnitskaya 8 Mar. 1963 13 p refs Transl. into ENGLISH of an article from Arkh. Patol. (Moscow), v. 24, no. 12, 1962 p 15–21

(JPRS-18020; OTS-63-21277) OTS: $0.50

The investigation consisted of a study of rats which were divided into 8 groups—four controls and four experimental. The investigations showed that the presence and degree of maturity of plasma cells in the lymph nodes, and especially in the spleen, of animals are a clear morphologic index of the process of antibody formation, which may be used to study the laws of immunogenesis, both under ordinary conditions and following ionizing radiation. C.L.W.

N64-11039 Joint Publications Research Service, Washington, D.C.

SELF-LEARNING AS ONE OF THE BASIC STEPS IN THE DESIGN OF SELF-ADJUSTING SYSTEMS

P. I. Chinaev *In its* Principles of the Design of Self-Learning Systems 21 Oct. 1963 p 156–179 refs (See N64-11029 02-01)

Self-learning, in self-adjusting systems, is the best method for obtaining full information regarding the dynamic properties of an object, provided the speed of the self-adjusting system is not a limiting factor. A circuit which includes a self-learning model (with a digital or continuous-action computer) represents an additional, and more accurate, circuit for self-adjustment. It is advisable to introduce and index of the degree of self-learning to evaluate the degree of perfection of a process of self-adjustment. Self-adjusting systems, lacking elements of self-learning, should be regarded as self-adjusting systems with a zero level of self-adjustment. The higher the level of self-adjustment, i.e., the more circuits in the system containing elements of self-learning, the more perfect will be the process of self-adjustment. The functions of self-learning in a self-adjusting system can be different. They will depend on the task before the system and the purpose for which it is designed. I.v.L.

N64-11040 Joint Publications Research Service, Washington, D.C.

SOME QUESTIONS ON THE TEACHING OF AUTOMATA

A. A. Lyapunov *In its* Principles of the Design of Self-Learning Systems 21 Oct. 1963 p 180–185 (See N64-11029 02-01)

A system of concepts for teaching automata is discussed. The direction in which such a system of concepts can be sought is the following. (1) Each automata with a memory is a learning automata. Learning is the dependence of the functioning of the automata upon the information inscribed in their memory unit. (2) The control system is of the hierarchic type, i.e., consisting of several control systems, wherein the systems at the lower command level receive the information directly from outside and process a direct response. During a unit of time in these cycles of control, numerous symbols, which have a small entropy, circulate. The next level of control receives information regarding the rate of work of each of its subordinate systems. (3) Each level of command can have a different range of activity. (4) The system can be readjusted in order to take experience into account. (5) Systems embodying the principle of reproduction, i.e., the creation of new units of control, are possible. I.v.L.

N64-11043 Joint Publications Research Service, Washington, D.C.

THE BASIC CONCEPT OF BIOMETRY AND ITS GENERAL APPLICATION

Ireneusz Juvancy (Hung. Acad. of Sci.) 27 Mar. 1963 29 p Transl. into ENGLISH of an article from Magyar Tudomany (Budapest), v. 7, no. 10, Oct. 1962

The concept of biometry is approached and its purpose and most important methods are described, along with its general application. The purpose of biometry is to widen the knowledge of biology and to make it more exact and more reliable. The objective of biometry therefore is identical with that of the biological sciences, but while its methods are applicable to any branch or to any problems of the biological sciences, biometry does not attempt to solve a biological problem. It serves as an aid to the biological sciences by helping to pinpoint problems. C.L.W.

N64-11044 Joint Publications Research Service, Washington, D.C.
THEORETICAL BASIS FOR THE PRINCIPLE OF SINGLE-CELLED ALGAE CULTIVATION
I. V. Smirnov 29 Mar. 1963 18 p refs Transl. into ENGLISH of an article from Biofizika (Moscow), v. 8, no. 1, 1963 p 90-100
(JPRS-18432; OTS-63-21454) OTS: $0.50

A study was conducted to provide the basis for a mathematical approach to the principle of cultivating chlorella, which will make possible a theoretical evaluation of the productivity of the culture under various methods of cultivation as a function of the basic factors of cultivation, both biological and design. An examination of the growth process of chlorella was carried out on the basis that the concentrations of the constituents of the mineral medium and the carbon dioxide in the suspension during the entire cultivation period remain sufficient to sustain normal culture growth. In the examination of the process it was assumed that the culture suspension remains constant and that the suspension density is uniform throughout the entire volume of the cultivator. It was also assumed that cell respiration does not depend on illumination and is proportional to the amount of biomass in the cultivator. The problem was therefore reduced to finding a correlation between the increase in the amount of biomass and the radiant energy absorbed with time. Here it is assumed that the radiant stream intensity lies in the linear portion of photosynthesis. C.L.W.

N64-11058 Joint Publications Research Service, Washington, D.C.
CYBERNETICS IN EDUCATION AND AUTOMATION
22 Apr. 1963 24 p refs Transl. into ENGLISH of two articles
(JPRS-18832; OTS-63-21637) OTS: $0.75

CONTENTS:

1. CYBERNETICS IN RELATION TO IMPROVED EDUCATION AND TRAINING Wilfried Lange p 1-15 refs (See N64-11059 02-16)

2. CYBERNETICS-AUTOMATION—THE NATURE OF THE WORK G. Klaus p 16-21 refs (See N64-11060 02-16)

N64-11059 Joint Publications Research Service, Washington, D.C.
CYBERNETICS IN RELATION TO IMPROVED EDUCATION AND TRAINING
Wilfried Lange *In its* Cybernetics in Educ. and Automation 22 Apr. 1963 p 1-15 refs Transl. into ENGLISH from Paedagogik (Berlin), no. 2, Feb. 1963 p 159-167 (See N64-11058 02-16) OTS: $0.75

This discussion includes: the problem of basic knowledge; correct technology of thought—basis of improvement in learning; and creative mental work—a primary prerequisite for mastering modern production. C.L.W.

N64-11060 Joint Publications Research Service, Washington, D. C.
CYBERNETICS – AUTOMATION – NATURE OF WORK
G. Klaus *In its* Cybernetics in Educ. and Automation 22 Apr. 1963 p 16-21 refs Transl. into ENGLISH from Feingeraetetechnik (Berlin), no. 3, Mar. 1963 p 97-98 (See N64-11058 02-16) OTS: $0.75

Cybernetics and automation are discussed in terms of production processes in industry, construction, transportation, research, planning and designing, accounting, and administration. It is stated that the use of cybernetics and automation in these and other areas will eliminate monotonous and stereotyped jobs. C.L.W.

N64-11063 Joint Publications Research Service, Washington, D.C.
THE USE OF ACTH AND ADRENAL CORTICAL HORMONES ON INDIVIDUALS WHO HAVE BEEN EXPOSED TO THE EFFECT OF IONIZING RADIATIONS
N. A. Kurshakov, N. N. Rynkova, and I. I. Sokolova 6 May 1963 10 p refs Transl. into ENGLISH of an article from Probl. Endokrinol. i Gormonoterap. (Moscow), no. 2, 1963 p 73-76
(JPRS-19066; OTS-63-21754) OTS: $0.50

The following symptoms served as indications for the use of corticoid hormones in individuals who had been subjected to the prolonged action of small doses of ionizing radiation: indirect and direct symptoms of adrenal cortex insufficiency, and a hypoplastic state of hemopoiesis with the presence of leucopenia. The use of pathogenetic therapy (ACTH, cortisone, prednisolone) in these individuals improved their general condition, raised the amount of leucocytes, neutrophiles, and thrombocytes, simultaneously reducing the number of eosinophiles, and lead less frequently to moderate lymphopenia and monocytopenia. R.T.K.

N64-11064 Joint Publications Research Service, Washington, D.C.
TRANSLATIONS FROM GIGIYENA I SANITARIYA (HYGIENE AND SANITATION) NO. 12, 1962
A. F. Aksyuk et al 6 May 1963 20 p refs Transl. into ENGLISH of 4 articles (Moscow)
(JPRS-19067; OTS-63-21755)

These discussions on hygiene and sanitation concern: the effect of small concentrations of fluorine on the organism; the effect of fluorine in drinking water on the functioning of the central nervous system; sanitary indices for water reservoirs covered with a monomolecular film; and air ionization of large premises by means of wire aerials connected to a Franklinization unit. C.L.W.

N64-11066 Joint Publications Research Service, Washington, D.C.
TEXTBOOK OF SURGERY
B. Ye Pankrat'yev, ed., and B. M. Khromov 20 May 1963 40 p Transl. into ENGLISH of a selected chapter and table of contents from a book "Rukovodstvo po Khirurgii" Moscow, 1962 p 5-9 and 710-726
(JPRS-19278; OTS-63-21860) OTS: $1.00

A discussion is presented of the effect of ionizing radiation on wounds. Two main types of surgical problems occur: (1) when the effect of ionizing radiation on a wound surface depends on the direct radiation effect of radioactive agents entering the wound (radioactive mixtures); and (2) when the course of the wound process is complicated by the presence of one form or another of radiation sickness (combined radiation injuries). Recommended therapy is presented. A distinction is made between external and internal sources of radiation, although the resulting pathogenic effect is largely the same in both cases. A description is given of the biological mechanism of the primary effect of ionizing radiation. R.T.K.

N64-11067 Joint Publications Research Service, Washington, D.C.
TRANSLATIONS FROM NEKOTORYE PROBLEMY DEYSTVIYA IONIZIRUYUSHCHEY RADIATSII NA NERVNUYU SISTEMU (CERTAIN PROBLEMS OF THE EFFECT OF IONIZING RADIATION ON THE NERVOUS SYSTEM)
M. N. Livanov 20 May 1963 46 p refs Transl. into ENGLISH of Chapter II, conclusion, and table of contents, Moscow, 1962 p 24–47, 174–177, and 195–196
(JPRS-19284; OTS-63-21865) OTS: $1.25

Basis mechanisms are discussed of the effect of ionizing radiation on the nervous system. Included in the discussion are: reflected effect of radiation upon the central nervous system; and changes in the neural centers as the results of radiation effect on the periphery. The reactions of the nervous system to radiation that were discussed started with the initial ones—the functional—and ended with the subsequent ones which develop as an aftereffect of irradiation. C.L.W.

N64-11068 Joint Publications Research Service, Washington, D.C.
THE ULTRAVIOLET FLUORESCENCE OF MUSCLES
I. Ya. Barskiy, V. A. Brumberg, and Ye. M. Brumberg 20 May 1963 6 p refs Transl. into ENGLISH from Doklady Akad. Nauk SSSR (Moscow), v. 147, no. 2, 1963 p 474–476
(JPRS-19287; OTS-63-21868) OTS: $0.50

The intensity of ultraviolet fluorescence of various tissues was compared with their content of tryptophan. Results indicate that in the tested tissues there is no direct relationship between the content of tryptophan and the intensity of ultraviolet fluorescence. Ultraviolet fluorescence of muscles is therefore determined, not by the presence of tryptophan-containing proteins, but by some other fluorescent substance, or by tryptophan present in the muscles in some other state than it is in epithelial and connective tissues. R.T.K.

N64-11069 Joint Publications Research Service, Washington, D.C.
TRANSLATIONS FROM PERVICHNYYE PROTSESSY LUCHEVOGO PORAZHENIYA (PRIMARY PROCESSES OF RADIATION INJURY)
B. N. Tarusov 23 May 1963 30 p refs Transl. into ENGLISH of excerpts from booklet Moscow, Gostomizdat 1963 p 2, 85 93, 94–96
(JPRS-19363, OTS-63-21900) OTS: $0.75

Factors which determine the radiosensitivity of organisms to the effects of ionizing radiation are discussed. Included was the role of protection performed by vegetable pigments in plant cells and that performed by the natural antioxidants in animal organisms. C.L.W.

N64-11097 California U., Berkeley. Lawrence Radiation Lab.
BIOELECTRIC SENSITIVITY TO IRRADIATION OF THE RETINA AND VISUAL PATHWAYS
C. T. Gaffey and A. K. Kelley 9 Sep. 1963 41 p refs (Contract W-7405-eng-48)
(UCLR-11005) OTS: $1.00

A study has been made of the acute effects of ionizing radiation on the visual pathways of the cat, as revealed by electrophysiological techniques. Irradiation sources were: 910 Mev alpha particles from the 184-inch cyclotron, 40-Mev alpha particles from the heavy ion linear accelerator, and 250 kv X-rays. Rotational procedures restricted irradiation to the eye, optic tract, or optic chiasma. The b-wave amplitude of the electroretinogram served as an index of the functional sensitivity of retinal cells to unilateral irradiation. Photically evolved responses from chronically implanted bipolar electrodes in the optic tract provided a quantitative means of evaluating the influence of unilateral optic-tract irradiation. Midline irradiation of the optic chiasma was performed, and blockage of interocular transfer was used as a measure of the effectiveness of irradiation. Ophthalmoscopic examinations were performed on irradiated cats. Author

N64-11103* Aeronutronic, Newport Beach, Calif.
STUDY OF BASIC BIO-ELECTROCHEMISTRY Quarterly Engineering Progress Report, 20 Jun.–19 Sep. 1963
M. H. Boyer, R. C. Bean, Y. H. Inami, and W. C. Shepherd 19 Oct. 1963 69 p refs
(NASA Contract NASw-655)
(NASA CR-52607; U-2332) OTS: $6.60 ph, $2.27 mf

The survey of enzyme systems pertinent to the field of bioelectrochemistry has continued with the testing of two sugar oxidases from different sources, a diaphorase system, arginase, and an amino acid decarboxylase, L-glutamic acid decarboxylase. None of these was found effective for current production at normal electrode potentials without use of carriers. The bioelectrochemical activity of the D-amino acid oxidase tryptophan system has been extensively characterized. A combination of electrochemical, spectrophotometric and chronopotentiometric techniques has demonstrated that the major source of current in this system is the electrode oxidation of indole pyruvic acid, one of the major products of the enzyme-substrate reaction. A highly significant finding, from chronopotentiometric studies, has been that high electrode oxidation potentials may result in poisoning of the electrode with adsorbed oxidation products of the electroactive species. Author

N64-11111 Douglas Aircraft Co., Inc., El Segundo, Calif.
HUMAN TRACKING PERFORMANCE UNDER TRANSVERSE ACCELERATIONS
L. G. Summers 28 Sep. 1962 76 p refs
(NASA Contract NASr-68)
(NASA CR-52718; LB-31116) OTS: $7.60 ph, $2.48 mf

Human performance was measured for control display parameters during positive and negative transverse acceleration ("eyeballs in" and "eyeballs out"). Five subjects were given a compensatory tracking task in pitch and roll using a two-axis side arm controller and a CRT attitude display with a moving horizon. Three acceleration levels were used, each consisting of a two-minute duration. Performance was measured by the integral of absolute error in both the pitch and roll axes. There was a decrement in performance in the pitch axis with increased acceleration but differences in the roll axis were shown only for one analysis model of two. No differences were recorded in performance due to direction of the acceleration. Aircraft dynamics affected performance but did not interact with acceleration. Visual error feedback, which averaged performance over a period of time, improved performance in pitch and degraded performance in roll. Author

N64-11123 Joint Publications Research Service, Washington, D.C.
A HANDBOOK FOR VECTORCARDIOSCOPY
I. T. Akulinichev 2 May 1963 186 p refs Transl. into ENGLISH of a book "Prakticheskiye voprosy vektorkardioskopii", Moscow, State Med. Publ. House, 1960 214 p refs
(JPRS-19030; OTS-63-21740) OTS: $3.00

The topics discussed are: the vector and the vectorgram, the electrical vectors of the heart, vectorcardiography, the physical basis of vectorcardiography, the model of the electrical field, the law of signs and the polarity of the vectorcardiogram, the system of leads for biovoltages in vectorcardiography, the projection of a vectorcardiogram, the precardial system of vectorcardiography, the criterion of reliability and the questions of vectorcardiography standardization, analyzing and reading vectorcardiograms, a normal vectorcardiogram, the electrocardiogram and the vectorcardiogram, the vectorcardiogram with diffuse changes of the myocardium, the vectorcardiogram with hypertrophies of the ventricular myocardium, the vectorcardiogram with coronary insufficiency and myocardial infarct, the vectorcardiogram and the electrocardiogram with focal changes of the myocardium, the diagnostic significance

of vectorcardiography, technical questions of vectorcardioscopy, Soviet vector-electrocardioscopes, and the use of the vectorcardioscope. R.T.K.

N64-11124 Joint Publications Research Service, Washington, D.C.
MEDICINE AND PHYSICS
B. V. Ognev and G. D. Novinskiy 6 May 1963 127 p refs Transl. into ENGLISH of a booklet "Meditsina i Fizika", Moscow, Znaniya Publishing House of the All-Union Soc. for Dissemination of Political and Sci. Inform., 1962 p 1-64
(JPRS-19043; OTS-63-21743) OTS: $2.75

The problems which arose in medical science in connection with the development of physical, technical and other related sciences are discussed as follows: cybernetics and bionics, information theory, radiometry, electron optics, polymeric materials, illuminating devices, television, luminescence, ultrasound, mirror effect, and atomic energy. The relation between cybernetics and medicine is discussed as follows: the historical development of cybernetics, the control of the organism, lifeless models of living processes, and diagnosis by machine. R.T.K.

N64-11127 Joint Publications Research Service, Washington, D.C.
LOWERING THE IMMUNOBIOLOGICAL RESISTANCE OF THE ORGANISM AS A MANIFESTATION OF THE IRREVERSIBLE COMPONENT OF RADIATION SICKNESS
I. G. Akoyev et al 13 May 1963 12 p refs Transl. into ENGLISH of an article from Med. Rad. (Moscow), v. 8, no. 2, 1963 p 47-50
(JPRS-19152; OTS-63-21805) OTS: $0.50

The influence of preliminary irradiation conditions on the life span of mice after contamination with toxin was studied. Results indicate that in an irradiated organism, for a period of time after restoration of radioresistance and reparation of reversible radiation injuries, lesions remain in the mechanism of immunobiological resistance for a long time. This mechanism determines the ability of the organism to counteract the influence of bacterial toxins. Manifestation of these lesions, which was displayed in the reduction of the average life span after contamination by a toxin, increased when the irradiation dose was increased. However, the conditions of radiation (single or double) and the increase in time intervals between irradiations did not influence the degree of reduction of the organism's immunity. R.T.K.

N64-11131 Joint Publications Research Service, Washington, D.C.
HUMAN REACTIONS IN SIMULATED SPACE ENVIRONMENT
A. Zhigarev and A. Iordanskiy 28 Jun. 1963 6 p Transl. into ENGLISH of an article from Kommunist (Yerevan), 14 Jun. 1963 p 3
(JPRS-19953; OTS-63-31167) OTS: $0.50

A discussion is presented of the effect on man of a prolonged stay in an isolation cabin, in conditions of limited movement, and with little link to the outside world. R.T.K.

N64-11132 Joint Publications Research Service, Washington, D.C.
NEW TASKS IN DEVELOPMENT OF BIOCHEMICAL PRODUCTIONS
5 Jul. 1963 8 p Transl. into ENGLISH of an article from Med. Prom. SSSR (Moscow), no. 4, 1963 p 3-6
(JPRS-20041; OTS-63-31215) OTS: $0.50

The creation of new therapeutic substances for the prevention and treatment of disease is discussed. Particular emphasis is placed on the microbiological transformation method whereby it is possible to obtain a rearrangement of the molecules of chemical compounds, approximating their structure to the structure of biologically important elements of the cell. R.T.K.

N64-11133 Joint Publications Research Service, Washington, D.C.
THE SOVIET COSMONAUTS
Ye. Petrov 10 Jul. 1963 26 p refs Transl. into ENGLISH of a portion of an article from Krasnaya Zvezda (Moscow), 16 Feb. and 16 and 22 Mar. 1962
(JPRS-20100; OTS-63-31243) OTS: $0.75

The role of the Soviet cosmonauts in designing their spacecraft and planning their missions is discussed, with a general description of the training program and the variety of tests to which they are subjected. D.E.R.

N64-11134 Joint Publications Research Service, Washington, D.C.
LIFE IN OUTER SPACE
N. Sisakyan 15 Jul. 1963 15 p Transl. into ENGLISH of an article from Pravda (Moscow), 21 Jun. 1963 p 2 and 6
(JPRS-20168; OTS-63-31283) OTS: $0.50

The following biological problems encountered in spaceflight are discussed: (1) those related to flight dynamics—overloading, vibration, noise, and weightlessness; (2) those characterizing space as an extraordinary habitat—ultraviolet, infrared, ionizing radiation, barometric pressure, unusual thermal regime, etc.; (3) those relating to prolonged living in the hermetically sealed cabin of a spacecraft—isolation, limited space, unusual food, diurnal rhythms, microclimate, etc. In addition, the results of efforts to find life in outer space are discussed. R.T.K.

N64-11135 Joint Publications Research Service, Washington, D.C.
PSYCHOLOGY AND ASTRONAUTICS
Yu. Volynkin 15 Jul. 1963 17 p Transl. into ENGLISH of an article from Med Gazeta (USSR), 18 Jun. 1963 p 2ff
(JPRS 20171; OTS-63-31285) OTS: $0.50

A discussion is presented on the psychological and physiological effects on man of the unusual conditions encountered in spaceflight. The main problems in the engineering psychology of spaceflight are also examined. R.T.K.

N64-11136 Joint Publications Research Service, Washington, D.C.
STUDIES ON THE EFFECT OF IONIZING RADIATIONS UPON THE NERVOUS SYSTEM
P. F. Minayev 23 Jul. 1963 41 p refs Transl. into ENGLISH of portions of a book "Vliyaniye Ioniziruyushchikh Izlucheniy n na Tsentral'nuyu Nervnuyu Sistemu", Moscow, Publishing House of the Acad. Sci. USSR, 1962 p 5-7; 84-113; 131
(JPRS-20317; OTS-63-31367) OTS: $1.25

The following articles are included: (1) effect of ionizing radiations on the nervous system, (2) significance of the initial state of the nervous system under the effect of ionizing radiations, and (3) the nature of changes caused by the irradiation of neural tissue. R.T.K.

N64-11137 Joint Publications Research Service, Washington, D.C.
VELOCITY, ACCELERATION, WEIGHTLESSNESS
P. K. Isakov and R. A. Stasevich 26 Jul. 1963 66 p refs Transl. into ENGLISH of chapters four and five of a book "Skorosti, Uskoreniya, Nevesomost' ," Moscow, 1962 p 81-147
(JPRS-20345; OTS-63-31379) OTS: $1.75

The following topics on the effect of acceleration on the human body are presented: (1) how man perceives the change in the rate of movement, (2) the general effect of acceleration on the body, (3) on what the final result of the acceleration effect depends, and (4) methods of increasing resistance of the body to acceleration. The topics discussed in the chapter on weightlessness are: (1) physical conditions under which weightlessness occurs, (2) creation of weightlessness artificially, (3) the body and weightlessness, and (4) acceleration and weightlessness in spaceflights. R.T.K.

N64-11177 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th) Wright-Patterson AFB, Ohio

A METHODOLOGICAL APPROACH TO THE ANALYSIS AND AUTOMATIC HANDLING OF TASK INFORMATION FOR SYSTEMS IN THE CONCEPTUAL PHASE [Final Report]

Lawrence E. Reed, John P. Foley Jr., Ralph S. Graham, and Jonathan B. Hilgeman (Aeron. Systems Div.) Aug. 1963 126 p

(AMRL-TDR-63-78; AD-419018) OTS: $2.75

This report presents a technique for analyzing and processing task and task requirements data generated during the conceptual phase of system development. The technique includes: (1) a category system for organizing, classifying, and coding task information; (2) a task analysis format for recording and coding task descriptions and task requirements; and (3) computer update and retrieval programs. Task requirement data appearing in documents resulting from the Air Force Study Requirement program are analyzed and used for testing the technique on an actual personnel training problem. The test program indicates that the technique can be used to assist human factors specialists to isolate and process task and task requirements associated with advanced systems for making personnel, training, and training equipment recommendations.

Author

N64-11206 Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

PROCEDURES AND EQUIPMENT USED IN INHALATION STUDIES ON SMALL ANIMALS

R. G. Thomas and R. Lie Sep. 1963 37 p refs

(Contract AT(29-2)-1013)

(LF-11) OTS: $0.75

Procedures and equipment used in exposing small animals to aerosols of fission products are described. The exposure chamber with attached plethysmographs for monitoring the respiratory patterns is shown diagrammatically, and the operational plan is set forth. Construction criteria for the plethysmographs are also included in detail. The descriptions concerning the animals include specifications on metabolism units and cleaning procedures, whole-body counting, and somewhat detailed sacrifice and necrotomy procedures.

Author

N64-11211 Joint Publications Research Service, Washington, D.C.

THE INTERRELATION OF ALGAE AND MICROORGANISMS

M. M. Telitchenko, N. V. Davydova, and V. D. Fedorov 13 Mar. 1963 12 p refs Transl. into ENGLISH of an article from Nauchn. Dok. Vysshei Shkoly. Biol. Nauki (Moscow), no. 4, 1962 p 157-163

(JPRS-18092; OTS-63-21309) OTS: $0.50

The results of studying the effect of growing cultures of protococcal algae (*Chlorella vulgaris* and *Scenedesmus obliquus*) on the survival rate of the causative agent of mouse * phus *Salmonella thyphimurium* are presented. It is concluded that algologically and bacteriologically pure cultures of protococcal algae (*Chlorella vulgaris* and *Scenedesmus obliquus*), during the multiplication process, release into the medium compounds showing antibacterial properties in regard to the bacteria of the group *Salmonella thyphimurium* (strains number 175, 710, 204, 2110, 3048, and 7091). The antibacterial properties of the compounds produced by the *S. obliquus* alga, in relation to the *S. thyphimurium* strains studied, are apparently stronger than for the compounds produced by the alga *Ch. vulgaris*.

P.V.E.

N64-11216 Joint Publications Research Service, Washington, D.C.

THE CELL DRYING MECHANISM IN PROLIFERATING CULTURES OF THE BLUE-GREEN ALGAE ANABAENA VARIABILIS AND AMORPHONOSTOC PUNCTIFORME

V. D. Federov 20 May 1963 10 p ref Transl. into ENGLISH of an article from Doklady Akad. Nauk SSSR (Moscow), v. 144, no. 6, 1962 p 1380-1383

(JPRS-19286; OTS-63-21867)

Investigations were made of the content of living cells with the aid of triphenyltetrazolchloride (TTC) in pure cultures of the blue-green algae *Anabaena variabilis* and *Amorphonostoc punctiforme* growing in mineral media. These investigations have shown that at the time of the lag phase of growth, the harvest of algae decreases slightly; the percentage content of live cells in the cultures, on the other hand, increases. Changes in the percentage of dying cells during algal growth are also presented. Upon transferring blue-green algae into a new medium during the lag phase, there is autolysis of dead cells introduced with the inoculate, which leads to an increase in the proportion of live cells in the cultures.

R.T.K.

N64-11217 Joint Publications Research Service, Washington, D.C.

THE EFFECT OF SODIUM GALLATE ON THE NUCLEIC ACID CONTENT IN THE ORGANS OF HEALTHY AND IRRADIATED RATS

V. A. Barboy et al 23 May 1963 10 p refs Transl. into ENGLISH of an article from Ukr. Biokhim Zh. (Kiev), v. 35, no. 1, 1963 p 84-90

(JPRS-19355; OTS-63-21895) OTS: $0.50

An investigation was made of the effect of the intra-abdominal introduction of sodium gallate in a 60-mg dose per kg of weight on the NA (nucleic acid) content of the liver, spleen, the mucous membrane of the small intestines, and testicles of rats which were either unirradiated or were irradiated with a 750-r dose. Results are presented.

R.T.K.

N64-11219 Joint Publications Research Service, Washington, D.C.

TRANSLATIONS FROM OCHERKI PO ISTORII AVIATSIONNOY MEDITSINY (OUTLINES ON THE HISTORY OF AVIATION MEDICINE) [MOSCOW, 1962]

A. A. Sergeyev 9 May 1963 56 p refs Transl. into ENGLISH of portions of a book, 1962 p 206-232; 289-300

(JPRS-19125; OTS-63-21794) OTS: $1.50

A discussion is presented of aviation medicine in the U.S.S.R. during World War II. A summary is given of the research conducted by various military medical institutes during that period.

R.T.K.

N64-11220 Joint Publications Research Service, Washington, D.C.

LUMINESCENT SERUMS

P. K. Tabokov et al 28 Jun. 1963 9 p refs Transl. into ENGLISH of an article from Zh. Mikrobiol., Epidemiol. i Immunobiol. (Moscow), v. 33, no. 10, 1962

(JPRS-19936; OTS-63-31159) OTS: $0.50

A new method for the isolation of immune euglobulins (antibodies) from agglutinating antiplague and anticholera serums is proposed, and a new method of purifying the labeled antibodies from the fluorochrome excess is presented. The method of isolating and purifying antibodies shortens the time required to prepare luminescent conjugates from 3 to 4 weeks to 3 to 4 days. The method of preparing fluorochrome-labeled antibodies is realizable in any laboratory, since it requires no special equipment, such as refrigeration, centrifuges, and rooms. The immune euglobulins isolated by the new method are classifiable among the gamma-globulines in their electrophoretic composition. Advantages of the new luminescent stain (fluorescein isothiocyanate) over fluorescein isocyanate are presented.

P.V.E.

N64-11223 Joint Publications Research Service, Washington, D.C.
CONSCIOUSNESS AND THE BRAIN
M. A. Logvin 19 Jul. 1963 57 p refs Transl. into ENGLISH of a book "Problema soznaniya i mozg", Moscow, Znaniye Publ. House, All-Union Soc. for the Propagation of Political and Sci. Knowledge, 1963 48 p
(JPRS-20270; OTS-63-31339) OTS: $1.50

Discussions are presented of the following topics: (1) I. P. Pavlov's doctrine and recent research on brain activity, (2) the physiological basis of consciousness, and (3) the nature of consciousness. R.T.K.

N64-11224 Joint Publications Research Service, Washington, D.C.
BIOCHEMICAL CHANGES RESULTING FROM IRRADIATION, HIGH TEMPERATURE, BURNS, AND POLIOMYELITIS
22 Jul. 1963 32 p refs Transl. into ENGLISH of five articles from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 7, no. 2 Mar.–Apr. 1963 p 9–14; 58–62; 68–71
(JPRS-20298; OTS-63-31356) OTS: $1.00

Included in this report are: (1) some immunological data on the fate of bone marrow transplanted to dogs after whole-body irradiation, (2) changes in mineral and protein metabolism in calcified tissues following thermal burns, (3) the mechanism of changes in vascular-tissue permeability following the effect of high external temperature on the organism, (4) the change of heteroprotein specificity under the effect of temperature and pressure, and (5) the activity of cholinesterase of various protein tissues of mice during experimental poliomyelitis. R.T.K.

N64-11225 Joint Publications Research Service, Washington, D.C.
ARREST AND RESTORATION OF CARDIAC ACTIVITY
V. Marinesku et al 22 Nov. 1963 8 p Transl. into ENGLISH of an article from Khirurgiya (Moscow), no. 9, Sep. 1963 p 19-22
(JPRS 22010; OTS-63-41220) OTS: $0.50

A number of problems relative to the diagnosis and treatment of cardiac arrest are discussed on the basis of 83 cases. Reversible cardiac arrest (without severe incompatible-with-life lesions) is emphasized. The authors undertook resuscitation in 75 cases with complete success in 33 patients; successful results were achieved in 45 cases. The treatment consisted in massage of the heart and artificial respiration, as well as blood transfusion when necessary. Ventricular fibrillation supervened in 20 patients; this complication was treated by means of an electric defibrillator with successful results in 8 patients. The maximal duration of successful resuscitation amounted to 63 minutes. Author

N64-11226 Joint Publications Research Service, Washington, D.C.
LONG-RANGE CONSEQUENCES OF ACUTE CARDIAC ARREST
V. I. Maslov 22 Nov. 1963 11 p Transl. into ENGLISH of an article from Khirurgiya (Moscow), no. 9, Sep. 1963 p 14-18
(JPRS-22012; OTS-63-41221) OTS: $0.50

Out of 105 patients who had sustained acute heart arrest, 41 were successfully resuscitated and discharged from the hospital in satisfactory condition. Most resumed their usual avocations or studies. In 10 patients there were specific sequelae of cardiac arrest in the form of psychosthenia, inhibition, euphoria, deterioration of the memory, etc. With timely and effective heart massage, and in the absence of prolonged hypoxia preceding acute cardiac arrest, no neuropsychic disorders were noted in the remote sequelae. The article contains a description of two observations. In instances of impending development of posthypoxiac brain lesions, the utilization of prolonged therapeutic hypothermia in the immediate restorative period following resuscitation is advocated. Author

N64-11258 Maryland U., College Park, Md.
DETECTING AND RECORDING THE BEHAVIOR OF ANIMALS IN A MULTI-ENCLOSURE, PROGRAMMED ENVIRONMENT
Jack D. Findley Repr. from Bio-Telemetry, 1963 p 213–216
(NASA Grant NsG-189-61)

Outlined are two examples of experiments on the behavior of more than one organism in a physical environment composed of interconnected enclosures and on the programing of the conditions by which the animals move from chamber to chamber and of the behavioral requirements within each chamber. One example was a multienclosure for use with dogs, the other for use with chimps. Simple telemetry proved to be an essential part of each operation. C.L.W.

N64-11259 Florida State U., Tallahassee
IMPROVED METHOD FOR THE PSYCHOPHYSICAL STUDY OF THE TEMPERATURE SENSE
D. R. Kenshalo Repr. from Rev. Sci. Instr., v. 34, no. 8, Aug. 1963 p 883–886 refs
(NASA Grant NsG-148-61; Publ. Health Serv. Grant B-2992)

Peltier refrigerators are almost ideal transducers to provide the precise temperature control necessary for investigation of thermal sensitivity. The operation of Peltier refrigerators is briefly described, and a circuit is presented which automatically controls the temperature of the refrigerator to within $\pm 0.025^{\circ}$ C of a predetermined value. Changes in the temperature of the refrigerator from 0.05° to 10° C can be obtained with less than a 2% error. Author

N64-11260 California U., Los Angeles
STATUS REPORT ON DEVELOPMENT OF A HIGH-SPEED HIGH-INTENSITY MOLECULAR BEAM
Eldon L. Knuth Jul. 1963 79 p refs
(NASA Grant NsG-237-62)
(NASA CR-52865; Rept. 63-30) OTS: $7.60 ph, $2.57 mf

Using an arc-heated source and a hypersonic jet, molecular energies exceeding 1 ev and beam intensities of the order of 10^{16} molecules/cm^2sec are anticipated. A two-disk beam chopper and speed selector provides a means for analyzing the speed distribution in the generated beam, for chopping the beam into bursts of nearly monoenergetic molecules suitable for scattering studies using the time-of-flight technique, and for modulating the beam in order to facilitate detection. A through-flow ionization detector possesses the versatility required for scattering studies using the time-of-flight technique. A sorption pump and a turbopump serve as central components of alternative pumping systems for the collimating chamber. All system components have been fabricated; an arc-heated beam was generated and detected. Author

N64-11269 Joint Publications Research Service, Washington, D.C.
PSYCHOPHARMACOLOGICAL COMPOUNDS
Yu. A. Aleksandrovskiy et al 26 Nov. 1963 53 p Transl. into ENGLISH of a booklet "Psikhofarmakologicheskiye preparaty" Moscow, Min. of Health RSFSR, 1962 26 p
(JPRS-22042; OTS-63-41237)

A brief description is presented of the classification method for psychopharmacological compounds. Synonyms of psychopharmacological drugs are listed in alphabetical order. The official names of compounds are given in order, and are followed by references to subordination to any given group of compounds presented in the table of psychopharmacological drugs which is included. This table contains basic information on the chemical structure of the compound, indications and counterindications of its application, recommended dosages, and notes on its effects. P.V.E.

N64-11270 Joint Publications Research Service, Washington, D.C.

THE ALGORITHMICAL APPROACH TO THE ANALYSIS OF TEACHING METHODS IS VALID

L. N. Landa 29 Nov. 1963 34 p refs Transl. into ENGLISH of an article from Voprosy Psikhologii (Moscow), no. 4, 1963 p 143–152

(JPRS-22075; OTS-63-41254) OTS: $1.00

A rebuttal is presented of a paper entitled "Is the 'Algorithmical' Approach to the Analysis of Teaching Methods Valid," which criticizes an earlier paper by the present author. P.V.E.

N64-11272 Joint Publications Research Service, Washington, D.C.

PATHOGENIC EFFECT OF LOW AND MEDIUM DOSES OF GAMMA-RAYS ON THE PROGENY OF IRRADIATED INSECTS

V. Ya. Podolyan 3 Dec. 1963 10 p refs Transl. into ENGLISH of an article from Tr. Inst. Zool. i Parazitol., Akad. Nauk Tadzh. SSR, Parazity Dikikh Zhivotn. Kazakhstana (Alma-Ata), v. 19, 1963 p 220–225

(JPRS-22107; OTS-63-41271) OTS: $0.50

The effect of low and medium doses of gamma-irradiation (source, GUT-400 cobalt gun) on adult winged specimen of the spring carrion fly (*Protophormia terrae novae*) and on the progeny of these insects from the first to the fifth generation was investigated. Results indicate that: (1) A pathogenic effect is exerted by comparatively low doses of irradiation in arthropods and particularly in Diptera. (2) The particular hazard of low and medium doses of gamma-rays lies in the fact that, aside from a direct pathogenic effect on the specimens being irradiated, the rays exert a destructive effect on subsequent generations of irradiated specimens, which is expressed in the occurrence of a high percentage of unfertilized eggs, high mortality rate of the larvae and pupae, and an extremely low egg productivity of the female. All of these factors lead to degeneration and extinction of progeny of irradiated insects. These results indicate that the release of irradiated males and females en masse, under natural conditions, could offer a means for the control of parasitic artnropods which are vectors of infectious diseases and infestations in man and other animals. I.v.L.

N64-11273 Joint Publications Research Service, Washington, D.C.

THE EFFECT OF PROTON AND GAMMA-RADIATION ON THE FUNCTIONAL STATE OF THE VESTIBULAR ANALYZER

A. A. Sveshnikov 4 Dec. 1963 9 p refs Transl. into ENGLISH of an article from Med. Rad. (Moscow), v. 8, no. 9, 1963 p 48–52

(JPRS-22120; OTS-63-41278) OTS: $0.50

After irradiation with high energy protons in doses of 500 and 350 rads, pronounced changes in the vestibular mechanisms of dogs were observed only when there was a considerable disorder of the general compensatory mechanisms (during the climax of radiation sickness). A single dose of radiation of 200 r produces a more pronounced change in the function of the vestibular mechanism than the same dose of 200 r given fractionally (every other day in a dose of 9 r). Essential changes in the autonomic vestibular reactions were observed only after ionizing radiation in high doses. R.T.K.

N64-11274 Joint Publications Research Service, Washington, D.C.

DEPRESSION OF ANTIBODY PRODUCTION IN MONKEYS AFTER GAMMA-IRRADIATION IN HIGH DOSES

S. M. Pekerman 4 Dec. 1963 8 p refs Transl. into ENGLISH of an article from Med. Rd. (Moscow), v. 8, no. 9, 1963 p 61–65

(JPRS-22121; OTS-63-42179) OTS: $0.50

The purpose of the present investigation was the determination of conditions of irradiation ensuring a complete inhibition of the immunological reactivity in monkeys in connection with bone marrow transplantation. Fifteen monkeys (*Macaca rhesus*), aged 2 to 3 years, were subjected to gamma irradiation in doses of 314, 407, 592, 714, and 814 r. Twenty-four hours later all these monkeys and 9 control monkeys were immunized with typhoid vaccine, sheep erythocytes, egg yolk, or horse serum. Doses of 315 and 407 r did not inhibit the immunological reactivity, while doses of 592 and 714 r caused a considerable inhibition of the latter, manifested by a reduction of the titers of antibodies and their delayed formation. In irradiation with a dose of 814 r, there was seen a complete inhibition of antibody formation. Although doses of 592 and 714 r are lethal for monkeys, they do not cause a complete inhibition of the immunological reactivity, which takes place only with a dose of 814 r. Author

N64-11293* IIT Research Inst., Chicago, Ill.

LIFE IN EXTRATERRESTRIAL ENVIRONMENTS Quarterly Status Report, 15 Sep–15 Nov. 1963

Charles A. Hagen and Regnal Jones [1963] 20 p

(NASA Contract NASr-22; IITRI Proj. C194)

(NASA CR-52841; IITRI-C194-11) OTS: $1.60 ph, $0.80 mf

Bacterial counts are given for soil samples collected at Rocky Mountain National Park, Colorado and White Sand National Monument, New Mexico. Faculative, lecithinase positive microorganisms were isolated from a variety of desert and tundra soil samples. These bacteria were able to survive the simulated Martian environment of the experiment. Fungal components of lichen species were isolated and were able to survive the Martian atmosphere. Apothecia germination, with mycelial growth also occurred in the simulated Martian environment. Some pigmentation of lichenized fungi grown in the Martian atmosphere was noticed. R.T.K.

N64-11316 Joint Publications Research Service, Washington, D.C.

CHANGES IN THE MECHANICAL PROPERTIES OF SYNTHETIC VASCULAR PROSTHESES

N. B. Dobrova and A. D. Drogaytsev 10 Apr. 1963 15 p refs Transl. into ENGLISH of an article from Khirurgiya (Moscow), no 2, 1963 p 137–141

(JPRS-18644; OTS-63-21557) OTS: $0.50

The changes in the mechanical properties of a plastic tubule, used as a substitute for a blood vessel when it is placed in the organism, are reviewed in an effort to increase the efficiency of such transplants. To determine the strength and elasticity of such materials as polyamides, polyesters, and polytetrafluoroethylene, implants into the cardiovascular system of dogs have been studied for periods of two weeks, as well as *in vitro* experiments on the variations in volume of such substances as nylon and caprone, terilen, dacron and lavsen, teflon, and fluorolon, with a change in internal pressure. The same substances were tested after implantation to find that the polytetrafluoroethylene substances, teflon and fluorolon, were the most chemically inert in the animal and that the alteration of mechanical properties on implantation depend to a great degree on the chemical inertness. D.E.R.

N64-11317 Joint Publications Research Service, Washington, D.C.

AVERAGE DIAMETER OF ERYTHROCYTES DURING CHRONIC ACTION OF SMALL DOSES OF IONIZING RADIATION ON THE HUMAN ORGANISM

Ye. D. Gol'dberg 26 Apr. 1963 6 p refs Transl. into ENGLISH of an article from Lab. Delo (Moscow), no. 2, 1963 p 9–11

(JPRS-18938; OTS-63-21696) OTS: $0.50

Significant changes in the acid stability of the erythrocytes

of people normally subjected to small doses of ionizing radiation in their daily work have been demonstrated. These changes are manifested by a shortened life span of the erythrocytes and their average diameter, which tends to macrocytosis. This points out the general tendency toward stable changes in erythropoiesis in the direction of an increase in the specific gravity of the macroblastic hemopoiesis. D.E.R.

N64-11318 Joint Publications Research Service, Washington, D.C.
THE BLOOD COAGULATION SYSTEM
M. S. Machabeli 16 May 1963 17 p Transl. into ENGLISH of chapter four and the table of contents of a book "Sistema Svertyvania Krovi", Tiflis, Acad. of Sci. Georgian SSR, 1961 p 186-189, 273-275
(JPRS-19219; OTS-63-21830) OTS: $0.50

A hypothesis for the physiological process of hemostasis is constructed, presenting only the basic links of the humoral process generally, rather than specifically. The coagulation process is divided into three phases, thromboplastin formation, thrombin formation, and fibrin formation. Retraction and fibrinolysis are called "post-phase," since, at this time, coagulation is completed, the fibrin clot is formed, and all subsequent phases lead to a subsiding of the process. Clot retraction is then discussed as a process depending on the quality and quantity of thrombocytes, fibrinogen, thrombin concentration, plasma correlation, anticoagulants, calcium concentration, the ionic strength of the medium, and temperature. The action of physiological anticoagulants is discussed. The enzymatic process of fibrinolysis is described as dependent on the profactors, kinase, and inhibitors. D.E.R.

N64-11319 Joint Publications Research Service, Washington, D.C.
THE EFFECT OF ASCORBIC ACID ON THE FUNCTION OF THE SUPRARENAL GLANDS UNDER THE INFLUENCE OF HIGH AMBIENT TEMPERATURE
E. L. Perel'man and F. F. Sultanov 3 Jul. 1963 7 p refs Transl. into ENGLISH of an article from Zdravookhr. Turkmenistana (Ashkhabad), v. 7, no. 4, Apr. 1963 p 3-6
(JPRS-20011; OTS-63-31198) OTS: $0.50

The effect of ascorbic acid on the function of the suprarenal glands of rats, under the influence of high ambient temperature, was investigated. Results indicate that: acute overheating ("heat shock") is associated with a pronounced reduction in the ascorbic-acid content of the suprarenal glands without increase in the weight of these glands; a simultaneous increase in the ascorbic-acid concentration of the blood is observed. It may be supposed that these changes are the results of exhaustion of the suprarenal function under the influence of excessive heat, which leads to a disorder of adaptive mechanisms. Under these conditions of excessive heat, the suprarenal glands make inadequate use of ascorbic acid, possibly because of reduction in the synthesis of steroid hormones (which may be indicated by the lack of increase of their weight), and a large quantity of ascorbic acid is discharged into the blood. I.v.L.

N64-11320 Joint Publications Research Service, Washington, D.C.
CHANGES IN THE ANTERIOR LOBE OF THE HYPOPHYSIS DURING IRRADIATION AND COOLING
Ye. B. Pavlova 5 Jul. 1963 9 p refs Transl. into ENGLISH of an article from Probl. Endokrinol. i Gormonoterap. (Moscow), v. 9, no. 3, 1963 p 3-7
(JPRS-20037; OTS-63-31211) OTS: $0.50

Twenty-four hours after irradiation (at the period of maximal corticosterone secretion by the adrenal glands) experimental animals showed marked adrenal hypertrophy, with the appearance of vacuolized delta-basophils in the anterior lobe of the hypophysis. As the result of a 3-day cooling period, there was hypertrophy of the adrenal glands, thymus involution, and vacuolization of the delta-basophilic cells in the hypophysis. Similar changes in the delta-basophilic cells of the anterior lobe of the hypophysis are regarded as a morphological manifestation of intensified ACTH secretion in response to unfavorable effects. Author

N64-11346 Joint Publications Research Service, Washington, D.C.
STUDIES IN BIOLOGICAL SCIENCES, USSR
Yu. B. Kudryashov, B. A. Lomsadze, Liu Hao-t'u, and Ye. V. Stefanovich 17 Apr. 1963 22 p refs Transl. into ENGLISH of 2 articles from Nauchn. Dokl. Vysshei Shkoly, Biol. Nauki (Moscow), no. 1, 1963
(JPRS-18760; OTS-63-21600) OTS: $0.75

The topics included are: (1) the disturbance mechanism of protein autolysis in the liver of irradiated rats, and (2) the change in the biocurrents of muscles under the influence of stimulants of the first and second signal systems during human muscular activity. R.T.K.

N64-11349 Joint Publications Research Service, Washington, D.C.
PREVENTION AND TREATMENT OF ACUTE RADIATION SICKNESS IN DOGS WITH THE AID OF SODIUM GALLATE, USSR
O. O. Horodets'kyy and V. A. Baraboy 20 May 1963 8 p refs Transl. into ENGLISH of an article from Fiziol. Zhur., Akad. Nauk Ukr. RSR (Kiev), v. 9, no. 2, 1963 p 240-244
(JPRS-19269; OTS-63-21852) OTS: $0.50

The use of sodium gallate in the prevention and treatment of acute radiation sickness in dogs was investigated. Results indicate that: (1) The intravenous administration of sodium gallate in dogs, 30 minutes prior to irradiation with a dose of 600 r, led to the survival of three out of five animals and caused a prolongation, by seven to ten days, of the average length of life of the animals which died. (2) The administration of sodium gallate immediately after irradiation of dogs with the 600-r dose also led to survival of three dogs out of seven, and to an increased length of life of the animals, which later died in an average of six days. (3) The antiradiation influence of sodium gallate, when given before as well as after irradiation, leads to a mitigation of the severity of the clinical course of radiation sickness and to a postponement by four to eight days, or more, of the period of fulminating radiation sickness. (4) Sodium gallate should be introduced into clinical use as an antiradiation measure. I.v.L.

N64-11352 Joint Publications Research Service, Washington, D.C.
PROBLEMS OF PERCEPTION AND THE PHENOMENON OF "ATTUNEMENT" OF THE SENSE ORGANS
P. G. Snyakin and A. I. Yesakov 20 Jun. 1963 14 p refs Transl. into ENGLISH of an article from Voprosy Filosofii (Moscow), no. 2, 1963 p 61-69
(JPRS-19762; OTS-63-22080) OTS: $0.50

The phenomenon of man's attainment of knowledge through the sense organs is discussed. Many facts concerning the modern physiology of analyzers have been accumulated, revealing the material substrate of sensation and the structures responsible for its initial emergence. The so-called phenomenon of "adjustment" of the sensory apparatus, which is regarded by some as being the physiologic mechanism which underlies the development of this correspondence between perception and the objects of the natural world, is discussed in particular. P.V.E.

N64-11353 Joint Publications Research Service, Washington, D.C.
THE PROBLEM OF THE IRRITATING EFFECT OF IONIZING RADIATION

K. Sh. Nadareyshvili 24 Jun. 1963 14 p refs Trans. into ENGLISH of an article from Soobshcheniya Akad. Nauk Gruzin. SSR (Tiflis), v. 30, no. 2, 1963 p 213–220
(JPRS-19806; OTS-63-31095) OTS: $0.50

It is established that the early changes of various physiological functions, originating after the start of irradiation, represent a complex neuroreflex act. To demonstrate the existence of ensuing sensory or subsensory phenomena, rabbits were exposed to X-rays and then placed under intense illumination. It is concluded that: (1) X-ray irradiation of various regions of the body manifests characteristics of an irritating agent in reference to certain physiologic functions, (2) with combinations of X-ray irradiation and electrocutaneous irritation, defensive conditioned reflexes can be developed, and (3) following a total X-ray dose of the head or whole-body irradiation, the electrodefensive reflexes are reduced and may disappear. D.E.R.

N64-11354 Joint Publications Research Service, Washington, D.C.
THERAPEUTIC AND CYTOTOXIC EFFECT OF ANTIBODIES AND THEIR ROLE IN THE PATHOGENESIS OF RADIATION SICKNESS
I. N. Mayskiy et al 5 Jul. 1963 28 p refs Transl. into ENGLISH of an article from Usp. Sovrem. Biol. (Moscow), v. 55, no. 2, 1963 p 219–238
(JPRS-20040; OTS-63-31214) OTS: $0.75

Experiments dealing with the action of various kinds of sera on malignant growths are discussed. The sera include anti-organ and anti-cancer in relation to irradiated tumor cells, and anti-enzymatic sera obtained through immunization with ronidase. The experiments are as follows: (1) a study of the action of cytotoxic antibodies in the metastasizing of the Brown–Pierce tumor in rabbits; anti-organ sera obtained from sheep liver, kidneys, and lungs were used; (2) a study of the stage-wise character of anti-cancer serum action; (3) a study of immunogenesis and allergic reactions in rabbits with transplanted Brown–Pierce tumor upon their vaccination with tularemia vaccine; (4) a study of the effect of sera produced from goats and horses through immunization with ronidase on cancerous rabbits; this study was aimed at inactivating the growth propagation factor. I.v.L.

N64-11355 Joint Publications Research Service, Washington, D.C.
STUDIES IN IONIZING AND X-RAY IRRADIATION
O. P. Domareva, N. I. Nuzhdin, I. A. Nechayev 30 Jul. 1963 59 p refs Transl. into ENGLISH of 2 chapters and table of contents from the book "Deystviye Ioniziruyushchikh Izlucheniy na Organizm" Moscow, Publ. House of Acad. Sci. USSR, 1962 p 162–166, 173–197, and 207
(JPRS-20421; OTS-63-31418) OTS: $1.50

Two investigations are discussed in this report. One investigation deals with the role of the adrenal glands in the mechanism of transmission of the distant effect of radiation. As a test object, the mitotic activity of the cornea of X-irradiated mice was selected. Results indicate that screening of the adrenal glands does not change the distant radiation effect, whereas their removal eliminates this effect. The second investigation deals with the effect of protective substances on the survival and the changes in the internal organs of mice, with different radiosensitivity, when subjected to X-ray irradiation. Results indicate that differences in the natural radiosensitivity of the CC_{57}-brown, C_3H, and BALB/c mice are connected with differences in the specific radioresistance of their spleen and liver. This is attested to not only by the dynamics of the weight indices of these organs, but also by the analysis of the data on diethylstilbestrol protection. These data show that the natural differences in radiosensitivity against a total X-ray irradiation with a 600-r dose are leveled off when protected with a preliminary administration of diethylstilbestrol. I.v.L.

N64-11356 Joint Publications Research Service, Washington, D.C.
NEW METHOD OF APPLYING ELECTRODES OF AN IMPLANTED ELECTRIC STIMULATOR
V. S. Savel'yev 19 Nov. 1963 6 p refs Transl. into ENGLISH of an article from Grudnaya Khirurgiya (Moscow), no. 5, Sep./Oct. 1963 p 98–100
(JPRS-21909; OTS-63-41159) OTS: $0.50

A new method is presented for applying the electrodes of an implanted electric stimulator, which makes it possible to exclude the effect of respiratory movements of the interspaces on the electrodes during respiration. The method is as follows. The implanted electric stimulator is put under the skin in the area of the left subcostal margin. Below the xiphoid process, the aponeurosis is divided in the midline for two centimeters. By dull dissection a tunnel is formed in the anterior mediastinum for subsequent passage of the myocardial electrodes into the left pleural cavity. A thoracotomy is performed on the patient in the fourth interspace, from the sternum to the midaxillary line. The pericardium is incised two to three centimeters to the front of, and in parallel with, the phrenic nerve. The mediastinal pleura is cut at the sternum at the place where it goes onto the diaphragm. The electrodes are brought out through the tunnel in the anterior mediastinum, and sutured to the myocardium along the axis of the heart. P.V.E.

N64-11357 Joint Publications Research Service, Washington, D.C.
OSMOTIC STABILITY OF LEUKOCYTES IN PERSONS SUBJECTED TO THE ACTION OF SOME OCCUPATIONAL HAZARDS, USSR
A. V. Scheglova 4 Dec. 1963 7 p refs Transl. into ENGLISH of an article from Probl. Gematol. i Pereliv. Krovi (Moscow), v. 8, no. 10, 1963 p 26–29
(JPRS-22122; OTS-63-41280) OTS: $0.50

The osmotic stability of leukocytes (O.S.L.) in persons working in various occupations was investigated. Occupational factors considered were those of roentgenologists coming in contact with benzene and with lead, the combined influence of radiation and lead, the combined influence of X-ray and magnetic fields, and patients with chronic lead and benzene intoxication. Results showed that: (1) in the radiographologists, the percentage content of these cells was increased from 1.5 to 2 times by comparison with the control; (2) in subjects with benzene intoxication, the altered cells were considerably more abundant than in subjects who were in contact with benzene; (3) in work with lead, and when lead intoxication was actually apparent, the number of altered cells remained the same as in the control group; (4) in subjects working under the combined influence of lead and gamma-radiation, the percentage content of altered and destroyed cells was sharply increased by comparison with their number under the action of each one of these factors separately; and (5) under the combined action of X-ray and a field of high frequency, the number of altered cells was somewhat greater than under the action of X-rays alone. P.V.E.

N64-11358 Joint Publications Research Service, Washington, D.C.
THE MECHANISM OF ACTION OF PROTECTIVE-THERAPEUTIC COMBINATIONS IN ACUTE RADIATION SICKNESS IN RATS, USSR
T. N. Protasova 4 Dec. 1963 7 p refs Transl. into ENGLISH of an article from Med. Radiol. (Moscow), v. 8, no. 9, 1963 p 66–68
(JPRS-22123; OTS-63-41281) OTS: $0.50

The effect of protective–therapeutic combinations on the oxidative degradation of the amino acids, dl-alanine, glutamic acid, and tyrosine, in the liver of gamma-irradiated rats was

investigated. The protective combination consisted of amygdalin, aureomycin, nicotinic acid, and $NaHCO_3$, and was administered orally for three days before irradiation. The therapeutic combination consisted of streptomycin in a novacain solution, securinine, ascorbic acid, vitamin P, vitamin B_1, and vitamin B_6. Results indicate that: (1) the successive use of protective and therapeutic combinations exerted a definite normalizing effect on the activity of the enzyme systems (amino acids); this applies particularly to the tyrosine oxidation system, the activity of which in the treated animals was close to normal for almost the entire period after irradiation; (2) the combination of protection and therapy proved to be less effective than protection and therapy separately; (3) the activity of various enzymes reacts differently to the administration of protective and therapeutic agents. I.v.L.

N64-11359 Joint Publications Research Service, Washington, D.C.

EFFECT OF CERTAIN PROTECTIVE SUBSTANCES ON CHANGES IN THE REACTIVITY OF TISSUE SULFHYDRIL GROUPS IN IRRADIATED ANIMALS, USSR

L. I. Korchak and T. A. Speranskaya 4 Dec. 1963 6 p refs Transl. into ENGLISH of an article from Dokl. Akad. Nauk SSSR (Moscow), v. 151, no. 3, 1963 p 712–713
(JPRS-22125; OTS-63-41283) OTS: $0.50

The effect of protective substances on the changes in the reactivity of thiol groups in the liver-tissue-homogenate of X-irradiated mice was investigated. The protective substances were morphine, unithiol, β-aminoethylisothiuronium bromide hydrobromide, cystamin, and cysteinamin. The reactivity of the thiol groups was judged on the basis of the change in content of these groups in the process of the incubation of the homogenate for 2 hours at 37° C. Determination of the thiol groups was made by the method of amperometric mercurimetric titration. Results indicate that protective substances, whether or not their protective action depends on the creation of tissue hypoxia (as in the case of morphine) or whether their counterradiation is connected with the diminution of the pressure of oxygen in the tissues (as in the case of cystamin, cysteinamin, and β-aminoethylisothiuronium bromide hydrobromide), prevent to approximately the same extent the radiation change of the reactivity of the thiol groups in radiosensitive tissue. Unithiol did not weaken the influence of ionizing radiation on the reactivity of tissue thiol groups. I.v.L.

N64-11375 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

FORMATION OF ADENOSINE BY ULTRA-VIOLET IRRADIATION OF A SOLUTION OF ADENINE AND RIBOSE

Cyril Ponnamperuma, Ruth Mariner and Carl Sagan (Harvard U.) Repr. from Nature, v. 198, no. 4886, 22 June 1963 p 1199–1200 refs

The formation of adenosine by the ultraviolet irradiation of a solution of adenine-8-^{14}C and ribose was investigated. The amount of adenosine formed was estimated from a count of the aliquot of the elute from the chromatogram by liquid scintillation counting, using an internal standard of toluene labelled with C^{14}. Results were as follows: (1) The yield of adenosine was about 0.01% with phosphoric acid and with polyphosphate ester. The corresponding quantum yield for the production of adenosine is then about $\sim 10^{-5}$. (2) The adenosine synthesis appeared to be independent of pH. (3) No adenosine was detected when adenosine and ribose were irradiated with ultraviolet light in the absence of phosphorus. This result may possibly confer a unique role to phosphorus in the evolution of compounds of biological significance. From these results, it can be concluded that the formation of adenosine by the relatively simple abiological method described in this report is significant in the context of the gradual evolution of life on this planet over a period of several hundred million years. I.v.L.

N64-11383 Radiation Applications, Inc., Long Island City, N.Y.

WATER RECOVERY STUDY Quarterly Report for Apr.-Jun. 1963

9 Aug. 1963 16 p refs
(NASA Contract NASw-520)
(NASA CR-51575; RAI 323) OTS: $1.60 ph, $0.80 mf

Ultrafiltration studies have centered on the fabrication of membrane filters capable of direct rejection of the urea species present in urine. Membrane filters prepared from specially cast cellulose acetate and cellophane were evaluated. Further experimentation in the optimization of the cellulose acetate membrane filter employed in the ultrafiltration of modified urine was undertaken. The results to date indicate that either prior urea removal, or conversion to an ionic derivative such as an ammonium salt, shows the maximum promise for the ultrafiltration mode of potable water recovery. Author

N64-11396 Naval School of Aviation Medicine, Pensacola, Fla.

ROTARY AUTOKINESIS AND DISPLACEMENT OF THE VISUAL HORIZONTAL ASSOCIATED WITH HEAD (BODY) POSITION

Earl F. Miller, II and Ashton Graybiel Repr. from Aerospace Med. v. 34, no. 10, Oct. 1963 p 915–919 refs Presented at the 34th Ann. Meeting, Aerospace Med. Assoc., Los Angeles, 30 Apr. 1963
(NASA Grant NsG-R-47)

Subjects were tested in an upright and in a recumbent (left side) position. In both positions, the procedure was identical: empirical visual cues serving as a background to the luminous line target were alternately illuminated for two minutes, then darkened completely for five minutes during each period. It was found that a lack of visual cues did not appreciably influence the accurate and relatively stable localization of the horizontal, in the upright position; however, in the recumbent position, removal of these cues caused, after a brief lag period, a gradual spontaneous rotation of the phenomenal horizontal up to a maximum displacement typical for each subject. Superimposed upon these perceptual changes was the considerable fluctuant movement in horizontality which was described as a form of autokinesis (rotary). These illusions disappeared almost intantaneously when a visual framework was provided. Author

N64-11414 Joint Publications Research Service, Washington, D.C.

TRANSLATIONS FROM AKUSTICHESKIY ZHURNAL (ACOUSTIC JOURNAL) VOL. 8, NO. 4, OCTOBER-DECEMBER 1962

Ye. A. Radionova 11 Apr. 1963 14 p refs Transl. into ENGLISH of an article p 447-453
(JPRS-18659; OTS-63-21564) OTS: $0.50

A study has been made of the reliability of measuring the intensity of a short sound signal at the level of the primary neuron of the auditory system by recording the summational nervous response to a click from the round window of the cochlea. In analyzing the relationship of the amplitude of summational nervous response to the intensity and dispersion of the click, it is concluded that, in the peripheral division of the auditory analyzer, two groups of nervous elements exist (a more sensitive and a less sensitive), which make it possible to measure the intensity of a short sound signal over a wide range, but which, however, produce a slight lowering of differential sensitivity in the range of moderate intensities. Author

N64-11415 Joint Publications Research Service, Washington, D.C.

FUNDAMENTALS OF PRACTICAL BALLISTO-CARDIOGRAPHY

R. M. Bayevskiy 30 Apr 1963 153 p refs Transl. into ENGLISH of a book "Osnovy Prakticheskoy Ballisto-Kardiografii" Moscow, Medgiz, 1962 p 3-173
(JPRS-18967; OTS-63-21713) OTS $3.00

The following topics are discussed: (1) a brief historical outline on the development of ballisto-cardiography, (2) physical fundamentals of ballisto-cardiography, (3) techniques and methods of ballisto-cardiography, (4) normal ballisto-cardiogram (BKG) and its variations, (5) analysis and clinical BKG evaluation, (6) BKG changes during various illnesses, (7) application of ballisto-cardiography in surgery, obstetrics, physiotherapy, health resorts and physical therapy, and sports and aviation medicine, and (8) mass ballisto-cardiography R T K

N64-11416 Joint Publications Research Service, Washington, D.C.
DEVELOPMENT OF TECHNICAL CYBERNETICS
9 Dec. 1963 10 p Transl. into ENGLISH of an article from Vestnik Akad. Nauk SSSR (Moscow), no. 9, 1963 p 3-8
(JPRS-22188; OTS-63-41318) OTS: $0.50

The study of control processes is discussed with regard to the construction and optimal control of fully automatic machines. The electric and electronic advances that permit the solution of problems of technical cybernetics are mentioned, and contributions to cybernetic studies made at other research institutions are summarized. D E R

N64-11417 Joint Publications Research Service, Washington, D.C.
CYBERNETICS AND MEDICINE
V. Parin and D. Menitskiy 9 Dec. 1963 6 p refs Transl. into ENGLISH of an article from Med. Rabotnik (Moscow), 19 Apr. 1960 p 2
(JPRS-22189; OTS-63-41319) OTS: $0.50

The contributions of the science of cybernetics to the study of medicine in Russia are discussed. It is noted that cybernetic techniques are being used for the protection of the health of the population, and to furnish automatic objective diagnostics. Other important uses of cybernetics are the making of artificial limbs and body organs, artificial breathing apparatus, the control of body processes, and simulation studies. D E R

N64-11430 Joint Publications Research Service, Washington, D.C.
APPARATUS FOR CORRELATIVE ANALYSIS OF PHYSIOLOGICAL PROCESSES
L. N. Mishin 25 Apr. 1963 12 p Transl. into ENGLISH of an article from Med. Prom. SSSR (Moscow), no. 2, 1963 p 43-49
(JPRS-18899; OTS-63-21673) OTS: $0.50

The random character of the physical processes which accompany the vital activities of an organism has been studied using a correlometer. Such processes as the electrical activity in the organism, the acoustic phenomena associated with pulmonary and cardiovascular activity, the mechanical shifting of vital organs, their hyperemia, etc., can be objectively determined; and their correlative function can be calculated by receiving an electrical signal of these functions, delaying the signal in time, multiplying the signal, integrating it with other body signals, and indicating the value of the correlative function. The design of such an instrument complex is explained. The complex records the data on tape with at least two recording channels for periodic and random processes. D E R

N64-11432 Joint Publications Research Service, Washington, D.C.
EFFECTIVENESS OF ANTIHISTAMINES IN ANESTHESIOLOGY
D. G. Tagdisi 27 Nov. 1963 14 p refs Transl. into ENGLISH of an article from Azerb. Med. (Baku), no. 9, Sep. 1963 p 3-11
(JPRS-22058; OTS-63-41246) OTS: $0.50

Experiments have determined the role and mechanisms of histamine and antihistamine in the appearance and elimination of pain sensitivity, respectively. The effect of these drugs on reflex reaction time, on local conduction of nerve impulses, and their effect as anesthetics, have also been investigated. From these experiments, it is concluded that the antihistamine, Dimedrol, has practical significance in anesthesiology and in dealing with general and local disturbances of organisms arising in response to trauma and the effects of shock. D E R

N64-11433 Joint Publications Research Service, Washington, D.C.
COMBINED ACTION OF NEUTRON IRRADIATION AND ELEVATED TEMPERATURE ON ANIMALS
A. F. Gur'yev 29 Jul. 1963 9 p refs Transl. into ENGLISH of an article from Gigiyena i Sanit. (Moscow), v. 38, no. 5, May 1963 p 24-29
(JPRS-20379; OTS-63-21396) OTS $0.50

Experiments with rabbits have shown the effect of keeping animals at an elevated ambient-air temperature after massive whole-body X-irradiation in doses on the order of 250 to 600 r. Results show that the elevated temperatures increase the severity of acute radiation sickness. Rabbits also were given doses of fast-neutron irradiation from a polonium-beryllium source. These results show that the changes in certain red and white blood cell indices and the blood coagulation system are more marked when the animals are subjected to combined irradiation and high ambient-air temperatures. Such exposure also intensifies the development of radiation injuries (burns) from fractionated fast-neutron irradiation. The work was conducted mainly to study the hygienic conditions of work with radioactive materials in the petroleum industry. D E R

N64-11436 Minnesota U., Minneapolis
CONTINUOUS PROPAGATION OF MICROORGANISMS
A. G. Fredrickson and H. M. Tsuchiya. Repr. from A. I. Ch. E. July 1963 p 459-468 refs
(NASA Grant NsG-79-60)

Microorganisms undergo a cycle of maturation during their lifespan in a proliferating culture. This gives rise to a distribution of degrees of cellular maturation in the culture. The gross rate of any metabolic process carried on by the culture is therefore an average over all degrees of maturation present. Equations embodying the life-cycle concept are developed for cultures of organisms which proliferate by binary fission and do not form spores. The equations are solved for the age distribution in the special case of a continuous, steady-state fermentation. Expressions for calculating gross metabolic rates and cell size distributions are derived. The stability of the steady-state fermentor is discussed. Author

N64-11439 Air Force Systems Command, Wright-Patterson AFB, Ohio. Behavioral Sci. Lab.
INFORMATION THEORY AND HUMAN BEHAVIOR: UNCERTAINTY AS A FUNDAMENTAL VARIABLE IN INFORMATION-PROCESSING TASKS [Dec. 1, 1961-Aug. 24, 1962]
Karl L. Wiegand (Ph.D. Thesis) Oct. 1963 103 p refs
(Contract AF 33(616)-7122)
(AMRL-TDR-63-89, AD-403485)

Three studies were performed to investigate the relationship between (1) stimulus uncertainty and simple reaction time, (2) joint stimulus-response uncertainty and choice reaction time, and (3) uncertainty in a complex information transformation task and reaction time. A linear relationship was found in each case. The mean reaction time for performing the transformation task could be predicted remarkably well using the rate of information transmission obtained in the choice reaction time task. Author

N64-11445 Aerojet-General Corp., Azusa, Calif.
A STUDY OF THE EFFECTS OF LONG-TERM INGESTION OF RECOVERED WATER: HUMAN INGESTION TRIALS [Nov. 1961-Apr. 1963]

D. de Steiguer and A. T. Pessa Wright-Patterson AFB, Ohio. Biomedical Lab. Oct. 1963 27 p refs
(Contract AF 33(616)-8196)
(AMRL-TDR-63-70; AD-424132) OTS: $0.75

This work was conducted to obtain subjective responses to recycled water recovered from urine, laboratory data on the recovery procedures, and clinical data to indicate any pathophysiological effects. Four male human volunteers participated; an 8-week control period, during which a minimum of 1500 cc of distilled water was consumed each day, was followed by an 8-week experimental period, during which 1500 cc/day of distillate was to be consumed. A still of standard laboratory glassware was constructed to permit recovery of large percentages of human urine. Chemical analyses indicated that the distillate conformed to water standards established by the U.S. Public Health Service. The clinical examinations included cephalin-flocculation and thymol-turbidity tests, complete blood counts, and urinalyses. None of the subjects demonstrated psychologic or physiologic symptoms. Author

N64-11461 Farr Cytochemical Labs., Camden, Maine
RESEARCH ON THE CYTOCHEMISTRY OF MICROORGANISMS [Final Report, Feb. 1962-Feb. 1963]
Wanda K. Farr Wright-Patterson AFB, Ohio, Biomedical Lab., Aug. 1963 51 p refs
(Contract AF 33(616)-7891)
(AMRL-TDR-63-72; AD-423528)

Cell wall substances in the alga, *Chlorella pyrenoidosa* 71105 and the fungus, *Linderina pennispora* NRRL 2237 have been identified and localized by means of standard cytochemical techniques. Pectic material in the primary lamella and cellulose in the secondary lamella have been found in the wall of *C. pyrenoidosa*. The walls of the cells of *L. pennispora* are chitinous, with no indication of the presence of cellulose at any stage of development. The pectic material in the wall of the alga is in the form of a pectic-protein complex, and the chitin in the walls of the fungal cells is in the form of a chitin-protein complex. The wall of *C. pyrenoidosa* reacts positively to an enzyme mixture of pectinase and cellulase, and the walls of *L. pennispora* react similarly to chitinase. These identifications and reactions to enzymes can be used in the effort to bring about total assimilation of cell wall substances if these algal and fungal cells should be chosen as food materials in meeting the nutritional requirements of the space program. Author

N64-11516 National Aeronautics and Space Administration, Washington, D.C.
WHAT DOES THE SPACE PROGRAM REVEAL ABOUT HUMAN ENGINEERING AND MEDICAL RESEARCH?
Eugene B. Konecci *In its* Conf. on Space, Sci., and Urban Life, Oakland, Calif., Mar. 28-30, 1963 p 145-157 (See N64-11502 03-01) GPO: $1.75

The importance of establishing requirements for the development of an adequate life support system and protective system for man's survival in the space environment was pointed out. The program must include the study of man, man-machine, and man-systems. The study of man results in the setting of physiological and mental limits necessary to establish the requirements for man's equipment and habitability. The next area, man machine (biotechnology), results from the parameters imposed by the man area and includes life support systems, protective systems, and man-machine control. Finally, man and the equipment designed according to man's requirements are integrated into the man systems area. C.L.W.

N64-11522 Joint Publications Research Service, Washington, D.C.
THE INTERACTION OF THE ANALYZERS UNDER FLIGHT CONDITIONS ON AIRPLANES AND SPACESHIPS
V. V. Baranovskiy, M. D. Yemel'yanov, and A. G. Kuznetsov *In its* Transl. from Zhur. Vyshey Nervnoy Deyatel'nosti im. I. P. Pavlova 12 Feb. 1963 p 1-12 refs (See N64-11521 03-01) OTS: $1.00

The interaction of visual, vestibular, and motor sense organs under conditions simulating flight was investigated. Results indicate that: (1) Illusions result from changes in the interaction of receptors controlling space perception. (2) Illusions occur from adequate stimulation of the vestibular mechanism and can be caused by a conditioned reflex connection through the visual receptors. (3) The motor receptors play an important part in the phenomena of spatial analysis and synthesis. R.T.K.

N64-11523 Joint Publications Research Service, Washington, D.C.
ELECTROPHYSIOLOGICAL STUDY OF THE ACTIVITY OF CUTANEOUS AND MOTOR ANALYZERS UNDER CONDITIONS OF ACCELERATION EFFECTS
E. V. Marukhanyan, P. K. Isokov, B. F. Asyamolov, G. I. Pavlov, and V. V. Usachev *In its* Transl. from Zhur. Vyshey Nervnoy Deyatel'nosti im. I. P. Pavlova 12 Feb. 1963 p 13-24 refs (See N64-11521 03-01) OTS: $1.00

The sensorimotor activity of man during evaluation of various weights, under conditions of increased gravity created by acceleration, was investigated. The data indicated that during acceleration there is a disorder of the ability to estimate weight accurately, and under these acceleration conditions the amplitudes of the electromyograph were increased. R.T.K.

N64-11524 Joint Publications Research Service, Washington, D.C.
MOBILITY OF NERVOUS PROCESSES IN DOGS OF DIFFERENT AGES IRRADIATED ANTENATALLY WITH IONIZING RADIATION
H. G. Ayrapetyanta *In its* Transl. from Zhur. Vysshey Nervnoy Deyatel'nosti im. I. P. Pavlov 12 Feb. 1963 p 25-38 refs (See N64-11521 03-01) OTS: $1.00

An investigation was made of the adaptability of nerve processes of prenatally irradiated dogs. Gravid females were subjected to whole-body irradiation with a dose of 200 r on the 20th day of pregnancy. The study of the adaptability of the nerve processes was begun in two-month-old puppies. The method used was that of bilateral revision of the signal significance of an associated pair of conditioned stimuli. Results indicate that with ionizing radiation in a dose of 200 r, adaptability, as judged by ability to learn a revision of signal significance, was impaired. Reduction of the adaptability of the nerve processes was established as early as two months and was still evident at a later age. Pathological lability of the excitatory process was also noted. R.T.K.

N64-11533 Joint Publications Research Service, Washington, D.C.
SOME QUESTIONS THAT DETERMINE THE DEVELOPMENT OF CYBERNETICS
V. M. Glushkov *In its* Translations from Avtomatyka (Automation), v. 7, no. 3, 1962 18 Feb. 1963 p 54-63 (See N64-11529 03-01) OTS: $2.25

The role of general-purpose digital computers in the progress of cybernetics is discussed. R.T.K.

N64-11534 Joint Publications Research Service, Washington, D.C.
ANALYSIS OF PERCEPTRONS
S. F. Kozubovs'kyy *In its* Translations from Avtomatyka (Automation), v. 7, no. 3, 1962 18 Feb. 1963 p 64-78 refs (See N64-11529 03-01) OTS: $2.25

An explanation is presented of the structure and uses of perceptrons. Simple perceptrons and sequentially-functioning perceptrons with four series of elements are discussed. R.T.K.

N64-11535 Joint Publications Research Service, Washington, D.C.
SUMMARY OF THE DIRECTIONS OF CYBERNETIC DEVELOPMENT
In its Translations from Avtomatyka (Automation), v. 7, no. 3, 1962 18 Feb. 1963 p 79 (See N64-11529 03-01) OTS: $2.25

The following topics are discussed: (1) general-purpose digital computers and "biological-type" computer systems; (2) self-organization systems; and (3) "macro" and "micro" systems of automation. R.T.K.

N64-11548 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BEHAVIORAL TESTING DURING A 7-DAY CONFINEMENT: THE INFORMATION PROCESSING TASK
Rollin M. Patton Washington, NASA, Dec. 1963 23 p refs (NASA TN D-1973) OTS: $0.75

Two subjects were confined for seven days in a mockup of a space capsule with a usable volume of 123 ft^3. A 4-hour-on, 4-hour-off duty schedule was maintained, with one subject working and one resting at all times. Various measures of physiological and behavioral functioning were taken. The subject's task was to locate and mark certain designated letters among an array of letters. Task complexity was manipulated by varying the number of designated letters and the ratio of designated to irrelevant letters within the array. The task was performed once during each duty period. Results are as follows. (1) Performance of the task was maintained at what appears to be a reasonably high level throughout the 7-day confinement which indicates that, under the conditions of this study, proficiency in an information-processing task can be maintained in a small capsule. (2) The hypothesis that, under unfavorable conditions (i.e., nonpreferred shifts), performance of relatively complex tasks would suffer greater decrements than would simple tasks was not confirmed, although the speed and error scores were markedly affected by variation in task complexity. I.v.L.

N64-11549 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BEHAVIORAL TESTING DURING A 7-DAY CONFINEMENT: THE PATTERN DISCRIMINATION TASK
Rollin M. Patton and Robert J. Randle, Jr. Washington, NASA, Dec. 1963 17 p refs
(NASA TN D-1974) OTS: $0.50

Two subjects were confined for 7 days in a mockup of a small space capsule while a variety of physiological and behavioral tests were conducted. One of the latter, the pattern discrimination task, exhibited changes in quality of performance related to the duration of confinement and time of day. Changes were also shown to occur over the course of a single shift. Nevertheless, performance remained at an acceptably high level throughout, suggesting that a crew compartment of comparable volume may be considered for use in a 7-day mission. Author

N64-11564 National Aeronautics and Space Administration, Washington, D.C.
EFFECT OF A CONSTANT MAGNETIC FIELD ON CONDITIONED REFLEXES IN A SEA FISH [O VLIYANII POSTOYANNOGO MAGNITNOGO POLYA NA USLOVNYYE REFLEKSY U MORSKIKH RYB]
Yu. A. Kholodov and G. L. Verevkina Dec. 1963 14 p refs Transl. into ENGLISH of an article from Biol. Belogo Morya (USSR), v. 1, 1962 p 248-255
(NASA TT F-189) OTS: $0.50

The object of the study was to clarify the possible effect of a constant magnetic field on conditioned reflexes in fish. The experiments were performed on threespine sticklebacks, flounder, and fourhorn sculpins. These fish were selected because they were small enough to insert in the solenoid used to set up the relatively homogeneous magnetic field employed in the experiments. The theory that in their long-range migrations fish orient themselves according to the earth's magnetic field also influenced the choice of subjects. Author

N64-11607 Joint Publications Research Service, Washington, D.C.
TRANSLATIONS FROM MEDITSINSKAYA RADIOLOGIYA (MEDICAL RADIOLOGY) [MOSCOW] NO. 12, 1962
V. I. Shevchenko et al 15 Feb. 1963 38 p refs Transl. into ENGLISH of 2 articles p 49-55 and 68-77
(JPRS-17659; OTS-63-21141) OTS: $1.00

CONTENTS:
1. CHARACTERISTICS OF DISTURBANCES OF THE BLOOD COAGULATION SYSTEM IN CHRONIC (OCCUPATIONAL) X-RAY IRRADIATION V. I. Shevchenko p 1-11 refs (See N64-11608 03-16)
2. EFFECT OF PROLONGED AND REPEATED IRRADIATIONS ON THE BLOOD AND HEMOPOIETIC ORGANS G. D. Baysogolov p 12-36 refs (See N64-11609 03-16)

N64-11608 Joint Publications Research Service, Washington, D.C.
CHARACTERISTICS OF DISTURBANCES OF THE BLOOD COAGULATION SYSTEM IN CHRONIC (OCCUPATIONAL) X-RAY IRRADIATION
V. I. Shevchenko *In its* Transl. from Med. Radiol. [Moscow] no. 12, 1962 15 Feb. 1963 p 1-11 refs (See N64-11607 03-16)

Marked disturbances of the blood coagulating system are elicited simultaneously with the subclinical manifestations of radiation effects in people who are exposed to X-rays in offices. The most regular manifestations were: prolongation of recalcification time, reduction of prothrombin consumption, as well as of the activity of plasmic prothrombin factors, and the impairment of thromboplastic formation. Less pronounced were: reduction of serotonin, of proaccelerin, of proco vertin, of prothrombin time, and of heparin tolerance. Retraction of the blood clot and free heparin of the blood showed no change. Prolonged rest and complex vitamin therapy led to the attenuation or elimination of clinical manifestations and to an improvement of the blood coagulation indices. Thus, although disturbances of blood coagulation following occupational radiation action are regular and sufficiently stable, they are nevertheless reversible. I.v.L.

N64-11609 Joint Publications Research Service, Washington, D.C.
EFFECT OF PROLONGED AND REPEATED IRRADIATIONS ON THE BLOOD AND HEMOPOIETIC ORGANS
G. D. Baysogolov *In its* Transl. from Med. Radiol. [Moscow] no. 12, 1962 15 Feb. 1963 p 12-36 refs (See N64-11607 03-16)

The effect of prolonged and repeated irradiations on the blood and hemopoietic organs is reviewed. Changes that take place in peripheral blood are a reflection of changes taking place in the hemopoietic organs. Data from basically morphological investigations attest to the fact that, under the effect of ionizing radiation, destructive-regenerative processes originate from the very first in the hemopoietic organs. However, in contrast to a single irradiation with a large dose, marked regenerative processes are observed simultaneously with destructive processes, in cases of chronic exposure. An increase in the single radiation dose shows a progressive increase in blood changes. The extent of blood changes depends on the species of the experimental animals. It is indicated that a single dose of the order of one r/d, upon prolonged action, causes no distinct changes in the picture of the peripheral blood in various species of animals. However, there are available data which show that definite changes in the composition of the peripheral blood were observed in rabbits exposed for a period of 60 days to a dose of 0.5 r/d. I.v.L.

N64-11621 Joint Publications Research Service, Washington, D.C.
CURATIVE SLEEP
P. Bul' 8 Mar. 1963 13 p Transl. into ENGLISH of an article from Znanie Sila (Moscow), no. 11, Nov. 1962 p 28-30
(JPRS-18021; OTS-63-21278) OTS: $0.50

Induced sleep, particularly electrosleep, as a cure for various illnesses is discussed. Types of ailments discussed include: (1) *Chronic Insomnia*—Cure from the insomnia was

complete after eight treatments with electrosleep each lasting a half hour. (2) *Bronchial Asthma*—After five sessions of electrosleep the attacks of bronchial asthma completely ceased. (3) *Ulcers*—After six treatments the patient's pains had disappeared, after the seventh session the nausea and burning disappeared, and after the thirteenth treatment the ulcer healed. Each treatment consisted of 40 minutes of sleep with the current turned on. (4) *Hypertension*—After fifteen to twenty treatments all symptoms of hypertension disappeared. P.V.E.

N64-11649 National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

UNITED STATES EXPERIENCE ON THE UTILIZATION OF MAN'S CAPABILITIES IN A SPACE ENVIRONMENT

Charles W. Mathews *In* Comm. on Space Res. Life Sci. and Space Res. 1963 p 141-159 refs (See N64-11647 03-01)

This paper deals with the stresses on the flight crew in various phases of spaceflight missions, and the ability of the crew to perform piloting-type tasks, as well as other specific operations, in the presence of these stresses. The paper draws on information obtained from the flight research to date as well as from ground tests and analyses. From the results, one can conclude that man can very ably withstand the stresses of short duration missions into near space and has demonstrated ability to perform the type of tasks associated with flight crew operation. The chief unknown factors of future flight operations are the stresses produced by longer duration missions. Consideration of the problems involved leads to the conclusion that they are amenable to engineering solution at some expense to spacecraft weight and performance. It appears desirable therefore to utilize the flight crew to a high degree in future missions in the type of tasks where human judgment is needed or where significant simplification of on-board equipment may result. Author

N64-11667 National Aeronautics and Space Administration, Washington, D.C.

PROBLEMS OF SPACE BIOLOGY

N. M. Sisakyan, O. G. Gazenko, A. M. Genin *In its* Prob. of Space Biol., Nov. 1963 p 17-27 (See N64-11665 03-01) OTS: $7.00

A brief and general discussion is presented of the effects of radiation encountered in outer space, and particularly of that associated with the lower belts of radiation surrounding the earth. Exposure to weightlessness is considered to be relatively safe; but two important points are made, namely, the need to study the effects of prolonged weightlessness on return to the gravitational field, and the effect of weightlessness on embryological development. Considerable emphasis is given to the problem of suitable diet during spaceflight. In view of the heavy weight demand of food and water, various methods of partial and complete recirculation are suggested. These include distillation ion exchange and electro-osmosis. Recirculation of oxygen is also briefly described: photolytic decomposition of carbon dioxide with hard ultraviolet in the presence of copper catalysts is suggested. Biochemical methods based on the action of anaerobic bacteria are also discussed. A number of suggestions are made regarding the synthesis of food. The article is concluded with a brief review of arguments in favor of the existence of organic life in the exosphere. Author

N64-11668 National Aeronautics and Space Administration, Washington, D.C.

RADIOBIOLOGICAL PROBLEMS OF SPACE FLIGHTS

A. A. Gyurdzhian *In its* Prob. of Space Biol., Nov 1963 p 29-118 refs (See N64-11665 03-01) OTS: $7.00

Nearly 300 references, both Russian and Western, relating to the physical and medical aspects of spaceflight are quoted and briefly reviewed. Fundamentals of cosmic radiation, radiation belts around the earth, and interreaction of various radiations with the environment are given. The effects of ionizing radiations on tissues, and the principles of protection against cosmic radiations, are discussed. The importance of solar activity forecasts is discussed. The results of experiments exposing biological material to cosmic radiation are also discussed. Author

N64-11669 National Aeronautics and Space Administration, Washington, D.C.

PROBLEMS OF BIOLOGICAL TELEMETRY

V. V. Parin, R. M. Bayevskiy, and O. G. Gazenko *In its* Prob. of Space Biol., Nov. 1963 p 119-132 refs (See N64-11665 03-01) OTS: $7.00

The main program of the intelligence collected during spaceflight included: electrocardiogram, cardiac tone, pulse wave propagation, electroencephalogram, electromyogram, pneumogram, arterial pressure, galvanic skin reaction, various motor reflexes, skin and body temperatures, activity of gastrointestinal tract, and oxygen saturation of the blood. The methods used during the second and third satellite flights carrying dogs included: electrocardiography, phonocardiography, arterial oscillography, pneumography, actography, thermometry, electromyography and seismocardiography. Samples of the radiotelemetric recordings of the tracks from the above measurements are given. Problems connected with the transmission and channeling of the intelligence are also discussed, and it is concluded that the reduction of the channel bandwidth with simultaneous increase of transmissive power will not lower the transmissive capacity of the channel. Methods of coding the physiological information, including such systems as cardiophonic pulse transmission, single-channel three-parameter coding, and five-parameter computer-assisted coding are discussed. Author

N64-11670 National Aeronautics and Space Administration, Washington, D.C.

PROBLEMS OF SPACE MICROBIOLOGY AND CYTOLOGY

N. N. Zhukov-Verezhnikov, I. N. Mayskiy, V. I. Yazdovskiy, A. P. Pekhov, N. I. Rybakov et al *In its* Prob. of Space Biol., Nov. 1963 p 133-151 refs (See N64-11665 03-01) OTS: $7.00

Microbiological and cytological investigations carried out in the Soviet satellites Vostok-1 and Vostok-2 were intended for solving the following two problems of biology: (1) study of conditions of life in outer space (viability of microorganisms and somatic cells and reproduction after exposure); (2) study of the genetic effects caused by spaceflight. Biological material of different levels of organization was studied: bacteria, phages, cells in tissue culture (Hela cancer cells, fibroblasts, amnion cells), and skin flaps which were regrafted to their donors after flight. No essential changes were observed in comparison with controls in microbiological and cytological specimens used in the spaceflights. It assumed, therefore, that spaceflight conditions have no unfavorable effect on highly organized, multicellular organisms of more highly developed animals or living cells. Only in one experiment in Vostok-2 was a slight increase observed in the induced phage production of lysogenic bacteria. The dissociative phenomena in the culture *E. coli* KK-12 increased somewhat. Author

N64-11671 National Aeronautics and Space Administration, Washington, D.C.

THE POSSIBILITY OF EXISTENCE AND METHODS OF DETECTING EXTRATERRESTRIAL LIFE

A. A. Imshenetskiy *In its* Prob. of Space Biol., Nov. 1963 p 153-160 (See N64-11665 03-01) OTS: $7.00

The author briefly reviews past and present origin-of-life theories, and the possibility of interplanetary transport of life forms by means of radiation pressure. It is simpler in principle to suppose that life forms on other planets will resemble terrestrial unicellular organisms, rather than to postulate the existence of types of metabolism not based on water and carbon. Such organisms can withstand liquid helium temperatures, but $-10°$ C appears to be the lower limit at which reproduction has been observed. Some thermophilic bacteria can withstand boiling for 4 to 5 days, and the author postulates that organisms could have become adapted to temperatures up to 150° C on

other planets. Many lower terrestrial forms are sufficiently radioresistant to withstand the effects of cosmic radiation, but resistance to ultraviolet radiation is much lower. The absence of oxygen is, in this respect, also immaterial as many terrestrial organisms can grow under anaerobic conditions. The author discusses various methods proposed for automatically recording the existence of life forms, from a vehicle which has landed on a planet. Author

N64-11672 National Aeronautics and Space Administration, Washington, D.C.

ON THE PROBLEM OF SUPPLYING THE CREWS OF SPACESHIPS WITH ANIMAL FOODSTUFFS

K. S. Akhlebininskiy, V. P. Bychkov, I. A. Il'ina, Yu. I. Kondrat'yev and A. S. Ushakov *In its* Prob. of Space Biol., Nov. 1963 p 161–168 refs (See N64-11665 03-01) OTS: $7.00

The most realistic way to provide spaceship crews with food of animal origin is to carry and raise, in these spaceships, higher-order animals which have been thoroughly studied from the zoological, physiological, and nutritional point of view (for instance, poultry, rabbits, etc). Chickens are suggested, in particular, since they can be fed on algae and food wastes, including chicken entrails, and require little space. Author

N64-11673 National Aeronautics and Space Administration, Washington, D.C.

BIOCHEMICAL INVESTIGATIONS OF THE BLOOD AND URINE OF ANIMALS THAT FLEW IN SATELLITES

A. A. Gyurdzhian, N. N. Demin, L. T. Tutochkina, M. S. Uspenskaya, and T. A. Federova *In its* Prob. of Space Biol., Nov. 1963 p 169–178 refs (See N64-11665 03-01) OTS: $7.00

The studies included determination of: (1) the protein composition of blood and its nonspecific cholinesterase activity, and (2) the amount of 21-oxy-20-ketocorticosteroids and intermediates of nucleic acid metabolism (deoxicytidine and Dische-positive substances) contained in urine. Dogs were studied under laboratory conditions and on board the Soviet satellites 2, 4, and 5. After a single period of acceleration or vibration under conditions similar to those pertaining to flights, relatively short-term changes were found to exist, the changes indicating an activation of the functions of the liver and other systems, i.e., an increase in the nonspecific cholinesterase activity, and a decrease in the concentration of serum mucoids in blood. Due to prolonged training, tests, rocket flights, and examinations, some dogs developed a state of dystrophia characterized by a stable rise of serum mucoids and α_2-globulin concentration in blood and by a reduction of the total amount of protein at the expense of the albumin fraction. It is concluded that the biochemical changes observed after the flight are more likely to be due to stress reactions than to ionizing radiation. Author

N64-11674 National Aeronautics and Space Administration, Washington, D.C.

CHANGES IN CERTAIN MORPHOLOGICAL AND BIOCHEMICAL INDICES OF THE PERIPHERAL BLOOD OF ANIMALS AFTER ROCKET FLIGHTS

I. I. Kas'yan, Ye. M. Yuganov, and T. S. L'vova *In its* Prob. of Space Biol., Nov. 1963 p 179–183 refs (See N64-11665 03-01) OTS: $7.00

Blood counts and blood biochemical determinations were carried out on 12 dogs which had undergone 2 to 5 spaceflights. Blood samples were taken on the eve of the flight, 1 1/2 to 2 1/2 hours after landing, and also at later stages. Forty-two investigations were carried out in all. After the flight, an increase in the white-cell count of 1,800 to 11,050 cells per mm^3 was noted, due mainly to an increase in neutrophils, with a shift to the left of up to 30 percent of unsegmented forms. These changes were ascribed to a redistribution of cells from depot organs under the influence of mechanical forces, although a stress reaction may also have been concerned. No changes were noted in the red-cell count, but, after the spaceflight, there was a reduction in clotting time, with an increase in the calcium and prothrombin levels and a slight rise in the platelet count. Author

N64-11675 National Aeronautics and Space Administration, Washington, D.C.

RESULTS OF INVESTIGATIONS OF SOME INDICES OF THE PERIPHERAL VESSELS IN DOGS DURING AND AFTER SPACE FLIGHT

V. V. Yakovlev *In its* Prob. of Space Biol., Nov. 1963 p 185–189 refs (See N64-11665 03-01) OTS: $7.00

Maximum arterial pressure, venous pressure, arterial and venous tone, and the blood stream rate in the peripheral blood vessels (of ears) of dogs have been measured by a universal manometer. Data obtained during spaceflights in rockets and satellites indicate that venous pressure increased during overloads, but, during the weightless period, both venous and arterial pressure were normal. Shifts in arterial and venous tone and the blood stream rate were not significant. Author

N64-11676 National Aeronautics and Space Administration, Washington, D.C.

OBSERVATIONS ON THE CONDITIONED REFLEX ACTIVITY OF WHITE RATS SOME CONSIDERABLE TIME AFTER TRAVELLING ON THE SECOND SOVIET SATELLITE

L. D. Luk'yanova *In its* Prob. of Space Biol., Nov. 1963 p 191–200 refs (See N64-11665 03-01) OTS: $7.00

The combined effect of various spaceflight factors on the higher nervous activity was investigated on seven male albino rats, of which two participated in the flight and five served as controls. A stereotype of six positive and one differentiated motor-alimentary conditioned reflexes from optical and acoustic analyzers was produced in all the animals; the composition of the peripheral blood, the weight and the general state were determined and the data were used for statistical processing. For 2 1/2 months after the flight no changes could be detected in the higher nervous activity of the rats studied; they were only slightly different from those of the controls. It is concluded that the animals withstood satisfactorily the conditions of spaceflight. Author

N64-11677 National Aeronautics and Space Administration, Washington, D.C.

INFLUENCE OF SPACE-FLIGHT FACTORS ON THE BACTERICIDAL ACTIVITY OF THE BODY

O. G. Alekseyeva and A. P. Volkova *In its* Prob. of Space Biol., Nov. 1963 p 201–209 (See N64-11665 03-01) OTS: $7.00

Dogs exposed to spaceflight factors exhibit a wavelike fluctuation of the phagocytic index. The ingestive ability of neutrophils was most affected. The digestive ability of neutrophils and the bactericidal function of plasma and skin were less affected. The appearance of Escherichia coli in the oral cavity in the immediate postflight period indicates a drop in the immunological activity. Similar changes in the immunological indices were obtained in ground tests after vibrations (70 cps, 0.4 mm amplitude) for 13 minutes and centrifuge accelerations (2, 6, 9, and 12 g) for one to two minutes. Dogs which have been exposed to spaceflight on previous occasions were less sensitive and showed less pronounced immunological changes, indicating an adaptation to the combined effects of spaceflight facors. Moderate immunological changes persisted in all dogs for months and sometimes years. Author

N64-11678 National Aeronautics and Space Administration, Washington, D.C.

EFFECT OF SPACE-FLIGHT CONDITIONS IN THE SATELLITE ON THE PRESERVATION OF THE VIABILITY OF CHLORELLA CULTURES

V. Ye. Semenenko and M. G. Vladimirova *In its* Prob. of Space Biol., Nov. 1963 p 211–226 refs (See N64-11665 03-01) OTS: $7.00

Cultures of Chlorella pyrenoidosa in sealed ampules in liquid nutrient media of varying densities and on agar slants

were exposed to the effects of spaceflight for 24 hours on the second orbital spaceship. Periodic illumination was provided for photographic and television observations. Macroscopic observations of the cultures immediately upon return to earth did not reveal clotting, cottony deposits, or other pathogenic signs. Comparative studies of cell morphology, photosynthetic activity, mutations, and culture growth and development all indicated that the experimental cultures had good resistance to the effects of launching, spaceflight, and reentry. In general, viability was preserved and the principal physiological processes, i.e., photosynthesis, growth, development and reproduction, showed no irreversible changes. However, the cultures had varying amounts of damaged cells and, upon cultivation, showed decreased photosynthetic activity immediately after landing. After 6 days of active growth, the algae approached the normal condition of the control cultures. Author

N64-11679 National Aeronautics and Space Administration, Washington, D.C.

EFFECTS OF FLIGHT IN THE SECOND SOVIET SATELLITE ON THE HEMOPOIETIC ORGANS OF ANIMALS

M. A. Arsen'yeva, V. V. Antipov, V. G. Petrukhin, T. S. L'vova, N. N. Orlova, and S. S. Il'ina *In its* Prob. of Space Biol., Nov. 1963 p 227–241 refs (See N64-11665 03-01) OTS: $7.00

Laboratory mice were used in the second satellite flight. Cytological investigations of bone marrow cells in the tested animals showed a statistically significant increase of mitotic damage, compared with the control animals. Comparison of this data with that obtained after exposure of the bone marrow cells to radiation of 50 r indicates that the damage caused by exposure to spaceflight does not decrease until the 60th day after exposure. Furthermore, the chromosomal fragmentation so characteristic of radiation damage during chromosome exchanges was almost absent. The morphological picture of bone marrow up to the 30th day after flight revealed an increase of myelopoesis, accompanied by the appearance of young white blood cell forms and an inhibition of erythropoesis. The histological investigation of the spleen showed a depression of hemopoiesis during the first 10 days, but a return of hemopoietic function accompanied by the appearance of young blood cell forms occurs by the 30th day. Author

N64-11680 National Aeronautics and Space Administration, Washington, D.C.

EFFECTS OF COSMIC FLIGHT FACTORS ON THE INCIDENCE OF RECESSIVE LETHAL MUTATIONS IN THE X-CHROMOSOME OF DROSOPHILA MELANOGASTER

Ya. L. Glembotskiy, E. A. Abeleva, Yu. A. Lapkin, and G. P. Parfenov *In its* Prob. of Space Biol., Nov. 1963 p 243–254 refs (See N64-11665 03-01) OTS: $7.00

For two lines of Drosophila melanogaster, a statistically reliable increase of mutation frequencies was observed after spaceflights (0.56 ±0.07 percent and 0.96 ±0.16 percent); the strain D-18, which is characterized by greater spontaneous mutability, proved to be more sensitive to the mutagenic effect of the whole complex of spaceflight factors. Twenty of the lethal mutations were cytologically analyzed and were shown to be point mutations. The occurrence of point mutations and the increase in spermatid mutation rate, as compared with mature sperm, indicate the possibility of cosmic radiation being the responsible factor. But, until the mutagenic effect of such spaceflight factors as rocket vibration and acceleration has been elucidated by further experiments, the mutagenic effect of cosmic radiation alone cannot be accurately determined. Author

N64-11681 National Aeronautics and Space Administration, Washington, D.C.

INCIDENCE OF DOMINANT LETHAL MUTATIONS IN DROSOPHILA MELANOGASTER DURING A SATELLITE FLIGHT

G. P. Parfenov *In its* Prob. of Space Biol., Nov. 1963 p 255–258 refs (See N64-11665 03-01) OTS: $7.00

After flight in a space satellite, the frequency of dominant lethal mutations which occurred in spermatids of male Drosophila, strain D-32, was significantly increased. No increase in these mutations was observed in mature spermatozoa. However, the frequency of dominant lethal mutations was also increased in both spermatids and spermatozoa when male flies were subjected to vibrations of 70 c/s on earth. No firm conclusions can be drawn, at present, on the contribution of vibrational effects to the induction of mutations during spaceflight. Author

N64-11682 National Aeronautics and Space Administration, Washington, D.C.

INFLUENCE OF SPACE-FLIGHT FACTORS ON HEREDITY AND DEVELOPMENT IN ACTINOMYCETES AND HIGHER-ORDER PLANTS

Ya. I. Glembotskiy, A. A. Prokof'yeva-Belgovskaya, Z. B. Shamina, V. V. Khvostova, S. A. Valeva et al *In its* Prob. of Space Biol., Nov. 1963 p 259–271 refs (See N64-11665 03-01) OTS: $7.00

Actinomyces erythreus, strain 2577, had a sixfold increase in viability (measured by the number of spores which survived and colonies which developed) as compared with the controls. The viability of *Actinomyces erythreus* 8594, a radiosensitive strain, was reduced to one-twelfth, and that of *Actinomyces aureofaciens* LS-B-2201 to one quarter. *Actinomyces streptomycini* Kras. strain LS-3 formed spores, while its mycelium autolyzed. Air-dry seeds of two types each of corn and peas and one of winter wheat were exposed to spaceflight, following which chromosome damage in the root cells of the seedlings was investigated. Both types of peas and one of corn showed increases in the mitotic index. All of the seeds showed chromosome rearrangements. Winter wheat (hybrid 186) showed the greatest number, which was to be expected since this hybrid is sensitive to both γ-rays and fast neutrons. However, the "Spartanets" pea type, which is resistant to γ-rays, also showed a statistically significant number of chromosome rearrangements. Author

N64-11683 National Aeronautics and Space Administration, Washington, D.C.

INFLUENCE OF SPACE-FLIGHT CONDITIONS ON SEEDS OF ALLIUM FISTULOSUM (SPRING ONION) AND NIGELLA DAMASCENA (NUTMEG FLOWER)

V. N. Sidorov and N. N. Sokolov *In its* Prob. of Space Biol., Nov. 1963 p 273–276 (See N64-11665 03-01) OTS: $7.00

The effect of spaceflight on seeds of *Allium fistulosum* and *Nigella damascena* was studied. There was no influence on the frequency of chromosome rearrangements, but the rate of seed germination was markedly increased in *Nigella damascena* but not in *Allium fistulosum*. This latter effect does not appear to be due to exposure of the seeds to cosmic radiation, but may depend on other factors encountered in flight. Author

N64-11684 National Aeronautics and Space Administration, Washington, D.C.

SPACE-FLIGHT FACTORS AND PRIMARY NONDISJUNCTION OF CHROMOSOMES

N. P. Dubinin and O. L. Kanavets *In its* Prob. of Space Biol., Nov. 1963 p 277–282 refs (See N64-11665 03-01) OTS: $7.00

In order to test the effects of spaceflight on the nondisjunction of chromosomes, homozygotic, white-eyed, unfertilized female *Drosophila* were used. Upon return, they were exposed to red-eyed males. The percentage of offspring affected by spaceflight factors was 0.19% ±0.021. When white-eyed control females were bred in a similar manner, the percentage of spores caused by nonseparation of the X-chromosome was only 0.048% ±0.017. The amount of radiation absorbed during the flight of Vostok I was too small to account for this change. In addition, laboratory experiments with X-rays have indicated that radiation effects are of short duration, lasting only 6 days. However, flies exposed to spaceflight factors produced an

soda-lime, silica gel, and oxygen gas. The air in sealed containers occupied by dogs weighing 5 to 7 kg could be maintained in a satisfactory condition by means of the installation for periods as long as 30 days, and the system was subsequently used in the second spaceflight with the dog Layka. Author

N64-11692 National Aeronautics and Space Administration, Washington, D.C.
PREPARATION OF THE ANIMAL PRIOR TO THE EXPERIMENT
O. G. Gazenko and V. S. Georgiyevskiy *In its* Prob. of Space Biol., Nov. 1963 p 353-359 refs (See N64-11665 03-01) OTS: $7.00

Dogs are considered to be the most suitable animals for spaceflight experiments; they should be crossbred males, not more than 6 kg in weight and 1.5 to 6 years old. The animals are first trained to become accustomed to confinement for 20 days in cages of gradually decreasing size, the final one being 54 × 41 × 20 cm. They are then adapted to existence in a hermetically sealed container 64 cm in diameter and 80-cm long containing all the appropriate equipment which is required for the spaceflight. The described procedure was used in selecting the dog, Layka, for the successful spaceflight. Author

N64-11693 National Aeronautics and Space Administration, Washington, D.C.
SANITARY DEVICES IN PRESSURIZED CAPSULES
O. G. Gazenko, A. A. Gyurdzhian and G. A. Zakharyev *In its* Prob. of Space Biol., Nov. 1963 p 361-368 refs (See N64-11665 03-01) OTS: $7.00

A device to collect and remove the excreta of animals that remain in a sealed cabin for many days is described. The device is made of rubber-impregnated knitted fabric and worn by the animal. The excreta are collected in a special can. The device functions quite well, and gives the animal sufficient freedom of movement and does not annoy it during the 20-day experiment. The technique described was successfully used for Layka on the second earth satellite and on the subsequent satellite spaceships. Author

N64-11694 National Aeronautics and Space Administration, Washington, D.C.
FASTENING OF AN ANIMAL IN A PRESSURIZED CAPSULE, FABRIC APPAREL AND DISTRIBUTION OF SENSORS FOR THE REGISTRATION OF PHYSIOLOGICAL FUNCTIONS
O. G. Gazenko and A. A. Gyurdzhian *In its* Prob. of Space Biol., Nov. 1963 p 369-377 refs (See N64-11665 03-01) OTS: $7.00

A fabric harness has been developed for affixing sensors to the body of a dog during spaceflight. It consists of two pieces which fit over the head and forelimbs, and hindquarters, respectively, and which are joined together by straps. A pocket in the neckpiece accommodates the sensor for recording pulse rate and arterial pressure. The harness is fixed to the capsule wall by means of chains which permit free movement of the animal, and, at the same time, prevent traction on the sensor leads. The harness was tolerated by animals for periods of up to 20 days, and was used on the dog Layka during the second spaceflight. Author

N64-11695 National Aeronautics and Space Administration, Washington, D.C.
PROVIDING DOGS WITH FOOD AND WATER UNDER SPACE-FLIGHT CONDITIONS
I. S. Balakhovskiy, L. I. Karpova, and S. F. Simpura *In its* Prob. of Space Biol., Nov. 1963 p 379-392 refs (See N64-11665 03-01) OTS: $7.00

The amount of food and water required by dogs, weighing 5 to 8 kg, during spaceflight conditions has been determined. In a preliminary study of energy requirements, the oxygen consumption of 8 dogs ranged from 0.604 to 0.906 l/hr/kg, and the 24-hour energy expenditure from 66 to 107.9 kg/body weight. These figures did not change essentially when the animals were confined in a simulated space cabin. Three dogs kept under similar conditions for 20 days remained well and lost no weight on a daily diet of 50 to 100 g of a jelly containing meat, sugar, and fat to a total calorific value of 500 kcal/100 g. The average daily intake of water was 120 ml, and the average rate of loss of water in the breath was 0.8 g/kg/hr. The construction of an automatic feeding apparatus is described, and also the regime used for feeding the dogs Layka, Belka, and Strelka during their spaceflights. Author

N64-11696 National Aeronautics and Space Administration, Washington, D.C.
RESULTS OF EXPERIMENTS CARRIED OUT IN SATELLITES
I. S. Balakhovskiy, O. G. Gazenko, A. A. Gyurdzhian, A. M. Genin, and A. R. Kotovskaya *In its* Prob. of Space Biol., Nov. 1963 p 393-404 refs (See N64-11665 03-01) OTS: $7.00

The main part of this work deals with the experiments carried out on dogs in pressurized capsules of the satellites. Electrocardiographic data, air pressure and air temperature data, respiration, carotid artery oscillations, arterial pressure data, and actogram data are discussed, and tracings of all the above variables shown against a time marker during the launching stage of a satellite. It is concluded that the launching period is satisfactorily endured by the animal, and the changes in the physiological function are well tolerated and are characteristic of the acceleration, noise, and vibrations. Full analogy between the respiratory and cardiac activities encountered during the propulsive stage of the flight and those in simulated laboratory tests was established. The animals endured equally well the transition from increased weight to the state of complete weightlessness. During the orbiting state, a considerable normalization of the cardiovascular and respiratory systems was observed. There was absence of any motor disturbance during that stage. Author

N64-11697 National Aeronautics and Space Administration, Washington, D.C.
THE AMINOACID COMPOSITION OF CHLORELLA-CHLORELLA PYRENOIDOSA
N. M. Sisakyan, E. N. Bezinger and M. G. Shaposhnikova *In its* Prob. of Space Biol., Nov. 1963 p 405-410 refs (See N64-11665 03-01) OTS: $7.00

The aminoacid composition of *Chlorella pyrenoidosa*, grown in an intensive culture, was investigated. Published information and the results of the experiments prove that this plant contains all the aminoacids required by man in quantities close to those of casein, a protein of high nutritive value. Author

N64-11698 National Aeronautics and Space Administration, Washington, D.C.
THE EFFECT OF GENERAL VIBRATION ON THE ANIMAL BODY
V. S. Georgiyevskiy and Ye. M. Yuganov *In its* Prob. of Space Biol., Nov. 1963 p 411-420 refs (See N64-11665 03-01) OTS: $7.00

Responses of some physiological functions to general vibrations have been investigated to elucidate the action of vibrations appearing at the active phase of a satellite flight upon the animal organism. Vibrations caused a considerable increase in the rate of heart muscle contractions and a moderate rise in arterial blood pressure. The changes in physiological functions observed can be of help in analyzing the effect of the flight on the animal onboard the satellite. Author

N64-11699 National Aeronautics and Space Administration, Washington, D.C.
THE EFFECT OF PROLONGED TRANSVERSE ACCELERATION ON ANIMALS

equally high percentage of mutants during the entire 18-day study, indicating an equally high number of chromosome separation failures. This indicates that spaceflight factors, unlike radiation, affect not only oocytes and maturing ova but also the oogonia. Therefore, it seems probable that the factors responsible for the disruption of chromosome separation are due to vibration, weightlessness, or combined factors. Author

N64-11685 National Aeronautics and Space Administration, Washington, D.C.
INFLUENCE OF SPACE-FLIGHT FACTORS ON THE LEVEL OF SEROTONIN IN THE BLOOD OF ANIMALS
V. S. Shashkov, V. V. Antipov, M. O. Raushenbakh, G. A. Chernov, and V. A. Maslennikova *In its* Prob. of Space Biol., Nov. 1963 p 283–290 refs (See N64-11665 03-01) OTS: $7.00

Changes in the serotonin (5-oxytriptamine) level in the blood of animals subjected to flight on orbital spaceships IV and V have been studied by Vane's method (ability of serotonin to cause contraction of smooth muscle fibers). Control animals kept at the home laboratory and those taken to the cosmodrome had identical (0.12 to 0.2 μg/ml) serotonin concentrations. Dogs flown in the spaceships showed an eight fold to tenfold drop in the serotonin level one to two days after flight. After two days this level returned to normal and remained normal up to 240 days. Similar reductions (by a factor of 4.3 to 10) in this level were obtained in mice and guinea pigs subjected to vibrations (35 and 70 cps, amplitude 0.4 mm) for 15 minutes, accompanied by acceleration overloads of 10 g. Restoration to normal levels of serotonin in the blood was noted after two days in the case of mice subjected to vibrations of 70 cps, and after one day in the case of those subjected to 35 cps. Author

N64-11686 National Aeronautics and Space Administration, Washington, D.C.
DETERMINATION OF THE INDUCED RADIOACTIVITY IN THE SECOND SOVIET ARTIFICIAL SATELLITE
V. V. Matveyev and A. D. Sokolov *In its* Prob. of Space Biol., Nov. 1963 p 291–293 refs (See N64-11665 03-01) OTS: $7.00

The possibility of the materials and instruments of a satellite becoming radioactive during flight in space cannot be ruled out. The residual γ-activity of bioelements AMN-1 (instruments specially developed for automatic recording of the biological activity of microorganisms under space conditions), used in the second Soviet satellite was determined. The measurements were made by means of a 4π-scintillation (absorption) counter 15 days after the return to earth of the capsule. At that time, the residual γ-activity, if present at all, did not exceed 10^{-10} radium gram equivalent. Author

N64-11687 National Aeronautics and Space Administration, Washington, D.C.
SOME RESULTS OF MEDICAL AND BIOLOGICAL INVESTIGATIONS IN THE SECOND AND THIRD SATELLITES
V. V. Antipov, R. M. Bayevskiy, O. G. Gazenko, A. M. Genin, A. A. Gyurdzhian et al *In its* Prob. of Space Biol., Nov. 1963 p 295–313 (See N64-11665 03-01) OTS: $7.00

Water and food were provided together in a mixture solidified with agar in order to facilitate automatic dispensing in conditions of weightlessness. This was carried out twice daily by command signals from the earth. Telemetric recording of the physiological parameters of the dogs Belka and Strelka during spaceflight showed the occurrence of tachycardia as a result of acceleration, noise, and vibration, and there was also a rise in the respiration rate; a return to normal preflight values occurred during the condition of weightlessness. Movements of the animals were observed by television cameras and by strain gage sensors mounted in the harness. No abnormalities were observed in the behavior of the animals after return to earth or during the following 3 months. It was concluded from the experiments carried out in the second satellite that dogs could readily be accustomed to spaceflight conditions. Genetic changes were noted in the progeny of actinomycetes, plant seeds, and fruit flies after return from spaceflight. Author

N64-11688 National Aeronautics and Space Administration, Washington, D.C.
MEDICAL AND BIOLOGICAL INVESTIGATIONS CARRIED OUT ON SOVIET ARTIFICIAL SATELLITES
O. G. Gazenko, V. I. Yazdovskiy and V. N. Chernigovskiy *In its* Prob. of Space Biol., Nov. 1963 p 315–318 (See N64-11665 03-01) OTS: $7.00

A general discussion of the problems connected with the choice of the experimental animal and the logistics for the biological experiments in the satellite is presented. The importance of careful design of the instrumentation and of the proper choice and thorough training of the experimental animals is emphasized. Author

N64-11689 National Aeronautics and Space Administration, Washington, D.C.
PRESSURIZED CAPSULE FOR AN ANIMAL
A. M. Bakhramov and V. I. Yazdovskiy *In its* Prob. of Space Bio., Nov. 1963 p 319–328 refs (See N64-11665 03-01) OTS: $7.00

A sealed cabin for housing animals during space flights is illustrated and described. It consists of a cylindrical capsule, 64 cm in diameter and 80 cm in length, made of 2-mm aluminum sheet, and provided with a detachable lid containing a plastic inspection port 16 cm in diameter. The capsule resisted excess internal and external pressures up to 1.5 atm without structural damage or leaking, and temperatures ranging from −40° to 50° C. The capsule is equipped internally with air conditioners and regenerators, automatic feeding and other apparatus, supported upon a metal frame. It was possible to maintain animals, in a normal state of activity, in the capsule for 20 days. Author

N64-11690 National Aeronautics and Space Administration, Washington, D.C.
RESEARCH APPARATUS
B. G. Buylov and R. G. Gryuntal *In its* Prob. of Space Biol., Nov. 1963 p 329–338 refs (See N64-11665 03-01) OTS: $7.00

The methods used for recording physiological data in the dog, Layka, during the second spaceflight are described. The electrocardiogram was picked up by silver electrodes implanted in the chest wall and amplified 3000-fold before transmission. Respiratory movements were picked up by two strain gages surrounding the chest and connected in parallel. Arterial blood pressure was recorded by a piezoelectric element applied to the carotid artery; an occluding cuff was periodically inflated and deflated by a piston, the internal pressure being recorded potentiometrically through a second channel in order to determine the cutoff pressure by the usual sphygmomanometric procedure. Movements were recorded by means of a spring-loaded thread attached to the animal and running to a variable resistance. The temperature and pressure of the air in the cabin were also recorded. An amplifier pack was provided to handle the telemetered information and incoming command signals. The system gave satisfactory service during the flight of the dog, Layka, in the second earth satellite. Author

N64-11691 National Aeronautics and Space Administration, Washington, D.C.
AIR REGENERATING SYSTEM IN A PRESSURIZED CAPSULE
A. D. Seryapin *In its* Prob. of Space Biol., Nov. 1963 p 339–352 refs (See N64-11665 03-01) OTS: $7.00

A system has been developed for regenerating the air in sealed capsules occupied by animals during spaceflights. A chemical method was used, and the air was brought in contact with the regenerator by electric fans. The total weight of the installation was 1/8 of that of a conventional system using

A. R. Kotovskaya and Ye. M. Yuganov *In its* Prob. of Space Biol., Nov. 1963 p 421-428 refs (See N64-11665 03-01) OTS: $7.00

The paper considers the effect upon animal organisms (dogs) of variable long-term accelerations acting transversely to the body axis. It has been found that the animals satisfactorily endured accelerations ranging from 2 to 10 g for 6 minutes, though the accelerations brought about essential changes in main indices of cardiovascular and respiratory systems. Their functions returned to normal 5 to 10 minutes after the action stopped. Author

N64-11700 National Aeronautics and Space Administration, Washington, D.C.

THE PROBLEM OF THE BIOLOGICAL ACTION OF COSMIC AND SOLAR RADIATIONS IN THE MOUNTAINS

V. I. Danileyko *In its* Prob. of Space Biol., Nov. 1963 p 429-437 refs (See N64-11665 03-01) OTS: $7.00

Hair depigmentation in people and animals, remaining for long periods at an altitude of 2200 to 3900 m above sea level, is evidently a result of the action of cosmic radiation particles on surface tissues of an organism. The high sensitivity to ionizing radiations of hair follicles of black mice makes it possible to employ the animals as biological indicators of cosmic radiation. In the case of the appearance of gray spots on the hairy coat of the animals the conclusion that heavy nuclei of cosmic radiation have struck the tissue can be drawn only if ionization traces are found there histologically. It was also found that mice staying in an open cage at the altitude of 2900 to 3900 m for 10 days showed a 13% increase in erithrocytes, as compared to the animals protected from solar radiation. This confirms the idea previously suggested by various authors, of the influence of solar radiation upon the hemopoietic function of bone marrow both in usual and mountain conditions. Author

N64-11701 National Aeronautics and Space Administration, Washington, D.C.

METHODS OF INVESTIGATING THE BLOOD CIRCULATION OF THE BRAIN UNDER CONDITIONS OF A MODIFIED GRAVITATIONAL FIELD

Yu. Ye. Moskalenko, R. M. Bayevskiy and O. G. Gazenko *In its* Prob. of Space Biol., Nov. 1963 p 439-443 refs (See N64-11665 03-01) OTS: $7.00

A description is given of a transistorized electroplethysmograph and its use for recording intracranial electroplethysmograms in dogs undergoing prolonged experiments and centrifuge runs. Information is given on applying the electroplethysmograph for investigating the degree of blood filling various parts of a man's body. Recommendations are made on using the described method during spaceflights. Author

N64-11702 National Aeronautics and Space Administration, Washington, D.C.

CONTAINERS FOR CERTAIN BIOLOGICAL MATERIALS USED IN EXPERIMENTS IN SPACESHIPS

I. V. Baranovskaya and A. A. Gyurdzhian *In its* Prob. of Space Biol., Nov. 1963 p 445-447 refs (See N64-11665 03-01) OTS: $7.00

Plexiglas containers used for carrying various biological material during the spaceship experiments, i.e., green plants, Drosophila, spiderwort, seeds and seedlings, Actinomycetes and Chlorella are briefly described. The containers met all the requirements of prolonged flight experiments. They allowed free access of light and air, and their transparency made it possible to observe the material by means of cine or television cameras. The biological material and containers suffered no damage and were used successfully in the second and subsequent Soviet satellites. Author

N64-11703 National Aeronautics and Space Administration, Washington, D.C.

ENSURING LIVING CONDITIONS FOR MICE DURING PROLONGED FLIGHT IN SPACESHIPS AND SATELLITES

I. V. Baranovskaya and A. A. Gyurdzhian *In its* Prob. of Space Biol., Nov. 1963 p 449-452 refs (See N64-11665 03-01) OTS: $7.00

A detailed description of containers for mice, used during satellite flights, is given. Also described is a feeding device for dispensing briquetted food. Water was supplied separately through a wick mechanism. A particular feature of the latter was that the rate of water supply was purely a function of the capillary effect and was independent of any such factors as accelerations, jerks, weightlessness, etc. The system proved successful in every respect, and was used during the 25-hour flight of the second satellite. Author

N64-11704 National Aeronautics and Space Administration, Washington, D.C.

METHOD OF "INTEGRATED" PHONOCARDIOGRAPHY

R. M. Bayevskiy *In its* Prob. of Space Biol., Nov. 1963 p 453-455 (See N64-11665 03-01) OTS: $7.00

The technique of "integrated" phonocardiography was developed for the purpose of lowering the capacity of the telemetry channel required for the transmission of phonocardiograms. It relies on separation of the low-frequency envelope of audiosignals by detection and integration of output signals of the phonocardiograph amplifier. As a result, the information relating to the frequency content is lost, but it is still possible to determine all the parameters related to the functioning of the heart muscle. Consequently, telemeter channels with a capacity considerably lower than that required for transmitting the usual types of phonocardiograms can be used. Author

N64-11705 National Aeronautics and Space Administration, Washington, D.C.

A TECHNIQUE FOR RECORDING SPHYGMOGRAMS OF DOGS

R. M. Bayevskiy and V. I. Polyakov *In its* Prob. of Space Biol., Nov. 1963 p 457-459 (See N64-11665 03-01) OTS: $7.00

A technique is described for measuring changes in the blood pressure of dogs during spaceflight. Measurement is made by means of rubber tubes or sleeves containing carbon which record changes in the movement of the walls of the carotid artery. The movement can be converted to an electrical signal which is amplified and traced. Blood-pressure changes in the caudal artery are measured by a similar device in the form of a ring. Author

N64-11706 National Aeronautics and Space Administration, Washington, D.C.

RECORDING OF SEISMOCARDIOGRAMS IN DOGS

R. M. Bayevskiy and L. A. Kazar'yan *In its* Prob. of Space Biol., Nov. 1963 p 461-464 refs (See N64-11665 03-01) OTS: $7.00

The fundamentals of seismocardiography are briefly discussed, and the constructional details of a sensor working on the principle of an electromagnetic-inertial transducer are given. The transducer was designed for a dog, and was built in a small (60- × 50- × 20-mm) metallic box containing a flat spring, carrying a seismic mass which served as the magnetic element of the transducing system. Two induction coils serve as the secondary elements of the system. The transducer was placed on the spine of the animal, and the working parameters were so chosen that the cardiac contractions could be recorded without any motor disturbances. Well-defined systolic and diastolic portions of the seismocardiogram are shown on the example of the dog Al'fa. The above tracing is compared with the ordinary ECG tracing. Author

N64-11707 National Aeronautics and Space Administration, Washington, D.C.

THE CHOICE OF LEADS AND THE ANALYSIS OF ELECTROCARDIOGRAMS IN DOGS

R. M. Bayevskiy and M. M. Osipova *In its* Prob. of Space Biol., Nov. 1963 p 465-469 refs (See N64-11665 03-01) OTS: $7.00

The standardization of electrocardiographic methods and their application to the study of dogs during spaceflights are discussed. The work is based on 500 ECG tracings obtained on 20 dogs. It is concluded that all the ECG wave patterns may be subdivided into five fundamental structural types. Furthermore, it is suggested that the following leads are most suitable for the above purpose: 2, 3, CR-1, CR-3, CL-1, CL-3, VF, and VL. The values of certain electrocardiographic parameters, including RR, ΔRP, PQ, QRS, and systolic index are given, showing the limits of normal variations. All the tracings were taken on a type 4 PFD-7 electrocardiograph. Author

N64-11708 National Aeronautics and Space Administration, Washington, D.C.

THE STUDY OF BIOLECTRIC POTENTIALS AND OXYGEN PRESSURE IN BRAIN TISSUES DURING HYPOXIA

Ye. A. Kovalenko and V. B. Malkin *In its* Prob. of Space Biol., Nov. 1963 p 471-482 refs (See N64-11665 03-01) OTS: $7.00

Under conditions of hypoxia, the animals tested revealed regular changes in their EEG which could be divided into two phases. The first phase was characterized by the appearance of high-voltage slow waves of gradually increasing amplitude, and the second phase was characterized by a depression of biocurrents, and a sharp diminishing of the amplitude and frequency of biopotentials. The results of the above experiments in various animals did not show a strict correlation between the changes in EEG and oxygen tension which occurred during and after the development of hypoxia. At the same time, relative changes in oxygen tension in the brain tissue of animals give grounds for believing that biopotential changes depend upon the oxygen tension in tissues. It should be noted that hypoxial changes in EEG depend not only upon a decrease in oxygen tension in a given part of the brain, but also upon the duration this decrease was being observed. Author

N64-11709 National Aeronautics and Space Administration, Washington, D.C.

COORDINATION OF ARBITRARY MOVEMENTS OF A HUMAN BEING IN A CHANGING GRAVITATIONAL FIELD

L. V. Chkhaidze *In its* Prob. of Space Biol., Nov. 1963 p 483-495 refs (See N64-11665 03-01) OTS: $7.00

Volunteers were trained to exert paired finger pressures in such a way that the first pressure of each pair was twice the force of the second. The ratio F of the difference between the pressures and the magnitude of the second pressure was used as a criterion of performance. Training was carried out first under visual instrumental control until a value of F of 0.6 was attained, after which the subject had to carry out further practice under control of his own proprioceptive mechanisms until a stable performance level of 0.85 to 0.90 was attained. The performance was then recorded by means of a tensiometer immediately before and during exposure to an acceleration of 3 g and 7 g, and to an acceleration increasing gradually up to 7 g. A mean initial value of F of 0.83 was recorded; during exposure to 3 g this fell to 0.63, and to 0.57 on exposure to 7 g. The results show that in an increased gravitational field subjective assessment of force is impaired. When the duration of the task was increased, however, the value of F rose again. Author

N64-11710 National Aeronautics and Space Administration, Washington, D.C.

A METHOD OF FASTENING ELECTRODES FOR REGISTERING AN ELECTROCARDIOGRAM DURING MANNED SPACE FLIGHTS

N. A. Agadzhanyan, I. T. Akulinichev, K. F. Zazykin and D. G. Maksimov *In its* Prob. of Space Biol., Nov. 1963 p 497-506 refs (See N64-11665 03-01) OTS: $7.00

Types of electrodes and methods of attaching them to the body were studied. Silver discs, 10 to 20 mm in diameter and 0.3 to 0.5 mm thick, gave good electrical contact with the least irritation to the skin. The edges were rounded and the undersurface was cupped in order to retain a layer of conducting paste. This consisted generally of sodium chloride, glycerol, lanoline, and antiseptics, and was best applied as a liquid layer to the skin, and as a semi-solid layer to the electrode. The electrodes were attached to the chest either by a covering of gauze which was fixed in position with glue, or by means of an elastic harness. During the first few days after attachment, the interelectrode resistance ranged from 5000 to 40,000 ohms; after 10 to 14 days, the resistance had risen five to seven times. Both methods caused approximately 50-percent loss in the ECG signal after ten days, and provided satisfactory contact with the body for up to 13 days. The gauze method occasionally caused slight irritations which were absent in the case of the breast-strap method. Author

N64-11736 Argentina. Comision Nacional de Energia Atomica, Buenos Aires

A CHART FOR THE CALCULATION OF THE EXACT TOTAL DOSES FROM UNIFORMLY DISTRIBUTED SOURCES [DIAGRAMA PARA EL CALCULO DE DOSIS TOTALES DEBIDAS A FUENTES UNIFORMEMENTE DISTRIBUIDAS]

A. E. Placer, R. B. Bravo, H. A. Mugliaroli, and O. R. Moll 1963 8 p refs In SPANISH

(*Its* Informe No. 94)

A table is given from which can be obtained the total dose of radioactivity, in rads, to a tissue, organ, or to the whole body, under conditions in which the radioactivity is uniformly distributed. The radioactive dose is obtained from the effective half-life and the total energy of the radioisotope. R.T.K.

N64-11773 Minnesota U., Minneapolis

THORACIC CAGE IMPEDANCE MEASUREMENTS IMPEDANCE PRODUCT SYSTEM

Edwin Kinnen and William Kubicek Brooks AFB, Tex., School of Aerospace Medicine, Oct. 1963 14 p ref

(Contract AF 41(657)403)

(SAM-TDR-63-69; AD-423077)

The measurement of (1) peak-to-peak amplitude of a percent change of impedance measured across the thorax, (2) heart rate as a beat-to-beat dc voltage level, and (3) the product of these two variables is performed by an impedance product system. Results show that the peak amplitude can be measured by a charge storage and transfer system accurately to within 3%. The cardiac tachometer is linear within 2.5% in a range from 50 to 250 beats/min. Multiplication of the two variables is accomplished with Pace TR-10 analog computer components with an error of less than 1%. Overall accuracy of the system appears to be within 5%. Tests on several subjects illustrate the change in impedance product with time following the cessation of exercise. Author

N64-11781 Joint Publications Research Service, Washington, D.C.

THE ACTION MECHANISM OF MEDICINAL SUBSTANCES AS A BIOLOGICAL PROBLEM

S. V. Anichkov 16 Dec. 1963 9 p Transl. into ENGLISH of an article from Sov. Med. (Moscow), v. 27, no. 8, 1963 p 3-8 (JPRS-22292; OTS-64-21023) OTS: $0.50

The relationship between an understanding of the action mechanisms of certain chemicals on human cells and tissues and the treatment of ensuing illnesses is discussed. Clarification of the mechanism of the action of prussic acid on tissues made possible the substantiation of the therapeutic action of methemoglobin and methemoglobin formants in poisoning by cyanides. The discovery of the mechanism of the action of toxins which block the thiolic enzymes led to the creation of a powerful antitoxin for the treatment of poisoning by arsenic, mercury, and other heavy metals. The discovery of the anticholinesterase mechanism of action of physostigmine led to the creation of synthetic anticholinesterase. An understanding of the carbanhydrase mechanism has led to the development of diuretic remedies, the chief of which is Diacarb. Also, the

use of antimetabolites in the treatment of malignant growths is discussed. I.v.L.

N64-11782 Joint Publications Research Service, Washington, D.C.
CYBERNETICS AND THE DEVELOPMENT OF CONTEMPORARY SCIENTIFIC KNOWLEDGE
I. B. Novik 16 Dec. 1963 16 p refs Transl. into ENGLISH of an article from Priorda (Moscow), no. 10, 1963 p 3-11
(JPRS-22296; OTS-64-21026) OTS: $0.50

In this review of cybernetics and the development of contemporary scientific knowledge, it is indicated that: (1) Cybernetics was the regular, natural result of the development of the scientific knowledge of the twentieth century, wherein the need for studying the information processes and the processes of control of complex dynamic systems appeared. (2) Cybernetics was not only the result of the progress of scientific knowledge, it intensified and accelerated the development of science. (3) The improvement of the functional-formalized approach made it possible to elaborate an extremely broad cybernetic method of analyzing qualitatively different phenomena. (4) The further development of dialectical-materialistic monism is a very important aspect in the elaboration of this fruitful scientific approach. I.v.L.

N64-11801 FMC Corp., Princeton, N.J. Chemical Research and Development Center
A STUDY OF THE FEASIBILITY OF THE REGENERATION OF CARBOHYDRATES IN A CLOSED CIRCUIT RESPIRATORY SYSTEM Final Report
G. C. Akerlof and P. W. D. Mitchell 1 Mar. 1963 197 p refs
(NASA Contract NASr-88)
(NASA CR-52972) OTS: $13.50 ph, $6.11 mf

A study has been made of the feasibility of producing formaldehyde from carbon dioxide. The process developed is carried out in two steps. In the first one, carbon dioxide is reduced with excess hydrogen in a glow discharge to the monoxide; in the second, the monoxide formed is reacted at ordinary temperatures with the remaining hydrogen in a silent discharge to give formaldehyde. A large laboratory unit has been built and tested for the continuous production of formaldehyde from carbon dioxide and hydrogen in a closed system at steady state. Two different types of silent discharge reactors were built for this pilot plant. Both were designed to come within a factor of two or three of the size required for a closed respiratory system with a crew of five. A mathematical analysis has been made of the design for a tapered, tubular, spinning, silent discharge reactor to operate at weightlessness with continuous feed of gas and liquid phase for absorption of formaldehyde generated. Sugars have been made by the condensation of aqueous formaldehyde using calcium hydroxide and solutions of lead oxide in sodium hydroxide as condensing agents. Author

N64-11808 National Aeronautics and Space Administration, Washington, D.C.
RETENTION OF HUMAN SYSTEM CAPABILITIES DURING MANNED SPACE FLIGHT
Robert L. Gervais (Douglas Aircraft Co., Inc.) and Eugene B. Konecci [1963] 33 p Presented at the 14th Intern. Astronautical Congr., Paris, 25 Sep.-1 Oct. 1963
(Paper 106)

The ecological philosophy of a space transportation system is postulated, and an ecological environmental evaluation is undertaken. Methods of defining and synthesizing the various requirements and constraints are advanced, such that the results of the evaluation can be implemented into the design of a space transportation system. In addition, vehicle-and-flight mechanics and dynamics are analyzed throughout all phases of flight, i.e., during boost, abort, space transfer, lunar and planetary operations, and entry; consequently, vehicle and effective man loadings are established. Methods of alleviating these loadings through various space or atmospheric maneuvers are then advanced, so that they become consistent with the established ecological requirements. Author

N64-11821 North American Aviation, Inc., Downey, Calif. Space and Information Systems Div.
HYPOTHERMIA AND ARTIFICIAL HIBERNATION FOR SPACE TRAVEL, A SURVEY
2 Mar. 1963 54 p 194 refs
(SID 63-354)

This is a survey of the research problem of sending a man on a long space voyage in a state of hypothermia or artificial hibernation. Bibliographic references include foreign language literature as well as English. Author

N64-11825 Maryland U., College Park
A LONG-TERM STUDY OF HUMAN PERFORMANCE IN A CONTINUOUSLY PROGRAMMED EXPERIMENTAL ENVIRONMENT
Jack D. Findley, Bernard M. Migler, and Joseph V. Brady Nov. 1963 114 p refs
(NASA Grant NsG-189-61)
(NASA CR-52913) OTS: $9.60 ph, $3.62 mf

A volunteer adult male was confined to a three-room experimental chamber for 5 months. A program of activities, controlled by automatic equipment, permitted the subject to engage in a particular sequence of activities. The terminal parts of the sequence allowed the subject to engage in more reinforcing activities and to choose among a greater selection of activities. Behavioral requirements in several activities were manipulated during the experiment. Performance changes were recorded in terms of frequency of selection of activities, duration of activities, and other quantitative and nonquantitative measures. The effects of some of the short-term manipulations in the conditions of the environment were observed on behaviors both closely and distantly related to the behavior being manipulated. The effects of prolonged social isolation and confinement resulted in the development of progressive behavior strain, which ultimately led to the termination of the experiment. These effects were described quantitatively in performance changes in many behaviors. Author

N64-11829 Joint Publications Research Service, Washington, D.C.
IMMUNOLOGY OF ACUTE RADIATION INJURY
R. V. Petrov 9 Apr. 1963 333 p refs Transl. into ENGLISH of a book "Immunologiya Ostrogo Luchevogo Porazheniya", Moscow, Gosatomizdat, 1962 p 1-267
(JPRS-18620; OTS-63-21545) OTS: $5.00

CONTENTS:

1. FIRST PART: THE EFFECT OF RADIATION ON ANTIMICROBIAL IMMUNITY R. V. Petrov p 3-87 refs (See N64-11830 03-16)
2. SECOND PART: INFECTIOUS PROCESSES IN THE IRRADIATED ORGANISM R. V. Petrov p 89-169 refs (See N64-11831 03-16)
3. THIRD PART: NONINFECTIOUS IMMUNOLOGY OF RADIATION SICKNESS R. V. Petrov p 170-328 refs (See N64-11832 03-16)

N64-11830 Joint Publications Research Service, Washington, D.C.
FIRST PART: THE EFFECT OF RADIATION ON ANTIMICROBIAL IMMUNITY
R. V. Petrov *In its* Immunol. of Acute Radiation Injury 9 Apr. 1963 p 3-88 refs (See N64-11829 03-16) OTS: $5.00

The antimicrobial immunity against infections in radiation sickness is so markedly impaired that susceptibility is increased not only to infection with pathogenic but also to conditionally pathogenic microorganisms. This increase in the sensitivity of irradiated animals occurs several days

(on the average, three) after the effect of the ionizing radiation and lasts for 2 to 6 weeks or even longer, depending on the dose of radiation, species of animal, and the nature of the infectious process. If the infectious process is characterized by a progressive or prolonged course, the increased sensitivity of the organism to the pathogen of this infection is demonstrable when infection is carried out simultaneously with irradiation. Increased sensitivity observed from the infection of irradiated animals is an integral index of the injurious effect of radiation on immunity. Also, an analysis of the radiation on various immunity factors is presented. I.v.L.

N64-11831 Joint Publications Research Service, Washington, D.C.

SECOND PART: INFECTIOUS PROCESSES IN THE IRRADIATED ORGANISM

R. V. Petrov *In its* Immunol. of Acute Radiation Injury 9 Apr. 1963 p 89-169 refs (See N64-11829 03-16) OTS: $5.00

Endogenous and exogenous infections in the irradiated organism are reviewed. The section on endogenous infections covers: (1) sources of endogenous infections; (2) times of the occurrence of bacterial invasion; (3) the role of endogenous infection in the pathogenesis of radiation sickness; and (4) principles of antibiotic therapy in acute radiation sickness. The section on exogenous infections covers: (1) characteristics of the course of the infections; (2) the activating effect of irradiation on a latent infectious process; (3) the effectiveness of active and passive immunization; (4) the characteristics of infectious processes in leptospirosis, gas gangrene, and tetanus; and (5) the effectiveness of various types of therapy on gas gangrene and tetanus. I.v.L.

N64-11832 Joint Publications Research Service, Washington, D.C.

THIRD PART: NONINFECTIOUS IMMUNOLOGY OF RADIATION SICKNESS

R. V. Petrov *In its* Immunol. of Acute Radiation Injury 9 Apr. 1963 p 170-328 refs (See N64-11829 03-16) OTS: $5.00

This review covers discussions of the following: (1) the antigenic properties of the tissues of irradiated animals, (2) C-reactive protein and radiation sickness; (3) reactions of the irradiated organism to tissue antigens; and (4) the study of the effect of immunization sera on the tissues of irradiated animals. I.v.L.

N64-11852 Joint Publications Research Service, Washington, D.C.

EXPERIMENTAL STUDIES IN COSMIC PHYSIOLOGY

P. V. Vasil'yev, A. D. Voskresenskiy, and O. G. Gazenko *In its* Sov. Rept. on Space Med. and Biol. 30 Apr. 1963 p 1-20 refs

(See N64-11851 03-01) OTS: $2.25

Two structural variants (empirical and theoretical) of physiological experiments are briefly characterized, and an analysis of certain data obtained in a theoretical approach to the physiology of forward accelerations is presented. Studies show that the most important immediate effects of forward accelerations consist of changes in pulmonary ventilation and redistribution of blood in the vascular system. In the lungs, the normal relationships in the distribution of blood and air are disturbed so that there is a reduction in the level of blood oxygenation. The drop in oxygen saturation of arterial blood and hemodynamic shifts can cause the development of cardiac and cerebral hypoxia. In this state, an augmented influx of impulses to the brain along different pathways implements the appearance of disturbances in central regulation which, in turn, reduces the compensatory mechanism of the organism. The appearance of pathological effects can be expected only with exposure to accelerations of a duration greater than one minute. P.V.E.

N64-11853 Joint Publications Research Service, Washington, D.C.

REACTIONS OF THE CARDIOVASCULAR AND RESPIRATORY SYSTEMS OF ANIMALS DURING FLIGHTS IN HERMETIC CABINS OF ROCKETS UP TO AN ALTITUDE OF 212 KM

I. I. Kas'yan *In its* Sov. Rept. on Space Med. and Biol. 30 Apr. 1963 p 21-54 refs (See N64-11851 03-01) OTS: $2.25

Studies of the cardiovascular and respiratory systems of animals during flights in hermetic cabins of rockets up to an altitude of 212 km led to the following conclusions: (1) Flights of living organisms into cosmic space are possible and safe. (2) Physiological reactions of the cardiovascular and respiratory systems are most evident in the active propulsion of the rocket and during the period of reentry; during the weightlessness period, indices of basic physiological functions in dogs returned to initial values—in most cases after 5 to 6 minutes; in anesthetized animals the blood pressure, pulse, and respiratory rate during the period of weightlessness did not differ significantly from the initial values. (3) Test animals repeatedly exposed to rocket flights did not exhibit any pathological changes, with respect to the basic physiological systems of the organism, after 3.5 to 4 years. P.V.E.

N64-11858 Joint Publications Research Service, Washington, D.C.

HYGIENIC EVALUATION OF WORKING CONDITIONS IN WORK WITH HIGH-FREQUENCY CURRENTS

L. T. Frolova (Med. Inst. im. M.I. Kalinin, Omsk) *In its* Transl. on Hyg. and Safety 6 May 1963 p 6-9 refs (See N64-11856 03-01) OTS: $0.50

The scope of the investigation included work conditions and health status of persons dealing with ultrahigh frequency electric currents. As evidenced, the density of the wave flux intensity was in excess of the permissible levels. Changes in the health status of the operators could be observed, predominantly in the form of an asthenovegetative syndrome and cardiovascular disorders. All this is due to nonobservance of regulations for the location of operating units, and inadequate protective screening of generators. This is confirmed by the relationship between organic changes and service record. Author

N64-11859 Joint Publications Research Service, Washington, D.C.

TRANSLATIONS FROM VESTNIK AKADEMII NAUK SSSR, SERIYA BIOLOGICHESKAYA [MOSCOW]. (HERALD OF THE ACADEMY OF SCIENCES USSR, BIOLOGY SERIES), NO. 2, 1963

L. A. Zilber et al. 29 Oct. 1963 95 p refs Transl. into ENGLISH of 6 articles p 167-239

(JPRS-19571; OTS-63-21988) OTS: $2.25

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1. ON THE ROLE OF VIRUSES IN THE ORIGIN OF CANCER L. A. Zilber p 1-16 refs

2. THE GENETICS OF TUMOR CELLS Yu. M. Olenov p 17-42 refs

3. SOME PHYSIOLOGICAL REACTIONS OF ANIMALS DURING FLIGHTS IN THE BIO-CABINS OF BALLISTIC ROCKETS UP TO HEIGHTS OF 450-473 km I. I. Kas'yan p 43-59 refs (See N64-11860 03-16)

4. THE REMOTE EFFECT OF COSMIC FLIGHT UPON THE VESTIBULAR-TONIC AND FLEXOR REFLEX IN THE GUINEA PIG Z. I. Apanasenko and M. A. Kuznetsova p 60-69 refs (See N64-11861 03-16)

5. MORPHOLOGICAL AND HISTOCHEMICAL INVESTIGATIONS OF THE LABYRINTH OF ANIMALS IN THE CONDITIONS OF A CHANGING GRAVITATIONAL FIELD Ya. A. Vinnikov, O. G. Gasenko, L. K. Titova, and A. A. Bronshteyn p 70-81 refs (See N64-11862 03-16)

6. MICRONECROTIC FOCI IN THE SPLEENS OF IRRADIATED ANIMALS V. A. Sondak, M. N. Meysel', and V. M. Manteyfel' p 82-92 refs

N64-11860 Joint Publications Research Service, Washington, D.C.

SOME PHYSIOLOGICAL REACTIONS OF ANIMALS DURING FLIGHTS IN THE BIO-CABINS OF BALLISTIC ROCKETS UP TO HEIGHTS OF 450-473 km

I. I. Kas'yan *In its* Transl. from Vestn. Akad. Nauk SSSR, Ser. Biol. [Moscow], no. 2, 1963 29 Oct. 1963 p 43-59 refs (See N64-11859 03-16) OTS: $2.25

The effect of overload and weightlessness on the main physiological functions of dogs when sent aloft in ballistic rockets to an altitude of 450 to 473 km was investigated. The effect of considerable overloads on the animals, as a rule, gave rise to marked changes in respiration and blood circulation. The pulse rate and the blood pressure increased, and the respiration rate for most of the animals rose. The EKG's of the dogs showed that no pathological changes arose during the flight. However, during various periods of the flight, changes in the duration of individual intervals and in spike configuration of the EKG were noted. Under weightlessness, in most cases, a tendency towards restoration of the recorded indices of cardiovascular and respiratory activity to the original level was noted. An examination of the dogs made 4 years after the flight revealed that the flight did not cause any unfavorable aftereffects in the general condition and behavior of the dogs. R.T.K.

N64-11861 Joint Publications Research Service, Washington, D.C.

THE REMOTE EFFECT OF COSMIC FLIGHT UPON THE VESTIBULAR-TONIC AND FLEXOR REFLEX IN THE GUINEA PIG

Z. I. Apanasenko and M. A. Kuznetsova *In its* Transl. from Vestn. Akad. Nauk SSSR, Ser. Biol. [Moscow], no 2, 1963 29 Oct. 1963 p 60-69 refs (See N64-11859 03-16) OTS: $2.25

The effect of spaceflight conditions on the functional state of the vestibular tonic and flexor reflexes in guinea pigs was investigated. Following the spaceship flight, the amplitude of the bioelectrical activity of the rear-extremity muscles (as recorded on an electromyogram during rest) was found to have increased significantly. In addition, there was a decrease in the latent period of the nonconditioned vestibular flexor reflexes. No reliable changes in the tonic reflexes were noted after 2 days following the spaceflight, whereas the latent period for the flexor reflexes decreased over a longer period of time. R.T.K.

N64-11862 Joint Publications Research Service, Washington, D.C.

MORPHOLOGICAL AND HISTOCHEMICAL INVESTIGATIONS OF THE LABYRINTH OF ANIMALS IN THE CONDITIONS OF A CHANGING GRAVITATIONAL FIELD

Ya. A. Vinnikov, O. G. Gasenko, L. K. Titova, and A. A. Bronshteyn *In its* Transl. from Vestn. Akad. Nauk SSSR, Ser. Biol. [Moscow], no. 2, 1963 29 Oct. 1963 p 70-81 refs (See N64-11859 03-16) OTS: $2.25

Data were obtained through the use of morphological and histochemical methods during investigation of the utricles of animals, both under conditions of relative repose and under conditions of radial acceleration. The action of 10 g for 3 minutes, in the direction "back-chest", induced in guinea pigs the phenomenon of expulsion of RNA-containing nucleolus from the nuclei to the basal region of the utricle hair cells, in the direction of the gravitational field vector. In the utricle receptor cells, a drop in content of cytoplasmatic RNA, total protein protein thiol, and carboxylic protein groups was observed. There was, as well, a drop in the activity of the oxidative enzymes of the mitochondria and of acetylcholinesterase in the region of the synapses. At accelerations of 10 g, the acetylcholinesterase activity in the region of the utricle synapse also decreases. R.T.K.

N64-11863 Wissenschaftliche Gesellschaft für Luft- und Raumfahrt, Cologne (W. Germany)

OPERATIONS RESEARCH IN AIR- AND SPACE-TRAVEL [UNTERNEHMENS-FORSCHUNG IN DER LUFT- UND RAUMFAHRT]

[1963] 95 p refs Report on the 3d Meeting of the Advisory Comm. Ottobrunn, 5 Feb. 1963 Chiefly in GERMAN; some ENGLISH

CONTENTS:

1. GENERAL INTRODUCTION TO MONTE CARLO METHODS F. Hammelrath (DFL, Brunswick) p 5-15 refs (See N64-11864 03-20)

2. ON THE FUNDAMENTALS OF MONTE CARLO METHODS G. Itzelsberger (Bolkow-Entwicklungen) p 14-26 (See N64-11865 03-20)

3. EXAMINATION OF SHORT RANDOM NUMBER SERIES WITH SO-CALLED ZONE TESTS E. Rusch (Siemens and Halske, Munich) p 27-64 refs (See N64-11866 03-20)

4. MONTE CARLO TECHNIQUES IN THE ANALYSIS OF AN AIRCRAFT MAINTENANCE ORGANIZATION J. R. Watson (Entwicklungsring Sud, Munich) p 65-73 (See N64-11867 03-20)

N64-11869 Joint Publications Research Service, Washington, D.C.

PROBLEMS OF SYSTEM ORGANIZATION IN THEORETICAL BIOLOGY

K. M. Khaylov 11 Dec. 1963 13 p refs Transl. into ENGLISH of an article from Zh. Obshch. biol. (Moscow), no. 5, 1963 p 324-333

(JPRS-22228; OTS-63-41339) OTS: $0.50

The logical basis of the idea of systemic organization was formed as a inter-discipline "general theory of systems." The biological part of this theory has been insufficiently developed, but it does include within itself three already formulated problems (the definition of the concept "living system," the enumeration of "objects" which can be examined in a systemic aspect, and the cosubordination of living systems within organic nature), which will lead in the future to the formation of a theory of systemic organization of living nature. The concept of systemic organization enters into theoretical biology as the evolutionary-phyletic concept. It is assumed that a single synthetic picture of life should capture both its aspects, evolutionary and organizational. The new structure of "synthetic" thought in biology, introducing the concept of the organizational discussion of the organic world, signifies rejection of a view of living nature as a monolith consisting of organisms having a single environment, one or two "leading" factors, and one decisive unity (with conditions of life). At the same time, a return to the evolutionary theory is made by a renovated and differentiated concept of the basic material factors of evolution. I.v.L.

N64-11871 Joint Publications Research Service, Washington, D.C.

NEW APPARATUS FOR PHYSIOTHERAPY

K. D. Gruzdev et al 13 Dec. 1963 13 p Transl. into ENGLISH of 2 articles from Vopr. Kurortol., Fizioterapii i Lecheb. Fiz. Kul't. (Moscow), v. 28, no. 5, Sep.-Oct. 1963 398-402 and 465-466

(JPRS-22280; OTS-64-21016) OTS: $0.50

CONTENTS:

1. PHYSIOLOGICALLY OPTIMAL FORMS OF ELECTRICAL STIMULATION AND PROSPECTS OF THERAPEUTIC UTILIZATION OF THEM IN CONNECTION WITH THE DEVELOPMENT OF RADIO ELECTRONICS K. D. Gruzdev p 1-6

2. APPARATUS FOR ULTRASONIC THERAPY V. G. Yasnogorskiy p 7-10

N64-11872 Joint Publications Research Service, Washington, D.C.

MAN AND TECHNOLOGY (OUTLINES IN ENGINEERING PSYCHOLOGY)

Boris Fedorovich Lomov 16 Dec. 1963 311 p refs Transl. into ENGLISH of the book "Chelovek i tekhnika (Ocherki inzhenernoy psikhologii)" Leningrad, Leningrad Order of

Lenin State U., 1963 p 1-265
(JPRS-22300; OTS-64-21030) OTS: $5.00

A general review of engineering psychology problems is presented. First, the general characteristics of man as a link in control systems, including the speed, precision, and reliability of human activity, is discussed. Four aspects of the reception and processing of information by man are considered: (1) the relationship of the physical properties of signals to the characteristics of sensitivity of the human sensory apparatus; (2) the selection of the physical form of signals addressed to man; (3) the characteristics of the volume of information which man may receive, store, and process; and (4) the psychic processes through which information is received. The practical problem of the design of indicators is considered, and the problem of motor (reflex) components of control activity is related to the design of control components. M.P.G.

N64-11874 Joint Publications Research Service, Washington, D.C.
EXPERIMENTAL TOXICOLOGY OF ORGANIC PHOSPHORUS INSECTICIDES
L. I. Medvyed, ed. 24 Dec. 1963 62 p Transl. into ENGLISH of Chapt. 5 from the book "Gigeniya i toksikologiya novykh pestitsidov i klinika otravleniy" Moscow, 1962 p 188-256
(JPRS-22450; OTS-64-21118) OTS: $1.50

The following articles are presented dealing with experimental toxicology of organic phosphorus insecticides: (1) Some Approaches to the Search for Selective Organic Phosphorus Insecticides of Low Toxicity for Man; (2) Relationship Between the Distribution of Organic Phosphorus Compounds in the Organism and Their Chemical Structure; (3) Anticholinesterase Activity of the Oxidation Products of Dethiophosphoric Acid Esters; (4) Some Methods of Studying Skin Penetrability of Organic Phosphorus Insecticides; (5) Comparative Toxicity of Phosphamide and Several Compounds with Related Chemical Structure; (6) The Toxicology of Mercaptophos; (7) Certain Data on the Toxology of "Dithiophos" and "Pyrophos"; and (8) Changes in Certain Blood Indices in the Conditioned-Reflex Activity of Animals Under "Methylmercaptophos". P.V.E.

N64-11882 Royal Air Force, Farnborough (Gt. Brit.) Inst. of Aviation Medicine
AERO-MEDICAL ASPECTS
W. K. Stewart *In* Advisory Group for Aeron. Res. and Develop. Proc. of the 12th AGARD Gen. Assembly Sep. 1962 p 93-109 refs (See N64-11877 03-01)

The accomplishments of the AGARD Aerospace Medicine Panel (and of its predecessor, the Aviation Medicine Panel) are reviewed in the context of topics discussed at symposia and meetings held during the past ten years and of the publications sponsored by the Panel. The research reported includes: methods and criteria for the psychological and medical selection of flying personnel; cockpit design and anthropometry; prevention of pilot error and pilot injuries; and vision in empty space and at low altitudes. Planned studies reflect the increased emphasis on space environmental factors; these will include cardiovascular assessment of pressure suits, gas mixtures in relation to cabin pressures, and biotelemetry-device development. Human problems associated with VTOL, low-level strike and reconnaissance, and supersonic transport aircraft operations will be investigated, and clinical, specialty, accident survey, and pathological studies will continue. M.P.G.

N64-11917 Joint Publications Research Service, Washington, D.C.
DEVELOPMENTS IN POPULAR CYBERNETICS
A. Khidekali 18 Dec. 1963 17 p Transl. into ENGLISH of an article from Nauka i Zhyttya (Kiev), no. 9, 1963 p 36-38
(JPRS-22345; OTS-64-21055) OTS: $0.50

Two articles are presented on the development and uses of cybernetics in the Ukraine. The first article deals with the importance of automation in industry, and the second describes a cybernetic instrument used for navigation of a ship by remote control. R.T.K.

N64-11918 Joint Publications Research Service, Washington, D.C.
CYBERNETICS IN MEDICINE AND PHYSIOLOGY
V. V. Parin and R. M. Bayevskiy 19 Dec. 1963 17 p refs Transl. into ENGLISH of the book "Kibernetika v meditsine i fiziologii" Moscow, State Publ. House of Med. Lit. 1963 p 1-119
(JPRS-22377; OTS-64-21071) OTS: $2.50

The following appear to be the main tasks of cybernetics in medicine and physiology: (1) the study of the brain and nervous system activities; (2) the investigation of automatic control systems in living beings; (3) the study of the interaction of cybernetic systems; (4) the study of problems relating to the use of mathematical methods to describe biological processes and analyze medical information; (5) the creation of new devices to collect and automatically process medical information (indicators of dangerous conditions, analyzers of biocurrents, single-channel recording systems, etc.); (6) the development of automatic diagnostic systems; (7) the development of biological control and stimulation systems for medical control and therapy; (8) the development of automatic recognition systems; (9) the development of models for research and teaching purposes; (10) the development of special instruments and devices to permit the use of existing electronic digital computers, analog computers, and memory devices for medical purposes; and (11) the provision of medical statistics, planning programs, and centralized administration for public health services. I.v.L.

N64-11946 Israel Program for Scientific Translations Ltd., Jerusalem
WORKS OF THE INSTITUTE OF HIGHER NERVOUS ACTIVITY. PHYSIOLOGICAL SERIES, VOLUME 6: EXPERIMENTAL STUDIES OF HIGHER NERVOUS ACTIVITY
V. S. Rustinov (Acad. Sci. USSR) ed. 1963 320 p refs Transl. of a book "Trudy instituta vysshei nervnoi deyatel'nosti seriya fiziologicheskaya" Moscow, Izdatel'stvo Akad. Nauk SSSR, 1961 (Publ. for HEW and NSF)
(IPST Cat. no. 985; OTS-63-11167) OTS: $3.25

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2. EFFECT OF PHYSICAL INTENSITY AND SIGNAL MEANING OF A CONDITIONED VISUAL STIMULUS ON MEASUREMENTS OF MOTOR RESPONSES IN MAN I. A. Shevelev p 9-19 refs

3. PHYSIOLOGICAL CHARACTERIZATION OF CONDITIONED REACTIONS ELABORATED WITH VERBAL REINFORCEMENT N. Yu. Alekseenko p 20-24 refs

4. INTERACTION OF SIMULTANEOUS CONDITIONED REACTIONS ELABORATED WITH DIFFERENT REINFORCEMENTS IN HEALTHY PERSONS AND IN SCHIZOPHRENIC PATIENTS M. M. Trunova p 25-32 refs

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11. DISTINCTIVE FUNCTIONAL TRAITS OF SO-CALLED VOLUNTARY MOVEMENTS OF DOGS E. I. Popova p 88-95 refs

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13. CHANGES IN THE MOTOR AND SECRETORY COMPONENTS OF A CONDITIONED ALIMENTARY MOTOR REFLEX DURING DIFFERENTIATION AND EXTINCTION O. N. Vasil'eva p 105-114 refs

14. SOME CORTICAL INTERACTION MECHANISMS OF DIFFERENT TYPES OF CONDITIONED REFLEXES IN DOGS U. G. Gasanov p 115-121 refs

15. INTERACTION OF CONDITIONED ALIMENTARY AND DEFENSE REFLEXES. REPORT 3 L. A. Preobrazhenskaya p 122-128

16. INTERACTION OF TWO EXCITATION CENTERS T. N. Ryantseva p 129-140 refs

17. INTERACTION OF EXTINCTION AND DIFFERENTIATION INHIBITION AT SUDDEN INTENSITY CHANGES OF THE INHIBITORY STIMULUS R. A. Cherkashina p 141-149 refs

18. A CONTRIBUTION TO THE PROBLEM OF THE INTERACTION OF EXCITATION AND INHIBITION. REPORT 2 I. M. Volkova p 150-161 refs

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27. LOCAL BIOELECTRIC PHENOMENA IN THE CEREBRAL CORTEX DURING CONDITIONED REFLEX ACTIVITY G. I. Shul'gina p 230-249 refs

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31. EFFECT OF MERATRAN ON HIGHER NERVOUS ACTIVITY IN DOGS. REPORT I A. Ya. Mekhedova p 278-285 refs

32. EFFECT OF VARIOUS PHENAMINE DOSES ON HIGHER NERVOUS ACTIVITY IN ANIMALS, AND DETERMINATION OF OPTIMAL DOSES IN VARIOUS TYPES OF NERVOUS SYSTEMS A. M. Nuzhina p 286-293

33. EFFECT OF OPTIMAL DOSES OF PHENAMINE ON EXTINCTION INHIBITION A. M. Nuzhina p 294-299 refs

34. SOME INDIVIDUAL TRAITS OF LOCAL UNCONDITIONED DEFENSE REFLEX ACTION IN WHITE RATS L. V. Komarov p 300-306 refs

35. CONDITIONED REFLEX ACTIVITY OF WISTAR-STRAIN RATS V. E. Miklashevskii p 307-314 refs

N64-11949 Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.

NYSTAGMUS RESPONSES OF THE CAT TO ROTATION AND TO DIRECTIONALLY EQUIVALENT AND NON-EQUIVALENT STIMULI AFTER UNILATERAL CALORIC HABITUATION

William E. Collins Aug. 1963 13 p refs
(CARI-63-14)

Six cats were exposed to mild angular accelerations before and after an intervening series of 15 caloric irrigations. All trails were in total darkness. Slow-phase displacement of the eyes, beat-frequency, and duration of nystagmus were scored. All 3 measures reflected a decline in both the primary and the secondary caloric measures. Responses to rotation following the caloric habituation showed almost no change, i.e., there was no apparent stimulus generalization. Differences in: (1) the patterns of nervous excitation elicited by unilateral and bilateral stimulation; and (2) intensity, were hypothesized as possible causes for the failure to obtain transfer. Additional unilateral caloric trials confirmed reports that the reduction of nystagmus is specific to the direction elicited during habituation trials. Author

N64-11959 Joint Publications Research Service, Washington, D.C.

BLOOD SUBSTITUTES AND TRANSFUSION

V. A. Ivanov et al 20 Dec. 1963 7 p Transl. into ENGLISH of a portion of a book "Khirurgiya", Moscow 1963 p 131-134
(JPRS-22401; OTS-64-21088) OTS: $0.50

The topics discussed are: (1) blood preparations—plasma, serum, erythrocyte mass, leukocyte mass, and thrombocyte mass; (2) blood substitutes—salt solutions, and solutions with human blood constituents; (3) donors, and the obtaining and preserving of blood. R.T.K.

N64-11987 California U., Berkeley Lawrence Radiation Lab.

SULFATE REDUCTION BY BACTERIA

Mark Leban and Charles R. Wilke 28 Aug. 1963 93 p refs
(Contract W-7405-eng-48)
(UCRL-10966) OTS: $2.00

Desulfovibrio aestaurii, a species of sulfate-reducing bacteria, was isolated from a mud sample obtained from a saltern. Isolation was complicated by an unknown straight rod bacteria, but was eventually achieved through the dilution method and through the "diffusion method." The isolated bacteria were grown in batch experiments to measure bacterial counts and sulfide concentrations. From the experimental data, the sulfate reduction rates in complex and simple lactate media were calculated. Correlations were set up expressing reduction rate in terms of growth rate and bacterial density. Reduction rates in a continuous cultivator were estimated. With another set of experiments, the effects of initial sulfate content on the sulfate reduction rate, and on percent conversion were studied. Also investigated was the effect of sodium chloride concentration on the reduction rate. Author

N64-11995 Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.

HUMAN SURVIVABILITY OF EXTREME IMPACTS IN FREE-FALL

Richard G. Snyder Aug. 1963 31 p refs
(CARI-63-15)

Fall distances ranged up to 275ft, and calculated velocities up to 116fps (79 mph). Physical and biological data are presented on both sexes with an age range of 1 1/2 to 91 years, and with impacts occurring in all body axis orientations. A detailed analysis of factors found to affect survivability in free-fall impacts is made. These cases, out of some 12,000 free-falls collected in the past two years, demonstrate that humans have survived impact forces considerably greater than those previously believed tolerable. Author

N64-12001 Maryland U., College Park

THE CAPACITY FOR ORGANIC SYNTHESIS IN CELLS OF SUCCESSIVE DEVELOPMENTAL STAGES

Constantine Sorokin Repr. from Arch. Mikrobiol. (Berlin), v. 46, 1963 p 29-43 refs
(NASA Grant NsG-70-60)

Synthesis of organic matter was studied on synchronized suspensions of the green high-temperature alga, *Chlorella* 7-11-05, in regard to the composition of the suspending fluid, and the developmental status of cells. Rates of synthetic activity were determined as changes in optical density of algal populations. The validity of this technique was substantiated by special parallel measurements of changes in optical density, dry weight, and chlorophyll content of algal suspensions. It was found that cells of earlier developmental stages generally possess a higher capacity for organic synthesis than cells approaching the end of the life cycle. Vacillation of metabolic activity throughout the life cycle and in the course of measurements during one experiment was discussed, and a higher reliability of the time-course curves as compared with a set of data obtained for short-time intervals was ascertained. The regular sequence of changes in synthetic activity in the course of cell development was ascribed to the regularity of changes in the rates of the anabolic and catabolic moieties of the metabolic turnover. Author

N64-12009 Joint Publications Research Service, Washington, D.C.

EXPERIMENT IN THE PSYCHOLOGICAL CHARACTERISTICS OF TEMPERAMENT

N. S. Leytes 20 Dec. 1963 59 p refs Transl. into ENGLISH of a chapter of a book "Tipologicheskiye Osobennosti Vysshey Nervnoy Deyatel'nosti Cheloveka", Moscow, 1956 p 267-303
(JPRS-22405; OTS-64-21091) OTS: $1.50

An experiment into the characterization of the vital manifestations of nervous-activity types (temperament), on the basis of long-term personal observations of high-school students is described. This paper is divided into three divisions. The first two divisions present detailed psychological descriptions of three school graduates; the third division contains an analysis of the material presented. The object of the paper is to shed light on the problem of the vital manifestations of the basic properties of higher nervous activity, and to attempt to detect the vital indices by which it is possible to judge temperament and its individual features. P.V.E.

N64-12067 Joint Publications Research Service, Washington, D.C.

DETERMINATION OF THE DEGREE OF SPIRALIZATION OF TRANSPORT RNA BY THE FLUORESCENT PROPERTIES OF THEIR COMPLEXES WITH ACRIDINE DYES

O. F. Borisova et al 31 Dec. 1963 9 p refs Transl. into ENGLISH of an article from Dokl. Akad. Nauk SSSR (Moscow), v. 152, no. 4, 1963 p1001-1004
(JPRS-22521; OTS-64-21166) OTS: $0.50

The degree of spiralization of transport ribonucleic acid (T-RNA) was investigated by a new method based on the differences in the duration of fluorescence of the dye, acridine orange, bound to spiral and despiralized sections of nucleic acids. T-RNA from yeast was isolated, and an aqueous solution of acridine orange was added to solutions of T-RNA of different concentrations (in a citrate buffer of 0.005 M + 0.05 mole of sodium chloride solution), in a quantity such that the final concentration of acridine orange in all cases was equal to 0.5×10^{-5} M. For these solutions, the absorption and fluorescence spectra were recorded, and the values of τ_z^T, where τ is the duration of fluorescence, (through a SZS-9+ZhS-18 filter) and τ_k^T (through a KS-10 filter) were measured. Results indicate that: (1) The degree of spiralization was 77.5%. However, the possibility is not ruled out that a future value for this degree may be changed somewhat in one direction or another. (2) The fluorescent characteristics of the acridine orange-T-RNA complex were practically identical to those which have been observed in the acridine orange-deoxyribonucleic acid complex. I.v.L.

N64-12068 Joint Publications Research Service, Washington, D.C.

THE EFFECT OF SUPRARENAL HORMONES ON THE RADIATION SENSITIVITY OF THE CHROMOSOMAL APPARATUS OF EPITHELIAL CELLS OF THE MOUSE CORNEA

Yu. Ya. Kerkis and V. V. Logvinova 31 Dec. 1963 7 p refs Transl. into ENGLISH of an article from Dokl. Akad. Nauk SSR, (Moscow), v. 152 no. 4, 1963 p 992-994
(JPRS-22522; OTS-64-21167) OTS: $0.50

The effect of adrenalectomy before and after irradiation on the radiosensitivity of the chromosomes in the epithelial cells of the mouse cornea was investigated. Results include the following: (1) The frequency of chromosome-rearrangement was practically the same for intact mice and for mice adrenalectomized after irradiation; therefore, adrenalectomy in itself did not increase the frequency of chromosome-rearrangement. (2) A dose of 25 r in animals adrenalectomized 3 hours before irradiation, as well as 24 hours before irradiation, caused more than a twofold increase in the percentage of rearrangements over those in intact mice irradiated with the same dose. From these results it can be concluded that: (1) the mechanism of protection does not amount to a prevention of the primary radiation injury but to the creation of more favorable conditions for recovery from the injuries which occurred initially under the beam; (2) the absence of any metabolites of suprarenal cortical metabolism in the body increased the injurious effect of irradiation on the chromosome-structure by approximately two times. I.v. L.

N64-12111 California U., Davis School of Veterinary Medicine

THE EFFECTS OF X-RADIATION ON WORK CAPACITY AND LONGEVITY OF THE DOG: LONG TERM EFFECTS OF X-RADIATION ON THE BEAGLE 12th Annual Progress Report

A. C. Anderson Jun. 1963 290 p refs
(Contract AT(04-3)-472)
(UCD-107) OTS: $3.50

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8. PSYCHOLOGICAL STUDIES: DYADIC DOMINANCE-SUBMISSION PATTERNS IN FEMALE BEAGLE

DOGS S. K. Solarz p 86-97 refs

9. THE EFFECT OF TOTAL BODY IRRADIATION ON REPRODUCTION A. C. Andersen p 98-128 refs

10. PATHOLOGY REPORT ON EXPERIMENTAL BEAGLES A. C. Andersen p 128-274 refs

11. EXPERIMENTAL DOG SURVIVAL A. C. Andersen p 275-280 ref

N64-12113 Los Alamos Scientific Lab., N. Mex.

HEALTH PHYSICS PLANNING FOR A HIGH-PRESSURE TRITIUM GAS EXPERIMENT AT A UNIVERSITY

Morris J. Engelke 15 Nov. 1963 34 p ref

(Contract W-7405-eng-36)

(LAMS-2959) OTS: $0.75

This paper is concerned with the problems encountered in the use of a multicurie high-pressure tritium gas target at a large university. The necessary administrative arrangements, state licensing, transportation, and health physics problems are discussed. Author

N64-12123 Columbia U., New York, N.Y. Radiological Research Lab.

Annual Report of Research Project [RADIOLOGICAL PHYSICS, BIOPHYSICS, AND RADIOLOGY]

H. H. Rossi Oak Ridge, Tenn., AEC, Div. of Tech. Inform., 1 Jan. 1963 200 p refs

(Contract AT(30-1)-2740)

(NYO-10451) OTS: $3.00

Research activities in radiological physics include: (1) dosimetry—dosimetry of monoenergetic neutrons, gas multiplication chamber for radiation measurement, dosimetry for irradiation of tissue culture cells, and dosimetry of 3 Mev; (2) measurements of microscopic distribution of radiation energy—local energy density, computer applications, and tissue equivalent proportional counter and gas-flow system; and (3) radiation protection—measurement of dose equivalent (RBE dose) in mixed radiation fields and ancillary problems. Activities in biophysics included: (1) RBE studies with monoenergetic neutrons; (2) radiation effects on cells in tissue culture; (3) UV-induced mutations in bacteria, radiation-sensitive and radiation-resistant bacterial mutants; and (4) spontaneous mutation rate and aging in *Drosophila melanogaster*. Research activities in radiobiology are also discussed. P.V.E.

N64-12132 Argonne National Lab., Ill.

A REVIEW OF THE ARGONNE NATIONAL LABORATORY RADIATION EXPOSURE EXPERIENCE FOR THE YEARS 1959-1961

Pete Tedeschi Feb. 1963 41 p refs

(Contract W-31-109-eng-38)

(ANL-6688) OTS: $1.00

A general analysis of experience with radiation exposure of employees was made by means of machine-processed records. Distribution of employee exposures according to age, years of employment, laboratory division, job group, and sex were determined for a 3-year period. A 23.6% increase in the number of employees monitored occurred from 1959 to 1961. The number of measurable exposures increased 107%. The greatest influence on the increase in measurable exposure was probably due to a change to a more sensitive film and from a 1-week to a 2-week film-wearing period. Evaluation of performance using the factors frequency rate, exposure rate, and average exposure reveals that the Radiation Safety Program is improving in effectiveness. The exposure rate has been reduced by as much as 71.1%, and the average exposure was reduced 42.4%. Author

N64-12139 Joint Publications Research Service, Washington, D.C.

EXCERPTS FROM VOL. 28 OF THE BOL'SHAYA MEDITSINSKAYA ENTSIKLOPEDIYA (GREAT MEDICAL ENCYCLOPEDIA) [MOSCOW 1962]

V. Spasskiy et al 10 Dec. 1963 29 p refs Transl. into ENGLISH p 158-160, 256-266, and 452-456

(JPRS-22213; OTS-63-41330) OTS: $0.75

Descriptions, as they appear in the *Great Medical Encyclopedia*, of air regeneration, roentgen, roentgen machines, and respirators are presented. P.V.E.

N64-12142 Joint Publications Research Service, Washington, D.C.

ELECTROCARDIOGRAPHY IN SPORTS MEDICINE

Lev Alekseyevich Butenko 31 Dec. 1963 24 p Transl. into ENGLISH of portions of a book "Elektrokardiografiya v sportivnoy meditsine", Leningrad, Medgiz, 4 Mar. 1963 p 3-19, 124-126, and 208

(JPRS-22508; OTS-64-21154) OTS: $0.75

Electrocardiographic examination is an aid in determining the state of the general and specific training of the organism and in evaluating physical training methods. The capabilities of electrocardiography are realized in the overall complex of medical examinations more fully when, apart from standard leads, unipolar chest leads, augmented unipolar limb leads, and Nebo leads are recorded after and during the performance of exercise. In addition, a determination of the "electrical position" of the heart and an axonometric analysis of the electrocardiogram should be made. Pronounced shifts (variants) occur in the functional and morphological condition of the heart in the process of athletic training. These variants are not noted in the hearts of athletes. Covered under these peculiarities of the electrocardiogram may be not only variants of the normal and functional heart condition but also prepathological and pathological changes. In view of this, in each concrete case before calling a particular characteristic of an athlete's electrocardiogram a variant of the norm, it must be proved that this characteristic is not pathological. I.v.L.

N64-12144 Joint Publications Research Service, Washington, D.C.

THE GNOSIOLOGICAL NATURE OF INFORMATION MODELLING

V. M. Glushkov 31 Dec. 1963 11 p Transl. into ENGLISH of an article from Voprosy Filosofii (Moscow), no. 10, Oct. 1963 p 13-18

(JPRS-22518; OTS-64-21163) OTS: $0.50

Information modeling is based on the fixation of a certain level of cognition of an object, making it possible not only to describe its structure but also to predict (with varying degrees of accuracy) its behavior. Electronic computers, like the brain, are universal instruments for information modeling. Any dynamic information model can be realized with them provided the memory component is sufficiently large. The demonstration of the property of universality possessed by electronic computers is based on two fundamental ideas. The first idea is that of coding the alphabets of any language in the alphabet of one particular language. The second idea is the breaking down of the arbitrary rules for the transformation of information into elementary rules. The problem of an information model of the brain is very important in terms of the epistemological theory. The theoretical possibility of building such models of the brain, with any degree of accuracy desired, must be acknowledged. I.v.L.

N64-12145 Joint Publications Research Service, Washington, D.C.

LEUKOSIS AND RADIATION

Ye. D. Gol'dberg 31 Dec. 1963 7 p Transl. into ENGLISH of the conclusion and table of contents of a book "Leykozy i Radiatsiya", 1963 p 61-65

(JPRS-22520; OTS-64-21165) OTS: $0.50

The development of leukoses can be put into a pathogenetic relationship with the occurrence of the mutational process in hemopoietic organs and cells of the reticuloendothelial system which creates a systemic hyperplasia of the neoplastic type. There is no doubt that ionizing radiation plays the role of a powerful mutagenic agent, the effect of which is proportional to the dose received. Apparently, whole-body irradiation, single and fractionated, and local segmental irradiation are equally dangerous. A formula is presented for calculating the total number of possible cases of leukosis. According to this formula, it is indicated that if nuclear weapons testing is continued, there will be more than 200,000 cases of leukemia per year. I.v.L.

N64-12146 Joint Publications Research Service, Washington, D.C.

THE MAIN TRENDS IN THE SYNTHESIS OF ANTIHYPERTENSIVE DRUGS

M. V. Rubtsov 31 Dec. 1963 14 p refs Transl. into ENGLISH of an article from Med. Prom. SSSR (Moscow), v. 17, no. 10, Oct. 1963 p 6-14

(JPRS-22524; OTS-64-21169) OTS: $0.50

A review of the main trends in the synthesis of antihypertensive agents is presented. A characterization is given of the most important preparations belonging to the following groups: (1) preparations with a central effect; (2) ganglion blocking preparations; (3) adrenolytics; (4) sympathicolytics; and (5) antispasmodics. R.T.K.

N64-12149 Joint Publications Research Service, Washington, D.C.

THE HUMORAL COMPONENT IN THE EFFECT OF BONE MARROW TRANSPLANTATION ON DOGS WITH ACUTE RADIATION SICKNESS

Chang Ts'ung-hsien 3 Jan. 1964 10 p refs Transl. into ENGLISH of an article from Med. Radiol. (Moscow), v. 8, no. 8, Aug. 1963 p 48-53

(JPRS-22591; OTS-64-21200) OTS: $0.50

Experiments were performed on nine dogs irradiated with a dose of 600 r ($LD_{95/45}$). The dose rate was 18 to 22 r/min. Three dogs served as the control group. Six dogs were injected intravenously, 2 days after irradiation, with the bone marrow from donor dogs. Results indicate: (1) The functional activity of bone marrow was clearly lower in the experimental dogs than in the control and was largely restored within 20 to 30 days. (2) The Moeschlin test (an intravenous pyrogen injection) on the two control dogs tested was characteristically negative on the fifth day after irradiation. This test on two of the three experimental dogs tested showed a definite leukocytosis (39% and 59% increase in the leucocyte count). (3) A suspension of destroyed bone marrow cells contains some humoral factor that stimulates the restoration of hematopoiesis in irradiated dogs and mitigates the course of acute radiation sickness. (4) The humoral factor has a more pronounced effect on leukopoiesis and thrombopoiesis than on erythrocytopoiesis. From these results it can be concluded that bone marrow transplantation definitely stimulates blood formation in the recipient. I.v.L.

N64-12176 School of Aerospace Medicine, Brooks AFB, Tex.

CONTINUOUS FUNCTIONAL TESTING OF OXYGEN BREATHING EQUIPMENT

J. Ryan Neville Aug. 1963 13 p refs

(SAM-TDR-63-56; AD-422773)

A method is described for the continuous functional testing of aviator's oxygen breathing equipment. By use of an oxygen detector that fits in the mask, recordings were made of changes in oxygen partial pressure in going from automix to 100% oxygen. The results obtained were compared with the expected change, and conclusions were drawn concerning the fit and functioning of the oxygen mask. The detector was also used to monitor the oxygen concentration delivered by the regulator, and comparisons were made of several different types of oxygen regulators. Author

N64-12213 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio

PSYCHOLOGICAL ASPECTS OF EXTENDED MANNED SPACE FLIGHT Final Report

Julien M. Christensen Sep. 1963 35 p refs Presented at the Am. Astron. Soc. Symp. on the Exploration of Mars, Denver, 6-7 Jun. 1963

(AMRL-TDR-63-81; AD-423442)

A sampling of some of the relevant information available in psychology is offered, and areas that will require further attention before predictions in the behavioral area for the Mars trip can be made with confidence are identified. A twofold thesis is developed. First, psychology has legitimate and important contributions to make to the Mars trip. Second, the advantages, however, are mutual, i.e., it is confidently predicted that participation in this venture will force psychologists to reexamine their traditional principles and theoretical positions and will stimulate an attack on the basic issues of human behavior with refreshing insights gained from new points of vantage. Author

N64-12214 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio

EMERGENCY LIFE SUSTAINING SYSTEM FOR SPACECRAFT Final Report

Henry W. Seeler Sep. 1963 14 p refs

(AMRL-TDR-63-82; AD-423799)

A concept for a complete emergency life sustaining system for use during failure of the normal pressurization system in a spacecraft is advanced. The system includes four components: (1) an astronaut's uniform with a built-in mechanical pressurization system; (2) a pressure-breathing demand-regulator; (3) an automatically actuated system of solid chemical oxygen candles; and (4) a one-man compression tube. This system has been partially fabricated and appears worthy of further development. Author

N64-12215 Institute of Occupational Health, Helsinki (Finland)

EFFECTS OF EXPOSURES TO EXTREMELY HOT ENVIRONMENTS ON TEMPERATURES OF THE TYMPANIC MEMBRANE, THE OESOPHAGUS, AND THE RECTUM OF MEN

Pekka Piironen Wright-Patterson AFB, Ohio, Biomed. Lab., Oct. 1963 52 p refs

(AF EOAR GRANT 62-31)

(AMRL-TDR-63-85; AD-424409) OTS: $1.50

The esophageal, tympanic, and rectal temperatures of resting nude human subjects were investigated in extremely hot thermal environments ranging from 50° to 130° C (120° to 265° F). Changes in temperatures in the esophagus and at the tympanic membrane appeared rapidly, were linear, and were of equal magnitude. They were considered to follow closely the blood temperature in the central circulation. The simultaneous changes in the rectal temperature were slow and irregular. Author

N64-12216 Inst. of Occupational Health, Helsinki (Finland)

THERMAL EXCHANGES OF THE HUMAN BODY IN EXTREME HEAT Technical Documentary Report [Nov. 1961-Dec. 1962]

Erkki Aikas and Pekka Piironen Wright-Patterson AFB, Ohio, Biomed. Lab., Oct. 1963 50 p refs

(Grant AF-EOAR-62-31)

(AMRL-TDR-63-86; AD-424396)

Seven nude men were exposed supine to various environmental temperatures ranging from 50° to 130° C (120° to 265° F). The respiratory heat exchange, the metabolic heat production, the change in the body heat content, and the coefficient for evaporative heat transfer were determined. The radiating surface area and coefficient for convective heat transfer were calculated by using the method of partitional calorimetry. The mean values obtained for the coefficients of evaporation and convection were 11.3 $\sqrt{v}$ kcal/m^2 h mm Hg and 6.8 $\sqrt{v}$ kcal/m^2 h° C (v in m/s), respectively. The radiation area factor determined was 0.49.
Author

N64-12219 John B. Pierce Foundation of Connecticut, New Haven
REDUCED SET POINT TEMPERATURE IN EXERCISING DOG
Donald C. Jackson and Harold T. Hammel Wright-Patterson AFB, Ohio, 6570th Aerospace Medical Research Labs., Oct. 1963 20 p refs
(Contract AF 33(657)-7603)
(AMRL-TDR-63-93; AD-424541) OTS: $0.50

Experiments were performed on dogs to test the hypothesis of an elevated set point temperature in exercise. Measurements of rectal, hypothalamic, and skin temperatures and respiratory evaporative heat loss were made on dogs at rest and during exercise on a level treadmill at 4 mph. Local hypothalamic heating and cooling during exercise, using surgically implanted thermodes, were performed on two dogs to confirm the temperature sensitivity of the hypothalamus of the exercising dog. Comparisons of evaporative heat loss during rest and exercise revealed much greater loss during exercise than at rest at the same hypothalamic temperatures. In experiments at low ambient temperatures, between 10° and 17° C, internal body temperatures were often the same or lower during exercise than during the preceding rest period, although panting and vasodilatation were observed during exercise in contrast to shivering and vasoconstriction during the rest period. These observations lead to the conclusion that the set point temperature in trained, exercising dogs is lowered from the resting level. Author

N64-12226 General Electric Co., Valley Forge, Pa. Missile and Space Div.
RESEARCH STUDY OF THE BIOMEDICAL ASPECTS OF THE PROPOSED AEROSPACE ENVIRONMENTAL CHAMBER
W. Olewinski, T. Marton, L. Wilder, R. Knipe and N. Belasco et al Arnold Eng. Dev. Center, Dec. 1963 235 p refs
(Contract AF 40(600)-1012)
(AEDC-TDR-63-256; AD-424461)

The major portion of the study considers the chamber where man will be introduced as a member of the crew of a test vehicle or, if necessary, to rescue personnel inside the chamber in case of emergency. Emergency chamber repressurization was not considered acceptable for rescue purposes. This portion of the study describes the emergencies and rescue procedures to be used in the chamber. Equipment including manipulators, pressure suits, pressurized capsules and associated life support equipment, transport equipment, personnel locks, and biomedical equipment were studied for use in the chamber. Recommended system concepts, operational procedures, and manpower requirements are outlined. During the last portion of the study different ground rules were considered (i.e., repressurization was considered for rescue). The study describes possible vehicle malfunctions which might lead to emergencies, physiological emergencies, and resulting rescue requirements. Simplified equipment concepts to provide for rescue of the test vehicle crew are also described. Author

N64-12238 Army Missile Command, Huntsville, Ala.
PILOTING ERRORS AND AIRCRAFT INSTRUMENTS
Jean Israel 25 Oct. 1963 14 p Transl. into ENGLISH by Joint Publ. Res. of an article from Tech. Sci. Aeronaut. Spatiales (Paris), May–Jun. 1962 p 203–208
(RSIC-89; AD-424784)

This report shows how accurate information, received from instruments, can be misused so as to cause pilot reading errors and, hence, accidents. The instrumentation discussed deals with any object in the cockpit that gives the pilot a useful visual signal; the instruments are grouped into three categories: (1) two-position instruments—luminous or magnetic indicators, stop-start buttons, left-right switches, etc.; (2) instruments indicating stable values, i.e., values that vary slowly with time, except in emergencies, and are of two kinds—adjustable values that can be regulated with the aid of knobs, and nonadjustable values indicating unalterable facts; and (3) instruments indicating unstable values, i.e., values that can be maintained by continuous action on the part of the pilot. It is assumed, in this discussion, that although the instruments function perfectly, the information received by the pilot may be "zero," "erroneous," or "imprecise." I.v.L.

N64-12246 USAF School of Aerospace Medicine, Brooks AFB, Tex.
A WATER RECYCLING SYSTEM FOR USE IN SEALED ENVIRONMENTS
John Hargreaves, Thomas E. Morgan, Jr., and B. E. Welch Oct. 1963 8 p refs
(SAM-TDR-63-60; AD-424120)

Production of potable water by a vacuum distillation process that was used during several experiments in a two-man space cabin simulator is discussed. Wash water, condensate collected from the relative humidity control coils, and urine were collected by simulator crew occupants and processed through a vacuum distillation apparatus on board the simulator, to supply drinking water for crew members during experiments lasting 17 days and 30 days. Author

N64-12254 Naval Radiological Defense Lab., San Francisco, Calif.
ENVIRONMENTAL STUDIES OF A 100-MAN UNDERGROUND SHELTER
R. H. Heiskell 1 Aug. 1963 75 p refs
(Contract CDM-SR-59-54)
(USNRDL-TR-618; AD-422534)

Temperature studies were conducted during both simulated and human occupancy tests on the 100-man shelter. The temperature of the shelter remained comfortable during 14 days of human occupancy. The ventilating air movement through the shelter designed for 16 cfm per occupant was adequate to reduce the carbon monoxide concentration from heavy smoking to below safe tolerance limits and it removed 69% of the heat generated by the occupants with only 31% of the heat being dissipated through the walls. The shelter temperature varied between 74° and 90° F with an outside air temperature of 50° to 94° F during the simulated occupancy test and between 70° and 82° F during the human occupancy tests with an outside air temperature of 36° to 67° F. Poor distribution of the inlet air resulted in uncomfortably cool areas in the front of the shelter during the human occupancy test. Author

N64-12255 Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.
THE COMPOSITION OF MITOCHROME AND CYTOCHROME OXIDASE FROM RAT LIVER MITOCHONDRIA
Herman W. Schmuckler 21 Oct. 1963 222 p refs
(NADC-MA-6319; AD-424100; Bu. Med. and Surgery Rept. 22)

Purified preparations of mitochrome and cytochrome oxidase from rat liver mitochondria were subjected to chemical analysis to determine whether these two proteins are similar. The large differences in their amino-acid composition as well as the absence of copper in mitochrome and its presence in cytochrome oxidase and the presence of ethanolamine in mitochrome and its absence in cytochrome oxidase allow only one conclusion: mitochrome and cytochrome oxidase are different proteins and it is highly unlikely that mitochrome is derived from aged preparations of cytochrome oxidase. Author

N64-12256 Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.
PILOT BIOMEDICAL AND PSYCHOLOGICAL INSTRUMENTATION FOR MONITORING PERFORMANCE DURING CENTRIFUGE SIMULATIONS OF SPACE FLIGHT
Randall M. Chambers 18 Oct. 1963 34 p refs
(NADC-MA-6308; AD-424301; BuMed. and Surgery Rept. 3)

This report presents some of the results of recent centrifuge acceleration research and training projects in which the biomedical, psychophysiological, and psychological performances of pilots were monitored and measured. Monitoring and recording instrumentation techniques are described, and an attempt is made to identify and quantify some of the capabilities and limitations of pilot performance during exposure to accelerations which vary in magnitude, duration, direction, rate of onset, and profile complexity. Apparatus and methods are presented and discussed for monitoring visual disturbance, discrimination and response behavior, and complex skill behavior, and an approach is made to the problem of monitoring higher mental functioning. Author

N64-12270 Rochester U., N.Y.
MICROWAVE MODIFICATION OF X-RAY LETHALITY IN MICE
R. A. E. Thomson, S. M. Michaelson, and J. W. Howland Griffiss AFB, N.Y., Human Eng. Lab., Aug. 1963 12 p refs (Contract AF 30(602)-2921)
(RADC-TDR-63-352; AD-424411)

Fourteen and thirty days after mice received 2800-Mc pulsed microwave treatment, they were subjected to 250kvp whole-body X-irradiation at dose levels of 700r, 800r, and 900r. These dose levels are the thirty-day LD30, LD75, and LD95 values for normal mice. Evidence of reduced lethality and tendency for longer survival times in the microwave pretreated mice, compared with that of normal X-irradiated mice, is presented. Author

N64-12319 Raytheon Co., Waltham, Mass.
PERTeach. THE DEVELOPMENT OF EXPERIMENTAL PROGRAMS FOR AUTOMATED TRAINING IN DECISION MAKING
G. J. Rath, R. E. Hannan, and M. L. Weiss L. G. Hanscom Fld., Bedford, Mass., Decision Sci. Lab., Aug. 1963 40 p refs
(Contract AF 19(628)-365)
(ESD-TDR-63-608; AD-421735)

This report discusses the concepts and techniques employed in the preparation of the programed instruction courses for training management and support personnel in PERT. The applicability of PERT to decision making is also discussed. Author

N64-12321 School of Aerospace Medicine, Brooks AFB, Tex.
EFFECTS ON MAN OF PROLONGED EXPOSURE TO OXYGEN AT A TOTAL PRESSURE OF 190 MM. HG
Thomas E. Morgan, Jr., Frode Ulvedal, Ralph G. Cutler, and B. E. Welch Sep 1963 10 p refs
(SAM-TDR-63-52, AD 423948)

Four 17-day experiments were conducted on healthy pilots in the two-man space cabin simulator. Total pressure averaged 192 mm Hg; partial pressure of oxygen, 174 mm Hg. This atmosphere was reasonably well tolerated by all test subjects. The symptoms consisted of irritation of the upper respiratory tract, aural atelectasis, and eye irritation. Postexperimentally, 2 of the 8 subjects demonstrated reduced arterial oxygen saturation immediately. Pictures, however, gave no X-ray evidence of pulmonary atelectasis. The incidence of baropathies following decompression from 750 mm Hg to 190 mm Hg exceeded 50% (5 of 8 subjects), even following 2 to 3 hours of preoxygenation. The utilization of an atmosphere consisting of oxygen, carbon dioxide, and water vapor at a total pressure of 190 mm Hg appears to be physiologically feasible, at least for 17 days. Author

N64-12340 School of Aerospace Medicine, Brooks AFB, Tex.
STUDIES WITH A SIMULATED MARTIAN ENVIRONMENT. GERMINATION AND GROWTH OF BACTERIAL SPORES
Thomas L. Roberts and Laurence A. Irvine Sep. 1963 10 p refs
(SAM-TDR-63-75; AD-424189)

Simulated Martian microenvironment containing 8% moisture permitted germination and growth of endospores of *Clostridium sporogenes*. Author

N64-12346 Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.
"IN VIVO" MEASUREMENT OF TOTAL GAS PRESSURE IN MAMMALIAN TISSUE
Michael T. Lategola Jul. 1963 9 p refs
(CARI-63-11)

An *in vivo* method for the quantitative estimation of total gas pressure in mammalian tissue has been established. This method utilizes a rigid-walled capsule specially constructed to be permeable to oxygen, carbon dioxide, and nitrogen (O_2, CO_2, and N_2), but negligibly permeable to water vapor. The results obtained at equilibrium, after subcutaneous implantation of this capsule, demonstrate directly that the total gas pressure in the adjacent tissue, which is represented by the intracapsular total gas pressure, is about 40 to 50 mm Hg less than the concomitant atmospheric pressure. The difference between these gas pressures is a result of the metabolic gas exchange and may, therefore, be used to detect quantitative changes in tissue gas metabolism. Author

N64-12356 Joint Publications Research Service, Washington, D.C.
SOME RECENT DEVELOPMENTS IN MEDICAL RADIO ENGINEERING AND ELECTRONICS ABROAD
I. Kozumplik et al 31 Dec. 1963 12 p refs Transl. into ENGLISH of 2 articles from Med. Prom. SSSR (Moscow), v. 17, no. 10, Oct. 1963 p 55-58 and 62-64
(JPRS-22551; OTS-64-21179) OTS: $0.50

CONTENTS:

1. DEVELOPMENTAL PROSPECTS OF MEDICAL ELECTRONICS IN CZECHOSLOVAKIA I. Kozumplik p 1-5
2. REVIEW OF THE BOOK MIKROAPPARATURA DLYA REGISTRATSII PO RADIO NEKOTORYKH FIZIOLOGICHESKIKH FUNKTSIY (MICROAPPARATUS FOR RECORDING SOME PHYSIOLOGICAL FUNCTIONS BY RADIO) T. Ye. Timofeyeva p 6-9 ref

N64-12357 Joint Publications Research Service, Washington, D.C.
PROBLEMS OF THE MECHANISM OF THE BIOLOGICAL EFFECT OF MICROWAVES
A. S. Presman 2 Jan. 1964 27 p refs Transl. into ENGLISH of an article from Vsp. Sovrem. Biol. (Moscow), v. 56, no. 2(5), Sep.-Oct. 1963 p 161-179
(JPRS-22580; OTS-64-21190) OTS: $0.75

An analysis of clinical and experimental data on the effect of microwaves on human and animal organisms shows that, in the nature of the manifestations, three main types of this effect can be distinguished. The first type (reversible effect of microwaves) is expressed in the form of functional changes in the human or animal organism. The second (irreversible effect of microwaves) consists of organic changes in tissues and organs. The third type (specific effect of microwaves) consists of such reactions to microwave irradiation that denote the presence of the capacity for special microwave reception in animals, as well as the reception of electromagnetic waves in other sections of the radiofrequency spectrum. Within the framework of this classification, an analysis is made of the possible nature of the primary physiological and biophysical-chemical processes underlying the biological effect of microwaves. I.v.L.

N64-12366 School of Aerospace Medicine, Brooks AFB, Tex.

STRESS IN DENTAL PATIENTS. ADRENOCORTICAL RESPONSES IN PATIENTS SCHEDULED FOR OPERATIVE DENTISTRY AND FOR IMPACTION SURGERY

Ira L. Shannon, Walter V. Davis, Lucian Szmyd. (AF Hospital, Lackland AFB), and John R. Prigmore (Utah U.) Feb. 1963 6 p refs

(SAM-TDR-63-11; AD-403651)

Serum free 17-hydroxycorticosteroid levels were determined for 1,700 systemically healthy, young adult males divided into the following groups: One thousand subjects were included in a physiologic baseline study; one control group of 209 subjects was sampled over a 21-week period; a second control group of 248 participants was studied along with 97 patients scheduled for operative dentistry and 146 patients appointed for impaction surgery. All samples were collected between 7:30 and 8:00 a.m. In the baseline study a serum free 17-OHCS mean of 14.82 (SD = 3.91) μg./100 ml. was found. The means for the two control groups were not significantly different. Variances for these groups did differ ($P < .05$). The anticipation of having a tooth filled was a significant ($P < .05$) stimulus to the adrenal cortex, but an appointment for impaction surgery produced a significantly greater response ($P < .001$). Author

N64-12384 Air Force Systems Command, Wright-Patterson AFB, Ohio

PROBLEMS OF CYBERNETICS (SELECTED ARTICLES)

N. B. Demidovich and V. I. Levenshteyn 16 Aug. 1963 51 p refs Transl. into ENGLISH of two articles from Probl. Kibernetiki (Moscow), no. 5, 1961 p 105–136

(FTD-TT-63-544/1+2+4; AD-415169) OTS: $4.60

A group-code theory and the application of the Hadamard matrix to a single problem of coding are discussed. The group-code theory deals with the question of the existence and uniqueness (to within equivalence) of group codes with a given distance matrix. The problem is reduced to the existence of whole-number nonnegative solutions of an algebraic system of equations with a known matrix (universal matrix) which depends only on the power of the code. It is demonstrated that the distance matrix determines a code which is unique in a certain sense. The Hadamard matrix is applied to the following problem which arises in the theory of error-detecting and error-correcting codes. There is a set of 2^n different n-digits sets of 0 and 1. The distance between two sets is defined as the number of digits in which they occur. The subset of binary sets (the code) is characterized by the following parameters: n is the length of the code sets; d is the minimum distance between the code sets; M is the number of code sets (the power of the code). The maximum power of a code with the parameters n and d is denoted by M(n, d). It is required for a given n and d to construct a code of M(n, d) sets (a maximum code). I.v.L.

N64-12392 Joint Publications Research Service, Washington, D.C.

STUDY OF CORTICAL REGULATION OF THE WATER AND ELECTROLYTE BALANCE

Z. T. Tursunov 31 Dec. 1963 10 p Transl. into ENGLISH of the Table of Contents and the conclusion of a book "Korkovaya Regulyatsiya Vodno-Solevogo Obmena", Tashkent, 1963 p 144–151

(JPRS-22523; OTS-64-21168) OTS: $0.50

Study was conducted of water and salt metabolism, and the role of the cerebral cortex in its regulation, under conditions of insolation and high temperature. It was determined that irradiation of healthy dogs causes considerable disorders of the water and salt balance, the degree and nature of which depend on the number of times to exposure and the duration of the high-temperature effect. The greatest changes were noted, as a rule, only at the beginning of the first course of irradiation. C.L.W.

N64-12393 Joint Publications Research Service, Washington, D.C.

NEW TYPES OF CHROMOSOME REARRANGEMENT DEVELOPING IN THE MICROSPORES OF TRADESCANTIA PALUDOSA UNDER THE INFLUENCE OF SEVERAL FACTORS OF SPACE FLIGHT

N. L. Delone et al 3 Jan. 1964 11 p refs Transl. into ENGLISH of an article from Dokl. Akad. Nauk SSSR (Moscow), v. 152, no. 5, 1963 p 1227–1230

(JPRS-22585; OTS-64-21194) OTS: $0.50

An analysis was conducted of the chromosome rearrangement in the microspores of *Tradescantia paludosa* under the influence of several factors of spaceflight. Chromosome rearrangement was detected in microspores of *Tradescantia paludosa* on board the Vostok-3 and the Vostok-4 spaceships. The most prevalent type of chromosome rearrangement detected during these flights develops also in experiments concerning the influence of acceleration. The microspores on the Vostok-4 were in a more sensitive phase than the microspores on the Vostok-3, but the percentage of chromosome rearrangement was higher in the Vostok-3 variation. These two circumstances result in the assumption that the chromosome rearrangements detected are caused by dynamic factors and consequently a more prolonged flight will not provoke the enhancement of the genetic effect. C.L.W.

N64-12432 Joint Publications Research Service, Washington, D.C.

REACTIONS OF THE BODY TO THE EFFECT OF LOW DOSES OF IONIZING RADIATION

M. G. Durmish'yan et al 13 May 1963 84 p refs Transl. into ENGLISH of selected chapters from the book "Reaktsii Organizma na Deystviye Malykh Doz Ioniziruyushchey Radiatsii", Moscow, 1962 p 3–28, 219–247, 251–259, and 302–303

(JPRS-19163; OTS-63-21809) OTS: $2.25

CONTENTS:

1. THE REACTIONS OF THE BODY TO THE EFFECT OF LOW DOSES OF IONIZING RADIATION M. G. Durmish'yan p 4–25 (See N64-12433 04-16)

2. SOME CHARACTERISTICS OF EXCRETION OF RADIOACTIVE SODIUM FROM THE BODIES OF WHITE RATS AND RABBITS V. P. Godin, S. I. Gorshkov, and L. V. Zhidkova p 26–35 refs (See N64-12434 04-16)

3. RATES OF EXCRETION OF Co^{60} AND Cs^{137} FROM THE BODIES OF ANIMALS S. I. Gorshkov, and A. F. Denisov p 26–35 refs (See N64-12435 04-16)

4. EXCRETION OF Br^{82}, Rb^{86} AND I^{131} FROM THE BODIES OF WHITE RATS S. I. Gorshkov, and A. F. Denisov p 43–51 refs (See N64-12436 04-16)

5. THE EFFECT OF FACTORS OF A NONRADIOACTIVE NATURE ON THE RATE OF Na^{24} EXCRETION V. P. Godin p 52–64 refs (See N64-12437 04-16)

6. DETERMINATION OF THE RULES AND REGULATIONS OF EXCRETION OF RADIOACTIVE SUBSTANCES IN THE CALCULATION OF INTERNAL DOSES OF IRRADIATION A. F. Denisov p 65–78 refs (See N64-12438 04-16)

N64-12433 Joint Publications Research Service, Washington, D.C.

THE REACTIONS OF THE BODY TO THE EFFECT OF LOW DOSES OF IONIZING RADIATION

M. G. Durmish'yan *In its* Reactions of the Body to the Effect of Low Doses of Ionizing Radiation 13 May 1963 p 4–25 (See N64-12432 04-16) OTS $2.25

The results of studies on the biological effect of low internal doses of radioactive isotopes, chiefly Na^{24} and P^{32}, on the bodies of rats, rabbits, and dogs are summarized. The following aspects were considered: (1) the comparative radiosensitivities of various organs and systems, including nervous function, conditioned reflexes, endocrine function, sympathetic nervous system, hemopoietic system, blood serum chemistry, excretory

function, glomerular filtration, and the summation effects of subliminal doses. (2) the significance of the age factor in determining the degree of radiosensitivity of the body; (3) the cyclic nature of chronic effects of low activity doses of radioisotopes; (4) the combined effects of low doses of irradiation and nonradiative factors; and (5) characteristics of excretion of radioactive sodium from the body. These studies should be useful in determining the initial indications of radiation injuries and in providing substantiating data for establishing permissible radiation levels. M.P.G.

N64-12434 Joint Publications Research Service, Washington, D.C.

SOME CHARACTERISTICS OF EXCRETION OF RADIOACTIVE SODIUM FROM THE BODIES OF WHITE RATS AND RABBITS

V. P. Godin, S. I. Gorshkov, and L. V. Zhidkova *In its* Reactions of the Body to the Effect of Low Doses of Ionizing Radiatio n 13 May 1963 p 26-35 refs (See N64-12432 04-16) OTS: $2.25

The rate of excretion of radioactive sodium from the bodies of rats and rabbits was studied in order to obtain baseline data for accurate calculation of internal irradiation doses. The following conclusions are presented: (1) Na^{24} is completely resorbed from the injection site. (2) Na^{24} is excreted principally in the urine with only trace amounts excreted in the stool. (3) The excretion rate is dependent upon the amount administered. (4) Na^{24} excretion occurs more slowly in rabbits than in rats. this difference is more pronounced after the administration of small doses. (5) Prior saturation of the body with stable sodium leads to a 16.8% to 50.4% acceleration in Na^{24} excretion. After the administration of an 0.05 millicurie dose of Na^{24} following saturation with stable sodium, the effective half-life of Na^{24} was reduced from 82 to 51 hours after the administration of an 0.05 millicurie dose and from 64 to 45 hours after administration of 0.5 millicurie. M.P.G.

N64-12435 Joint Publications Research Service, Washington, D.C.

RATES OF EXCRETION OF Co^{60} AND Cs^{137} FROM THE BODIES OF ANIMALS

S. I. Gorshkov and A. F. Denisov *In its* Reactions of the Body to the Effect of Low Doses of Ionizing Radiation 13 May 1963 p 36-42 refs (See N64-12432 04-16) OTS: $2.25

Co^{60} and Cs^{137} were administered subcutaneously in rats in 100, 50, and 10 millicurie doses, and the gamma radioactivity of the rats was compared to the radioactivity of water phantoms with the same initial activities of Co^{60} and Cs^{137}. The results indicate that this method gives results comparable with the usual method of determining the excretion rate according to the radioactivity of the excreta. Other conclusions are: (1) The tissue absorption of Co^{60} is 27% and of Cs^{137}, 100%. (2) The time at which 50% of the administered radioisotope is excreted is inversely proportional to the quantity administered. (3) Every successive 50% of the remainder is excreted more slowly, which is not in agreement with the generally accepted concepts of the constancy of effective half-life and exponential excretion rates; (4) Two months after administration, an average of 4% of the Co^{60} had not been excreted, and 6% to 10% of the Cs^{137} had not been excreted. M.P.G.

N64-12436 Joint Publications Research Service, Washington, D.C.

EXCRETION OF Br^{82}, Rb^{86}, AND I^{131} FROM THE BODIES OF WHITE RATS

S. I. Gorshkov and A. F. Denisov *In its* Reactions of the Body to the Effect of Low Doses of Ionizing Radiation 13 May 1963 p 43-51 refs (See N64-12432 04-16) OTS: $2.25

Bromine^{82}, rubidium^{86}, and iodine^{131} were injected subcutaneously into rats in quantities from 1 to 100 millicuries. The excretion rate of the radioisotopes was determined by comparing the external gamma radiation of the animal to that of a water phantom with the same initial activity. Since the excretion rate was found not to follow an exponential law and the fraction of isotope excreted with time did not remain constant, the data were analyzed in terms of "half-excretion time" θ_B, and "dimunition time" θ_{ef}, (where dimunition includes the simultaneous processes of decay and excretion). The tabulated data on each isotope show that the excretion of all three occurs more rapidly with increasing quantity administered. M.P.G.

N64-12437 Joint Publications Research Service, Washington, D.C.

THE EFFECT OF FACTORS OF A NONRADIOACTIVE NATURE ON THE RATE OF Na^{24} EXCRETION

V. P. Godin *In its* Reactions of the Body to the Effect of Low Doses of Ionizing Radiation 13 May 1963 p 52-64 refs (See N64-12432 04-16) OTS: $2.25

In an attempt to determine the effect of the functional state of the nervous system on the rate of Na^{24} excretion in rats, solutions of NaCl and caffeine were administered 3 hours prior to the administration of 1.0, 0.5, 0.1, and 0.05 millicuries of Na^{24}. The results indicate that the administration of one cc of a saturated saline solution accelerates the excretion of Na^{24} by 10% to 15% and correspondingly reduces the effective half-life by 20 to 25 hours. The administration of 0.008 gm of caffeine per kilogram of rat was found to accelerate the excretion of Na^{24} by 6% to 8%, thus reducing the effective half-life by 9 to 22 hours. M.P.G.

N64-12438 Joint Publications Research Service, Washington, D.C.

DETERMINATION OF THE RULES AND REGULATIONS OF EXCRETION OF RADIOACTIVE SUBSTANCES IN THE CALCULATION OF INTERNAL DOSES OF IRRADIATION

A. F. Denisov *In its* Reactions of the Body to the Effect of Low Doses of Ionizing Radiation 13 May 1963 p 65-78 refs (See N64-12432 04-16) OTS: $2.25

A method using graph templates of typical curves is proposed for determining internal doses of radioactivity from excretion data. This method was developed because calculations of the doses under the assumption that excretion is subject to an exponential law was found to lead to considerable errors. The graphic method of integration consists of plotting curves showing the decrease in the radioactive substance in a rectangular system of coordinates, cutting out the curves, and determining the area by weighing the paper. The data obtained in this way were tabulated, and standard templates of typical curves were prepared which can be used instead of the analytic weighing technique, thus facilitating the determination of the internal radiation dose without appreciably affecting the reliability of the results. M.P.G.

N64-12442 Joint Publications Research Service, Washington, D.C.

TRANSLATIONS ON NUTRITION

16 Dec. 1963 30 p refs Transl. into ENGLISH from Vopr. Pitaniya (Moscow), v. 22, no. 6, Nov.-Dec. 1963 (JPRS-22295; OTS-64-21025) OTS: $0.75

CONTENTS:

1. THE USE OF UNICELLULAR ALGAE FOR HUMAN NUTRITION (LITERATURE SURVEY) N. N. Boyko, N. S. Klyushkina, and Yu. I. Kondrat'yev p 1-10 refs (See N64-12443 04-16)

2. CALCIUM AND PHOSPHORUS DIETARY SUPPLEMENT AS A MEANS OF REDUCING STRONTIUM-90 ACCUMULATION IN SKELETAL BONES V. A. Knizhnikov and P. F. Burgryshev p 11-22 refs (See N64-12444 04-16)

3. STRONTIUM CONTENT IN FOOD PRODUCTS OF TURKMEN SSR ACCORDING TO SPECTRUM ANALYSIS DATA N. N. Grigor'yants (Turkmen Med. Inst.) p 23–27 refs

N64-12443 Joint Publications Research Service, Washington, D.C.

THE USE OF UNICELLULAR ALGAE FOR HUMAN NUTRITION (LITERATURE SURVEY)

N. N. Boyko, N. S. Klyushkina, and Yu. I. Kondrat'yev *In its* Transl. on Nutrition 16 Dec. 1963 p 1–10 refs (See N64-12442 04-16)

Investigations cited in this survey indicate that the unicellular algae, *Chlorella* and *Senedesmus*, are suitable as a supplement to human nutrition in a quantity of 30 to 40 grams per day. Furthermore, on the basis of the findings of Powell et al (1961), it may be assumed that man will tolerate well a diet containing up to 100 grams of dry algae daily, at least for a short time. Powell et al note that with algae nutrition, the gastrointestinal symptoms were more pronounced during the first days following consumption. This indicates a rather good adaptability of man to a diet to which unicellular algae are added. According to Japanese scientists, senedesmus protein is somewhat less digestible than chlorella protein, and bleached chlorella protein is better assimilated in the human organism than unbleached chlorella protein. I.v.L.

N64-12444 Joint Publications Research Service, Washington, D.C.

CALCIUM AND PHOSPHORUS DIETARY SUPPLEMENT AS A MEANS OF REDUCING STRONTIUM-90 ACCUMULATION IN SKELETAL BONES

V. A. Knizhnikov and P. F. Burgryshev *In its* Transl. on Nutrition 16 Dec. 1963 p 11–22 refs (See N64-12442 04-16)

A calcium and phosphorus dietary supplement for the reduction of strontium-90 accumulation in the skeletal bones of rats was investigated. Results indicate: (1) There was 33.33% to 50% reduction in the deposit in bone tissue of the strontium-90 entering the gastrointestinal tract when a calcium supplement was added to a diet of either low or normal calcium content. (2) The protective effect of a calcium supplement in the diet is governed primarily by the processes, in the gastrointestinal tract, of "dilution" and "carrying away" of strontium-90 together with the excess unassimilated calcium. (3) The greater the calcium content in the diet, the lower its assimilation and the lesser the "preference" given it over strontium. (4) The highest relative protective effect was observed when the calcium supplement did not exceed the normal calcium content in the diet by more than two to four times. (5) The protective action of the calcium content was enhanced when phosphorus was added to the diet in quantities producing a phosphorus-calcium ratio not exceeding 1:1. (6) A calcium supplement in the diet not only reduced calcium-45 deposit but also increased excretion of this isotope from the skeletal bones, and apparently of strontium-90 as well. I.v.L.

N64-12497 Joint Publications Research Service, Washington, D.C.

ELECTRON MICROSCOPIC EXAMINATION OF CARTILAGE CELL DIFFERENTIATION IN A REGENERATING BONE

L. N. Mikhaylova *In its* Transl. from Dokl. Akad. Nauk SSSR [Moscow], v. 149, no. 2, 1963 18 Jul. 1963 p 19–24 refs (See N64-12493 04-01) OTS: $1.00

The first stage in the regeneration of bone tissue—the development of a cartilage "model" at the site of the removed bone, i.e., the development of the osteogenic cell from a young chrondroblast to a chondrocyte—was investigated. The investigation consisted of an electron microscopic examination of regenerating tibia of white male rats after subperiosteal resection of the diaphysis of the tibia. Results indicate: (1) The process of chrondroblast differentiation, conjugated with the development of the basic cartilaginous matter, includes profound changes in the ultramicrostructure of the cell, which reveals the role of its organoids in the synthesis of protein products which make up to basic matter of cartilage. (2) The granular character of chromatin accumulations indicates the presence of RNA which apparently interacts with the RNA of the cytoplasm. (3) Profound changes are observed in the system of the ergastoplasm and the Golgi apparatus, the cisternae of which apparently accumulate protein products to be eliminated from the cell. (4) The method of formation of fibrillar structures is very complex and apparently does not fit into the alternative: extra or intracellular synthesis. I.v.L.

N64-12498 Joint Publications Research Service, Washington, D.C.

LUMINESCENT ANALYSIS OF LACUSTRINE DETRITUS

A. G. Rodina *In its* Transl. from Dokl. Akad. Nauk SSSR [Moscow], v. 149, no. 2, 1963 18 Jul. 1963 p 25–30 refs (See N64-12493 04-01) OTS: $1.00

A luminescent analysis of *Lacustrine detritus* was conducted in incident light with the opaque illuminator of the Blumberg system with an SVDSh-250-3 lamp with T-2N and SS-4 light filters. The following fluorochromes were used: coryphosphine and acridine orange. Both fluorochromes were well absorbed by the bacteria of the detritus and produced bright contrast luminescence in them. It was revealed that the detritus in these lakes is heterogeneous in composition and that it is autochthonous, planktonogenic, and chiefly algogenic. In addition this analysis revealed: (1) Bacteria are not only present on the surface of the detritus particles and around them, but also penetrate within them, frequently filling the entire contents as their inherent components. (2) The bacteria that develop in detritus are relatively large in size, and fine cells are practically absent. (3) Bacteria surround still, living algae. (4) Rapid thinning of animal tissues occurs under the influence of bacteria and their enzymes. (5) The food value of detritus is determined not only by the organic remains, but also by the enormous quantity of bacteria that develop on it and whose food value for aquatic animals is unquestioned. I.v.L.

N64-12499 Joint Publications Research Service, Washington, D.C.

THE MECHANISM OF THE BIOLOGICAL ACTION OF A PULSED MAGNETIC FIELD

N. A. Solov'yev *In its* Transl. from Dokl. Akad. Nauk SSSR [Moscow], v.149, no. 2, 1963 18 Jul. 1963 p 31–35 (See N64-12493 04-01) OTS: $1.00

The mechanism of the biological action of a pulsed magnetic field was investigated by the use of a pulsed magnetic field with an exponential increase, and the elimination of the influence of circuit-breaking extractors. Results indicate: (1) No significance of induced EMF and currents was detected in the appearance of phosphene under the action of a pulsed magnetic field of the order of the threshold values; hence the magnetic field itself is biologically active. (2) The increase in the brightness of phosphene (or the corresponding decrease in its threshold amplitude), when the pulse duration of the magnetic field is increased in the region of 15 to 40 msec and the magnetic field intensity is practically unchanged, is evidence of the comparatively slow processes, occurring in the media, which are sensitive to the magnetic field. At the same time, the rate of these processes depends on the magnetic-field intensity, since as the intensity is increased, the threshold duration drops. I.v.L.

N64-12504 Joint Publications Research Service, Washington, D.C.

TRANSLATIONS FROM VOPROSY PSIKHOLOGII (PROBLEMS IN PSYCHOLOGY) [MOSCOW] NO. 1, 1963

A. A. Genkin et al 10 Jun. 1963 6 p refs Transl. into ENGLISH of 2 Articles p 104–109 and 111–113
(JPRS-19615; OTS-63-22013) OTS: $0.75

CONTENTS:

1. SOME PRINCIPLES OF CORRECTION TABLES TO BE USED FOR EVALUATION OF THE RATE OF INFORMATION PROCESSING A. A. Genkin, V. I. Medvedev, and M. P. Shek p 1-16 refs (See N64-12505 04-16)

2. DECREASE IN THE VISUAL FACULTY UNDER CERTAIN CONDITIONS OF FATIGUE M. P. Shek p 17-20 (See N64-12506 04-16)

N64-12505 Joint Publications Research Service, Washington, D.C.

SOME PRINCIPLES OF CORRECTION TABLES TO BE USED FOR EVALUATION OF THE RATE OF INFORMATION PROCESSING

A. A. Genkin, V. I. Medvedev, and M. P. Shek *In its* Transl. from Vopr. Psikhologii [Moscow] no. 1, 1963 10 Jun. 1963 p 1-16 refs (See N64-12504 04-16) OTS: $0.75

Several objections are made to correction tables which use letters of the alphabet as the visual signals in quantitative examination of attention, discrimination, perception, etc. A table is proposed which overcomes most of these objections, since it is made up of signals with an identical *a priori* probability, random distribution, and homogeneity of the perceptive process. This table consists of 660 rings, each with a break in its circumference in one of eight possible positions. Further, the table can be used in four different orientations so that 24 variants of the sequence, all with the same statistical structure, are available. Statistical methods for analyzing the data obtained using this correction table are discussed. M.P.G.

N64-12506 Joint Publications Research Service, Washington, D.C.

DECREASE IN THE VISUAL FACULTY UNDER CERTAIN CONDITIONS OF FATIGUE

M. P. Shek *In its* Transl. from Vopr. Psikhologii [Moscow] no. 1, 1963 10 Jun. 1963 p 17-20 (See N64-12504 04-16) OTS: $0.75

The effect of auditory fatigue on the visual capability of human subjects was determined, using correction charts consisting of rings with breaks in their circumference. Preliminary studies indicated that general fatigue, induced by comparatively light laboratory work, leads to an increase in auditory and visual capabilities toward the end of a working day as compared to morning data. Isolated fatigue of the auditory and, especially, the visual faculty against a background of ordinary laboratory work, however, was accompanied by a marked decrease in visual perception at the end of a working day. A loss of sensory capability was also noted in subjects placed for a long time in an area having reduced air circulation. M.P.G.

N64-12508 Joint Publications Research Service, Washington, D.C.

CYBERNETICS AND PROGRESS IN SCIENCE AND TECHNOLOGY

A. I. Berg *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 7-24 (See N64-12507 04-01) OTS: $5.00

Despite advances in computer technology in the last 15 years, caution should be used in drawing conclusions when comparing the possibilities of modern electronic automation with the human brain. The basic concept of cybernetics, along with that of information, is optimization. Cybernetics is the science of purposeful and optimal control of complicated systems. This means that this science can help in solving the most difficult problems that are encountered in the next few decades. It will also be of assistance to the sciences concerning living nature, in the collection of full-valued information and in subordinating the forces of nature to the interests of mankind. P.V.E.

N64-12509 Joint Publications Research Service, Washington, D.C.

THE APPLICATION OF CYBERNETICS TO BIOLOGY AND MEDICINE

V. V. Parin *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 25-39 (See N64-12507 04-01) OTS: $5.00

The practical side of the problems of cybernetics in biology and in medicine is discussed. Cybernetics is one of the precise physicomathematical sciences and utilizes methods of mathematical and physical simulation for describing any systems, both biological and technological. Cybernetics extends the postulates of automatic control theory to living organisms. The chief peculiarity of biological systems is their multitude of circuits. The very same objects are controlled by several control devices, and these controlling devices are in turn the objects of control. It is stated that the study of biological analyzer systems is the most important practical problem of modern physiology, particularly if it is borne in mind that the receptor apparatuses do not possess constant sensitivity but vary it within quite wide limits, in particular, under the influence of actions sent out from the central nervous system. As a result, extensive research on analyzers, especially with the application of electrophysiological methods becomes of the greatest importance. P.V.E.

N64-12510 Joint Publications Research Service, Washington, D.C.

SELF-REGULATION OF CELLULAR PROCESSES

G. M. Frank *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 40-55 (See N64-12507 04-01) OTS: $5.00

Self-regulation of cellular processes with respect to a cell as a whole is discussed. In considering the internal organization of a cell it is often assumed that in addition to the already well-known catalytic functions of the membrane and multimembrane systems, this organization is an instrument for controlled transfers of substances. Movements in this system cannot be only passive, which would be to assume that two interacting mechanisms exist here: (1) unique enzymes for transfer of substances which are linked with the catalytic function of membranes by their appearance and by "selection" of temporary links; and (2) purely mechanical mechanisms or, more accurately, hydrodynamic capillary effects due to creation of pressure gradients and pumping functions of individual structural elements. The complexity of a living cell is connected not only with a large set of different individual chemical substances with their spatial submicroscopic organization which has been discovered in recent years, but also in the first instance with the complexity of combinations of rapidly completed exchange processes. P.V.E.

N64-12511 Joint Publications Research Service, Washington, D.C.

THE NUCLEIC ACIDS AND THE PROBLEM OF BIOSYNTHESIS OF PROTEIN

A. S. Spirin *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 56-63 (See N64-12507 04-01) OTS: $5.00

Three areas of development connected with the problem of biosynthesis of protein and with the problem of the biological role of nucleic acids are discussed: (1) deciphering the method for writing the structure or the genetic information in living cells and the deciphering of the "nuceotide-amino acid" code; (2) investigations into the understanding of the mechanisms for protein synthesis and its regulation resulting in the discovery of certain concrete molecular mechanisms for transfer of this genetic information encoded in nucleic acids to the places for protein synthesis and, in particular, in the discovery of the "messenger" RNA and its role; and (3) discovery of certain regulatory mechanisms in protein synthesis which control the process of transferring information from DNA. P.V.E.

N64-12512 Joint Publications Research Service, Washington, D.C.

WAYS FOR DEVELOPING PHYSIOLOGY AND PROBLEMS OF CYBERNETICS CONNECTED WITH THEM

N. A. Bernshteyn *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 64–79 (See N64-12507 04-01) OTS: $5.00

The important and fundamental advances which physiology (and perhaps, the entire set of biological sciences) is undergoing are discussed, and the points of contact and intersection theoretical cybernetics has with the most urgent problems of modern physiology are elucidated. P.V.E.

N64-12513 Joint Publications Research Service, Washington, D.C.

ON TACTICS USED IN CONTROLLING COMPLICATED SYSTEMS IN CONNECTION WITH PHYSIOLOGY

I. M. Gel'fand, V. S. Gurfinkel', and M. L. Tsetlin *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 80–89 (See N64-12507 04-01) OTS: $5.00

Some mathematical models which have been put forth in connection with physiology are examined. P.V.E.

N64-12514 Joint Publications Research Service, Washington, D.C.

THE THEORY OF FUNCTIONAL SYSTEMS AS A PREREQUISITE TO THE DEVELOPMENT OF PHYSIOLOGICAL CYBERNETICS

P. K. Anokhin *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 90–113 (See N64-12507 04-01) OTS: $5.00

The development of physiological cybernetics is discussed in the following areas: (1) a functional system as a self-regulating apparatus, (2) afferent synthesis, and (3) the apparatus of the acceptor of an action. A conclusion of the investigation of the laws for the formation of functional systems on different levels of organization is that there is one universal architectural principle in the activities of an organism. From the standpoint of a cybernetic approach to the problem of life, it is concluded that no attempt to understand the general architecture of adaptations, and of simulation of any manifestations of life, can be considered sufficient if they fail to take into account, in the proper manner, the principles of the organization of functional systems of the organism—afferent synthesis, the acceptor of an action, the formation of an action, and reverse afferentation of its results. P.V.E.

N64-12515 Joint Publications Research Service, Washington, D.C.

AN EXPERIMENT IN THE USE OF MATHEMATICAL MODELLING IN THE STUDY OF THE INTERRELATION OF THE PROCESSES OF STIMULATION AND INHIBITION

G. V. Savinov, L. V. Krushinskiy, D. A. Pless, and R. A. Valershteyn *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 114–128 (See N64-12507 04-01) OTS: $5.00

An investigation into the use of mathematical modeling for testing the laws experimentally established in the study of certain defensive systems used by the nervous system when it is acted upon by strong exterocentric stimuli is discussed. It is concluded that the value of using mathematical models in solving certain physiological problems has been shown. It is shown that proposed interrelationships between the components studied and physiological processes can be tested mathematically. The quantitative parameters of the described process were not accurately determined in the phenomenon under study; however, the model which was constructed showed that the manifold process of the appearance of parabiotic stages can be reduced to the interaction of two relatively simple processes of excitation and inhibition that change in accordance with certain characteristics when the nervous system is acted upon by exterocentral stimuli. P.V.E.

N64-12516 Joint Publications Research Service, Washington, D.C.

THE APPLICATION OF MATHEMATICAL METHODS IN PROCESSING THE RESULTS OF BIOLOGICAL OBSERVATIONS

B. V. Gnedenko, S. V. Fomin, and Ya. I. Khurgin *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 129–138 (See N64-12507 04-01) OTS: $5.00

The following areas are discussed with respect to mathematical processing of experimental biological data: (1) the objectives and methods of mathematical processing of experimental data and planning experiments; (2) methods for mathematical processing biological experiments—the application of random processes; (3) separation of the response to stimulation against a background of spontaneous activity; and (4) the spectral characteristics of a tremor. P.V.E.

N64-12517 Joint Publications Research Service, Washington, D.C.

THE APPLICATION OF ELECTRONIC COMPUTER TECHNIQUES TO THE ANALYSIS OF BIOELECTRIC PROCESSES IN THE BRAIN

M. N. Livanov *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 139–153 (See N64-12507 04-01) OTS: $5.00

An investigation of the correlation of points in the brain cortex in order to detect synchronicity is discussed. The investigation indicated that synchronicity did not require a compact arrangement of the correlation points, but that synchronously working points can be separated from each other by areas of the brain cortex that do not participate in the synchronous activity. It is also indicated that insulated constellations of synchronicity are interlaid (e.g., some points in the cortex work simultaneously with one synchronized system and with another). In response to different stimuli, constellations can change in three ways: (1) The synchronized system does not disappear but is reinforced—the amplitudes of the biopotentials participating at its points are increased. (2) The constellation is completely dissolved and can be replaced by another new constellation. (3) The constellation changes without being completely dissolved and retains a part of its previous features. P.V.E.

N64-12518 Joint Publications Research Service, Washington, D.C.

NEW DEVELOPMENTS IN OBTAINING AND ANALYZING INFORMATION ABOUT PHYSIOLOGICAL FUNCTIONS OF THE ENTIRE ORGANISM

Ye. B. Babskiy *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 154–173 (See N64-12507 04-01) OTS: $5.00

A discussion is presented of the problem of what the use of modern technology can do for the study of the physiological processes occurring in the entire organism and what the requirements of the methodologies and equipment to be used for such research are. P.V.E.

N64-12519 Joint Publications Research Service, Washingington, D.C.

INFORMATION PROCESSING BY THE BRAIN

A. V. Napalkov *In its* Biol. Aspects of Cybernetics 11 Jun 1963 p 174–191 (See N64-12507 04-01) OTS: $5.00

A study of the principles of information processing, which have arisen during the evolutionary process and are used by the human brain in order to study the problem of optimal organization of an active search system, is discussed. When studying the problem of self-organizing control systems the idea that the basis of complex brain operations is a hierarchical system of programs of operation of various levels is also important. Each of the programs of a higher level shapes and corrects the program of the lower level: the program of the first (lower) level is the program of animal behavior—the conditioned response system; the program of the second level is

the program of the self-organizing systems which assures the formation of new forms of behavior under various new conditions; and the program of the third level shapes the program of the second level. The present study of the human brain approached a solution of two basic problems that are being advanced by modern cybernetics: to clarify the algorithms of information processing at the base of the complex operations of the brain and to make clear the structure of the network of nerves that are the basis of these algorithms. P.V.E.

N64-12520 Joint Publications Research Service, Washington, D.C.

PROBLEMS AND DIFFICULTIES IN THE STUDY OF BIOLOGICAL ANALYZER SYSTEMS

G. V. Gershuni *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 192–207 (See N64-12507 04-01) OTS: $5.00

This article is concerned with the study of biological instruments with which an organism perceives the external world. It is theoretically and practically evident that the development of knowledge of the working of the brain and sense organs (the higher creations of nature) cannot be satisfactory with the isolated efforts of any one science. The minimum amount of knowledge necessary for research intended to solve such cardinal problems as the transmission and processing of information in the sense organs requires: (1) detailed knowledge of the basic structural elements; (2) use of the knowledge accumulated by physiology in its different sectors (electrophysiology, behavorial physiology, psychophysiology, and psychophysics); (3) the logics of the operations which a complex system can perform to solve certain problems; and (4) execution of these tasks in electronic models. It is concluded then that the study of the brain and sense organs as a whole requires the use of methods and concepts of various sciences. P.V.E.

N64-12521 Joint Publications Research Service, Washington, D.C.

CODING INFORMATION ABOUT COLOR IN THE RETINA

N. D. Nyuberg *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 208–213 (See N64-12507 04-01) OTS: $5.00

An analysis of the color coding in the human eye indicates that signals do not proceed as a result of light but as a result of a change in light, that is, they depend on both radiations in sequence. The mechanism by which the eye can determine between continuously changing colors can be conceived as follows: the condition of the receptors changes continuously with three degrees of freedom following changes in the light. A signal is sent when the rate of change reaches a certain level. The signal corresponds to the condition of the receptor at this moment and takes up a certain amount of time in which a new signal cannot be sent. When the signal is over a new signal can be sent which is preceded by erasure of traces of the preceding signal (pre-excitation retardation). As a result, the continuous change in color is transmitted by a discrete sequence of signals with a frequency on the order of the frequency of the merging of the flashes. Such an intermittent transmission of continuous changes of color can provide steady transmission of information about color along one fiber. P.V.E.

N64-12522 Joint Publications Research Service, Washington, D.C.

ELECTROPHYSIOLOGICAL STUDY OF RETINAL FUNCTIONS

A. L. Byzov *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p214–224 (See N64-12507 04-01) OTS: $5.00

Electrophysiological research into the structure of the retina is discussed. The characteristics of the elements of the retina are: (1) the photoreceptors—in the outer segments of the photoreceptors are visual pigments (rhodopsin, iodopsin, and others) which determine the spectral sensitivity of the receivers; (2) the horizontal cells whose dendrites branch in the outer synaptic layer and make contact with the receptors and probably with the bipolars; the electrical reaction of the horizontal cells is hyperbolization lasting for the entire period of illumination; (3) the bipolars, one of whose dendrites makes contact with the receptors (and possibly with the horizontal cells) and a signal, are sent through the other one to the ganglion cells—beginning with the bipolars and above, almost all the elements react only to a change in the intensity of light; and (4) the ganglion cells—receiving signals from the bipolars and probably from the amacrine cells, the ganglion cells are at the output of the retina and send signals to the central nervous system. P.V.E.

N64-12523 Joint Publications Research Service, Washington, D.C.

ON THE IDENTIFICATION OF OBJECTS IN THE VISUAL SYSTEM

V. D. Glezer, A. A. Nevskaya, A. V. Seredinskiy, and I. I. Tsukkerman *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 225–241 (See N64-12507 04-01) OTS: $5.00

From investigations into the primary processing of information in the retina, it is concluded that there is some basis to believe that optimal encoding (encoding with large blocks) occurs in the visual system. The more features that are used to encode the image the less probability there is of an error and the fewer the number of cells (or groups of cells) that are required for the most economical writing of the image. P.V.E.

N64-12524 Joint Publications Research Service, Washington, D.C.

EXPERIMENTS ON TEACHING MACHINES TO RECOGNIZE VISUAL IMAGES

M. A. Ayzerman *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 242–260 (See N64-12507 04-01) OTS: $5.00

A discussion and summary are presented of a project designed to gain greater understanding of the mechanism of teaching and recognition of visual images and to develop the simplest possible methods of reproducing the teaching process on universal computers. The main emphasis thus far has been in the development of methods of artificial reproduction of the mechanism of teaching the recognition of visual images on machines. P.V.E.

N64-12525 Joint Publications Research Service, Washington, D.C.

MODELING THE PROCESS OF INSTRUCTING FOR RECOGNITION ON A UNIVERSAL COMPUTER

M. M. Bongard *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 261–272 (See N64-12507 04-01) OTS: $5.00

A discussion is presented of the methodology, difficulties, and prospects that were uncovered in research into modeling the process of instructing for recognition on a universal computer. The resemblance between the problems of recognition of models and of the complexity of modeling real animal behavior is discussed. P.V.E.

N64-12526 Joint Publications Research Service, Washington, D.C.

TEACHING STOCHASTIC MACHINES

V. I. Varshavskiy, I. P. Vorontsova, M. L. Tsetlin *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 273–283 (See N64-12507 04-01) OTS: $5.00

A description is presented of some very simple models associated with the study of behavior. Some mathematical models are examined, and what can be said in connection with models of the behavior of living things is considered. P.V.E.

N64-12527 Joint Publications Research Service, Washington, D.C.

HUMAN SOLUTION OF THE PROBLEM OF SELECTION WITH PROBABILITY REINFORCEMENT OF THE MOTOR RESPONSES

M. A. Alekseyev, M. S. Zalkind, and V. M. Kushnarev *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 284-303 refs (See N64-12507 04-01) OTS: $5.00

An investigation to determine the characteristics of human solution of the problem of "choosing" one of two actions whose probability of reinforcement varies and to compare this solution with the solution of a similar problem by an automatic machine with a finite number of states is discussed. From the results of the investigation it is concluded that a problem of choice, the reinforcement of motions being anticipated, can be solved by man quite satisfactorily (but somewhat in an inferior fashion when compared to a machine with a linear tactic) and the more so the more complex the problem. The actual tactics or more accurately, the tactics of solving such problems are very complex and basically are manifest in two variants. Trying to gain the greatest number of reinforcements, the examinees shift from one button to the other either after failing to gain the reinforcement or, conversely, after gaining reinforcement. P.V.E.

N64-12528 Joint Publications Research Service, Washington, D.C.

SOME MECHANISMS OF BIOCHEMICAL SELF-REGULATION AT THE CELL LEVEL

K. A. Kafiani *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 304-312 (See N64-12507 04-01) OTS: $5.00

Certain aspects of the dynamic organization which sheds some light on the mechanism of self-regulation of metabolism on the cell level are discussed. Many enzymatic reactions are inhibited by the products of the reactions, not because of a simple shift in equilibrium, but because of a specific inhibition of the enzyme activity by the direct product of its activity. This "product" inhibition is exhibited in many enzymes which initiate practically irreversible reactions and is a simple negative feedback. In summary it is stated that the end product of an enzymatic reaction can regulate its own formation and that its concentration is a tangible signal which is fed back to the system which forms this product. The self-regulation of the formation of a given product can have the following mechanisms: "product" inhibition of the nearest enzyme of the chain; retroinhibition of the first enzyme in the chain; repression of the entire chain of enzymes. P.V.E.

N64-12529 Joint Publications Research Service, Washington, D.C.

EXPERIENCE IN DETERMINING ORGANISM AUTOMATISM AND ITS USE

V. G. Nesterov *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 313-322 (See N64-12507 04-01) OTS: $5.00

Research into the automatism of plants as compared to the self-regulation of internal processes in animals and into the automatism of complexes of organisms is discussed. One communication circuit between organisms and the environment (the moisture of the former and the state of the latter) is discussed in particular. P.V.E.

N64-12530 Joint Publications Research Service, Washington, D.C.

AN AUTOMATIC OPTIMUM FREQUENCY STIMULATOR AS AN INITIAL GENERAL-PHYSIOLOGICAL MODEL FOR DEVELOPING AUTOMATIC BIOLOGICALLY CONTROLLED TREATMENT-DIAGNOSTIC EQUIPMENT

K. D. Gruzdev and M. P. Spichenkov *In its* Biol. Aspects of Cybernetics 11 Jun. 1963 p 323-326 (See N64-12507 04-01) OTS: $5.00

The stimulator is the first step in the realization of an idea that can be defined generally as follows: the maximum individuality of a treatment dictated by the unremitting demand of its biological and consequently its therapeutic adequacy, which means its practical effectiveness, can be attained using special cybernetic treatment-diagnosis equipment. The machines must be able to give each of the patients subjected to it the possibility of selecting automatically at each moment the form of treatment most suitable for the patient. The stimulator was built to generalize and verify the hypothesis from general-physiological positions. P.V.E.

N64-12570 Joint Publications Research Service, Washington, D.C.

STUDIES IN BIOCHEMISTRY

N. I. Yelkina et al 2 Jul. 1963 25 p refs Transl. into ENGLISH of three articles from Vopr. Med. Khim. (Moscow), v. 9, no. 2, 1963 p 154-160, 180-188
(JPRS-19995; OTS-63-31185) OTS: $0.75

CONTENTS:

1. THE PROBLEM OF LIVER PATHOCHEMISTRY AFTER INJURY WITH PLUTONIUM-239 N. I. Yelkina and Z. B. Tokarskaya p 1-9 refs (See N64-12571 04-16)

2. THE CONTENT OF ADENOSINE TRIPHOSPHORIC ACID AND CREATINE PHOSPHATE IN THE BRAINS AND MUSCLES OF ANIMALS ADAPTED AND NOT ADAPTED TO THE COLD L. A. Guseva p 10-16 refs (See N64-12572 04-16)

3. THE EFFECT OF IMIPRAMINE ON THE ACTIVITY OF MONOAMINE OXIDASE OF THE CAT BRAIN R. A. Khaunina and I. P. Lapin p 17-22 refs (See N64-12573 04-16)

N64-12571 Joint Publications Research Service, Washington, D.C.

THE PROBLEM OF LIVER PATHOCHEMISTRY AFTER INJURY WITH PLUTONIUM-239

N. I. Yelkina and Z. B. Tokarskaya *In its* Studies in Biochemistry 2 Jul. 1963 p 1-9 refs (See N64-12570 04-16) OTS: $0.75

Rabbit blood plasma protein fraction composition and urea biosynthesis in the liver were investigated after plutonium-239 administration (7 c/kg). In dogs after doses of 2 c/kg, biosynthesis of urea in liver, blood plasma protein fractions, glutaminate-aspartate and glutamate-alanine transaminase and alkaline phosphatase activity were studied. Rabbit and dog blood plasma showed a gradual decrease in total protein content, mainly due to decrease in albumins, after plutonium-239 administration. In dog blood plasma, a gradual increase in transaminase activity was observed; the increase in glutamate-alanine transaminase activity was more distinct as compared with that of glutamate-aspartate transaminase activity. A reduction in urea biosynthesis was noted during the developing of pronounced liver cirrhosis. Blood plasma alkaline phosphatase activity was increased only in cases of distinct liver cirrhosis and jaundice. Albumin content decrease and transaminase activity increase were observed earlier than any morphological manifestations of intoxication. Author

N64-12572 Joint Publications Research Service, Washington, D.C.

THE CONTENT OF ADENOSINE TRIPHOSPHORIC ACID AND CREATINE PHOSPHATE IN THE BRAINS AND MUSCLES OF ANIMALS ADAPTED AND NOT ADAPTED TO THE COLD

L. A. Guseva *In its* Studies in Biochemistry 2 Jul. 1963 p 10-16 refs (See N64-12570 04-16) OTS: $0.75

After cooling for 4 hours at −5°, ATP and creatine phosphate content in the brain of albino mice adapted to cold varied significantly. In muscles, ATP and creatine phosphate were diminished, the creatine phosphate content decrease being more

significant than that of ATP. Body temperature in animals adapted to cold did not alter from the initial level. Under similar experimental conditions in nonadapted mice, ATP and creatine phosphate accumulation in brain and muscles was observed. At the same time, body temperature decreased by 6°. Author

N64-12573 Joint Publications Research Service, Washington, D.C.
THE EFFECT OF IMIPRAMINE ON THE ACTIVITY OF MONOAMINE OXIDASE OF THE CAT BRAIN

R. A. Khaunina and I. P. Lapin *In its* Studies in Biochemistry 2 Jul. 1963 p 17-22 refs (See N64-12570 04-16) OTS: $0.75

Cat brain monoamine oxidase activity was estimated in Warburg apparatus with butilamine and noradrenaline as substrates. Imipramin (imozine, tophranil) 1.10^{-5} to 1.10^{-3} M inhibits the enzyme activity in vitro by 14.9 to 30.4 percent. The enzyme activity was inhibited approximately to the same degree by iproniazide (iprazide) and chlorpromazine (aminazine). Inhibitory effect of imipramine and iproniazide on monoamine oxidase increased with increase in drug concentrations, whereas no correlation between the inhibition caused by chlorpromazine and its concentration could be noted. Single and repeated administration of imipramine (5 mg/kg) had no effect on monoamine oxidase activity. Author

N64-12576 Joint Publications Research Service, Washington, D.C.
THE ROLE OF FUNCTIONAL STRESS IN THE LOCALIZATION OF RADIATION INJURY

N. V. Sokolova 3 Jan. 1964 22 p Transl. into ENGLISH of portions of the publ. "Rol' Funktsional'noy Nagruzki v Lokalizatsii Luchevogo Porazheniya", Tomsk, 1962 p 3-5 and 100-115
(JPRS-22586; OTS-64-21195) OTS: $0.75

Research was undertaken in order to better understand the pathogenesis of radiation illness. The results of the experiments demonstrated that organ localization of radiation injury is, to a significant degree, determined by the level of the functional stress of the organ during radiation. R.T.K.

N64-12621 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AUTOMATION AND LIFE

A. N. Kolmogorov 1 Oct. 1963 14 p ref Transl. into ENGLISH from Fiz. Mat. Spisanie (Bulgaria), v. 5, no. 3, 1962 p 198-204
(FTD-TT-63-765/1; AD-424870)

The problems of cybernetics and automation and the realization of the higher nervous activity of the mind which is needed to develop highly complex machines and devices are discussed. The treatment took into consideration the modeling of the activity of the human mind as the basis for automation regardless of the complexity of the particular automation system. But the trend was shown towards leaning away from the idea that the human mind is unique, or rather is to remain unique in the area of thinking and displaying emotion. Argued for is the idea of the possibility of producing machines that can display emotion, multiply and reproduce, go through stages of evolution, and experience will and reason. C.L.W.

N64-12628 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INVESTIGATING THE STATE AND CONVERSIONS OF PIGMENTS IN PURPLE AND GREEN PHOTOSYNTHETIZING BACTERIA

Yu. Ye. Yerokhin and A. A. Krasnovskiy 10 Oct. 1963 20 p refs Transl. into ENGLISH from Biofizika (Moscow), v. 8, no. 4, 1963 p 446-456
(FTD-TT-63-867/1+2; AD-424447)

The employment of sensitive methods for registering spectra in combination with deep cooling of objects made possible the detection of the luminescence of aggregated forms of bacteriochlorophyll and bacterioviridine and the measurement of their spectra. An analysis is given of the results, after a comparative investigation of the state of and certain photochemical properties of pigments of purple and green photosynthesizing bacteria in cells, utilizing the method of measuring luminescence at low temperature. C.L.W.

N64-12634 Library of Congress, Washington, D.C. Aerospace Information Div.
SOVIET BIOASTRONAUTICS

16 Apr. 1963 38 p refs
(AID P-63-48) OTS: $3.60 ph, $1.34 mf

Abstracts are presented that are based on: (1) papers presented by Soviet delegates at the International Symposium on Basic Environmental Problems of Man, held in UNESCO House, Paris, France, from 29 October to 2 November 1962; and (2) a collection of articles published in 1962 by the Department of Biological Sciences, Academy of Sciences U.S.S.R., on the problems of space biology. R.T.K.

N64-12677 School of Aerospace Medicine, Brooks AFB, Tex.
EXCLUSION OF ANGULAR ACCELERATIONS AS THE PRINCIPAL CAUSE OF VISUAL ILLUSIONS DURING PARABOLIC FLIGHT MANEUVERS

Bruce H. Warren, James A. Roman, and Ashton Graybiel (Naval School of Aviation Med.) 13 p refs
(SAM-TDR-63-78; AD-422509)

The angular accelerations produced in the pitch axis during parabolic flights in the F-100F jet aircraft were reversed 180° with reference to the experimental subject. This was accomplished by flying the aircraft upside down during most of the subgravity period. During such reversal of angular accelerations, no difference was noted in the observed apparent displacements of a visual real target and afterimage from those observed when the aircraft was flown right side up. The conclusion is drawn that the angular accelerations resulting in the above maneuvers are not a significant factor in producing visual illusions previously observed and described during the subgravity phase. Author

N64-12701 Joint Publications Research Service, Washington, D.C.
STUDIES IN MOLECULAR GENETICS AND THE EFFECT OF RADIATION ON HEREDITY

N. P. Dubinin 2 Jan. 1964 26 p Transl. into ENGLISH of selections from the book "Molekulyarnaya Genetika i Deystviye na Nasledstvennost", Moscow, 1963 p 3-12 and 236-239
(JPRS-22581; OTS-64-21191) OTS: $0.75

Experimental genetics has found means of acting on the number and specific nature of occurring mutations. In this respect, the achievements of radiation and chemical genetics are particularly great. Their utilization has assured the possibility of actively producing extensive, many-sided hereditary variations in the most varied types of organisms. Along these lines, fruits and vegetables of prime practical importance have been obtained. Also, specifically by methods of radiation and chemical genetics and selection, new strains of lower organisms, which are capable of producing antibiotics, have been created. These new strains produce tens and even hundreds of times larger quantities of antibiotics now being used in the control of various diseases. I.v.L.

N64-12715 National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A FIXED-BASE VISUAL-SIMULATOR STUDY OF PILOT CONTROL OF ORBITAL DOCKING OF ATTITUDE-STABILIZED VEHICLES

Donald R. Riley and William T. Suit Jan. 1964 46 p refs
(NASA TN D-2036) OTS: $1.25

A study has been made on a fixed-base simulator of the ability of human pilots to perform the final docking between a manned spacecraft and an orbiting tank by using only visual cues for guidance. The results of the investigation showed that, for most of the simulator flights, the pilots performed the docking maneuver with the following accuracies at contact: (1) vertical and lateral displacements of a coupling mechanism of 1 inch or less; (2) longitudinal contact velocities less than 0.1 fps; (3) residual vertical and lateral velocities of 0.04 fps or less. Flights from 40 feet to contact could be performed in about 3 minutes. The characteristic-velocity increment (an indication of fuel consumption) was small; however, it increased with an increase in control acceleration for the range investigated (0.1 to 1.0 ft/sec^2). Additional considerations of a human's visual capability for judging closing velocity due to size change indicate that a human pilot can serve as a sensor for information gathering with sufficient accuracy for the entire docking maneuver. Author

N64-12724 Joint Publications Research Service, Washington, D.C.
INCIDENCE OF LEUKOSIS AFTER SINGLE AND FRACTIONATED IRRADIATION
S. N. Aleksandrov and K. F. Galkovskaya *In its* Transl. from Dokl. Akad. Nauk SSSR [Moscow, v. 149] no. 1, 1963 12 Jul. 1963 p 14–18 refs (See N64-12722 04-01) OTS: $1.00

The incidence of leukosis in impure-bred strain N mice exposed to 800-r whole-body radiation in a single dose, or in four fractionated doses of 200 r each at 7- or 30-day intervals, was investigated. Among the irradiated animals, 131 cases of leukosis were observed—113 were myeloid forms and 13 lymphoid, with the majority of myeloid forms occurring in males. In general, practically the same incidence of leukosis was noted after the single dose and after the fractionated doses at 7-day intervals; however, increasing the interval between doses to 30 days led to a marked increase in the incidence of leukosis in both males and females. M.P.G.

N64-12725 Joint Publications Research Service, Washington, D.C.
THE EFFECT OF D-C POLES ON ULTRABOUNDARY INHIBITION
N. P. Movchan *In its* Transl. from Dokl. Akad. Nauk SSSR [Moscow], v. 149, no. 1, 1963 12 Jul. 1963 p 1–7 refs (See N64-12722 04-01) OTS: $1.00

The effect of a direct electric current on previously established ultraboundary inhibition in dogs was investigated. (Ultraboundary inhibition, also called supraliminal or transmarginal inhibition, represents an inhibition of the intensity of reflexes occurring after a certain tolerance level in the intensity of the stimulus is reached.) A descending current of 2 to 7 ma, applied by using an anode on the head of the dog and a cathode on the back, was found to disinhibit ultraboundary inhibition. An ascending current, on the other hand, preserved the state of ultraboundary inhibition. The behavior of the dogs in the intervals between the conditioned stimuli was not affected by the applied current. Since ultraboundary inhibition serves to protect the cortical nerve cells from possible functional exhaustion and destruction, the use of a direct current to sustain or intensify this protective state may be of practical value. These results also show the catelectrotonic nature of ultraboundary inhibition and permit it to be categorized as a parabiotic type of inhibition. M.P.G.

N64-12747 Joint Publications Research Service, Washington, D.C.
STUDIES ON PROTECTION AGAINST CHEMICAL AGENTS AND RADIATION IN INDUSTRY
5 Dec. 1963 19 p refs Transl. into ENGLISH of 3 articles from Gigiena Truda i Prof. Zabolevaniya (Moscow), no. 10, Oct. 1963 p 3–8, 34–38, 54–55 refs
(JPRS-22154; OTS-63-41302) OTS: $0.50

CONTENTS:
1. HYGIENIC NORMALIZATION OF NEW CHEMICAL AGENTS A. S. Arkhipov p 1–7 (See N64-12748 04-16)
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3. THE PROBLEM OF PROTECTION OF THOSE WORKING WITH INDUSTRIAL ROENTGENOGRAPHY AND FLUOROSCOPY P. I. Moiseytsev p 14–16 refs (See N64-12750 04-16)

N64-12748 Joint Publications Research Service, Washington, D.C.
HYGIENIC NORMALIZATION OF NEW CHEMICAL AGENTS
A. S. Arkhipov *In its* Studies on Protect. against Chem. Agents and Radiation in Ind. 5 Dec. 1963 p 1–7 (See N64-12747 04-16) OTS: $0.50

The article deals with the establishment of maximally permissible concentrations of chemical substances in the atmosphere of industrial premises. Data are listed on all maximally permissible concentrations accepted in the U.S.S.R. Also discussed is the necessity for some standardization of conditions attending toxicological investigations of maximally-permissible concentrations in relation to the duration of daily poisonings and to the total duration of poisonings in a long-term experiment. Author

N64-12749 Joint Publications Research Service, Washington, D.C.
THE CONDITION OF THE CAPILLARY CIRCULATION AS CORRELATED WITH HYALURONIDASE ACTIVITY (PERMEABILITY FACTOR) AND BLOOD PROTEIN FRACTIONS DURING CHRONIC IRRADIATION
N. I. Gorbarenko and V. A. Bragian *In its* Studies on Protect. against Chem. Agents and Radiation in Ind. 14 Nov. 1961 p 8–13 refs (See N64-12747 04-16) OTS: $0.50

An attempt is made to demonstrate the interrelationship between the condition of the peripheral portion of the vascular system, the capillary permeability, hyaluronidase activity (the permeability factor), and the content of the serum protein fractions during chronic irradiation. The 231 subjects were chosen and divided into four groups, dependent on the degree of expression of their clinical syndrome. All subjects had been exposed to the long-term effect of radiation in X-ray clinics, from gamma-ray flaw detectors and accelerators, or from exposure to continuous-acting luminous materials. Complete test procedures and a summary of results and conclusions are included. J.E.T.

N64-12750 Joint Publications Research Service, Washington, D.C.
THE PROBLEM OF PROTECTION OF THOSE WORKING WITH INDUSTRIAL ROENTGENOGRAPHY AND FLUOROSCOPY
P. I. Moiseytsev *In its* Studies on Protect. against Chem. Agents and Radiation in Ind. 29 Jun. 1961 p 14–16 (See N64-12747 04-16) OTS: $0.50

The value of some recent Soviet publications concerning the problem of radiation protection is discussed. Various types of equipment are suggested for protection against the primary and secondary effects of radiation. J.E.T.

N64-12751 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin
LECTURES FROM THE INSTITUTE FOR FLIGHT-MEDICINE DELIVERED AT THE XI EUROPEAN AERONAUTICAL AND COSMONAUTICAL MEDICAL CONGRESS, MADRID 1962 [VORTRAGE AUS DEM INSTITUT FUR FLUGMEDIZIN]

Sep. 1963 74 p refs GERMAN text with transl. in ENGLISH or FRENCH
(DVL-273) Available from Vereinigte Universitats- u. Fachbuchhandlungen, R. Wagner Str. 1, Cologne, W. Ger.

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4. THE CONDITIONS OF FAT EMBOLISM DURING DECOMPRESSION O. Wünsche and R. H. E. Henn p 33–43 (See N64-12755 04-16)

5. EXPERIMENTAL STUDY ON FAT EMBOLISM IN DECOMPRESSION R. H. E. Henn and O. Wünsche p 48–53 (See N64-12756 04-16)

N64-12752 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin

A STUDY OF VOCATIONAL INTERESTS OF AIRLINE PILOT CANDIDATES

S. Fichtbauer and H. Kirsch *In its* Lectures from the Inst. for Flight-Med. delivered at the XI European Aeron. and Cosmonautical Med. Congr., Sep. 1963 p 11–15 (See N64-12751 04-16)

The selection procedure for becoming a pilot of the Deutsche Lufthansa requires that all young candidates answer a personality questionnaire. Among others, the questionnaire includes some questions regarding the motives for choosing this profession, favorite extracurricular activities, and previous failures. The answers of 100 pilot candidates were correlated with the pilot achievement and motivational professional adjustment which the candidates showed during their subsequent airline pilot training. A low positive correlation was found between the motivational adjustment criterion and the statement that being a pilot is attractive because of the high, versatile requirements of the profession. Furthermore, there was a low positive correlation between the statement that no previous failures were worth mentioning, and the pilot qualification. Finally, and surprisingly, a low negative correlation was seen between technical and mechanical interests and pilot achievement.

Author

N64-12753 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin

ALTERATIONS OF VEGETATIVE-HORMONAL STRESS RESPONSES IN MAN FOLLOWING STRESS ADAPTATION

K. E. Klein, H. Brüner, D. Jovy, and H. M. Wegmann *In its* Lectures from the Inst. for Flight-Med. delivered at the XI European Aeron. and Cosmonautical Med. Congr. Sep. 1963 p 19–24 refs (See N64-12751 04-16)

An investigation was made of the number of eosiniphiles in blood and the level of adrenocortical hormones in plasma in order to examine the behavior of the vegetative–hormonal system under adaptation to different stressors. Three groups of people were adapted as follows: group one was adapted to an altitude of 6200 m in the high mountains for 4 weeks continuously; the second was adapted to a simulated altitude of 6000 m in a decompression chamber by exposing them 30 minutes each day for a period of 4 weeks; and the third group was adapted to heat in a climatic chamber by exposing them 40 minutes a day for 4 weeks to 38° C and 85% relative humidity. Graphical results and conclusions are included. J.E.T.

N64-12754 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin

ON THE INFLUENCE OF LONG LASTING HYPOXIA ON THE ORGANIC TRANSAMINASES

K. H. Weiner and G. Schäfer *In its* Lectures from the Inst. for Flight-Med. delivered at the XI Europeam Aeron. and Cosmonautical Med. Congr. Sep. 1963 p 29–32 (See N64-12751 04-16)

Experiments on the changes in activity, of the glutamine acid-oxalacetic acid transaminase (GOT) and the pyrovat acid-oxalacetic acid transaminase (GPT) in liver, kidney, brain, heart, and serum demonstrated the influence of chronic hypoxia on the intermediary metabolism. As shown in earlier experiments on the serum GOT, considerable changes in activity of the transaminases first occurred in the tested organs under chronic hypoxia. After 40 days a steady state developed in all organs. The influence of hypoxia on the transaminase activity varies in the different organs. The experiments were performed on rabbits which were exposed for a period of 40 days to an O_2– partial pressure of 64 mm Hg in a low-pressure chamber. After exposure to oxygen-deficiency, the animals were kept for a further period of 20 days under normal conditions. During this period changes were also seen in the transaminase activity of different organs.

Author

N64-12755 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin

THE CONDITIONS OF FAT EMBOLISM DURING DECOMPRESSION DIE BEDINGUNGEN DER FETTEMBOLIE BEI DRUCKERNIEDRIGUNG]

O. Wünsche and R. H. E. Henn *In its* Lectures from the Inst. for Flight-Med. delivered at the XI European Aeron. and Cosmonautical Med. Congr. Sep. 1963 p 33–43 In GERMAN; FRENCH transl. (See N64-12751 04-16)

Two men underwent an unauthorized altitude increase in a decompression chamber. Both used oxygen masks. After 20 minutes, both men were dead, their oxygen masks still in place. Postmorten examinations showed, along with various internal hemorrhages, a distinct nontraumatic fat embolism in the cerebral vessels. This accident led to an investigation of conditions that predispose the occurrence of fat embolism. Rabbits, guinea pigs, and rats were placed in a 15-liter decompression chamber. An altitude of 18,000 meters was chosen as the maximum level of ascent. The speed of ascent varied from 20 seconds to 7 minutes. It was observed that disturbances in the test animals, due to acute oxygen deficiency, occurred at a much higher altitude than they do in man. In order to introduce the disturbance threshold at the highest possible altitude, long-duration ascents were conducted in a pure-oxygen medium. This short exposure to oxygen did not eliminate the body nitrogen and was markedly ineffective on fat tissues, which slowly eliminate nitrogen. I.v.L.

N64-12756 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin

EXPERIMENTAL STUDY ON FAT EMBOLISM IN DECOMPRESSION

R. H. E. Henn and O. Wünsche *In its* Lectures from the Inst. for Flight-Med. delivered at the XI European Aeron. and Cosmonautical Med. Congr. Sep. 1963 p 48–53 (See N64-12751 04-16)

Pictorial and graphical results are presented for the conditions and pathological findings of fat embolism caused by decompression. Rats, rabbits, and guinea pigs were the subject animals. Experimental procedures are described, and it is concluded that fat embolism in decompression is possible if: (1) there is no critical atmospheric hypoxydosis, in order to prevent premature suffocation; (2) the circulation is not severely disturbed by gas embolism; and (3) the ascent is fast enough to allow fat cells to rupture as a result of accumulating nitrogen (and yet slow enough to prevent severe gas-bubble formation). The importance of the rate of pressure change in the development of fat embolism is emphasized.

J.E.T.

N64-12764 Joint Publications Research Service, Washington, D.C.
STUDIES IN BURN TREATMENT, BLOOD STRUCTURES, AND RADIATION SICKNESS
N. T. Shutova et al 9 Dec. 1963 47 p refs Transl. into ENGLISH of 8 articles from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 7, no. 4, Jul.–Aug. 1963 p 3–10, 27–34, 40–45, 64–65, and 69–73
(JPRS-22180; OTS-63-41311) OTS: $1.25

CONTENTS:

1. THE PROBLEM OF HEREDITY N. T. Shutova p 1–10 refs (See N64-12765 04-16)

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3. THE PROPERDIN SYSTEM IN BURNS A. M. Yakovlev, O. S. Krasnopevtseva, G. G. Komleva, and S. D. Yakovleva p 17–22a refs (See N64-12767 04-16)

4. THE USE OF BLOOD SUBSTITUTES AND OXIDATION OF THE INTERMEDIATE METABOLIC PRODUCTS DURING REANIMATION AFTER CLINICAL DEATH O. N. Bulanova, and I. O. Zaks p 23–30a refs (See N64-12768 04-16)

5. THE PROTECTIVE AND THERAPEUTIC EFFECTS OF THE SOMATOTROPIC HORMONE IN ACUTE RADIATION SICKNESS S. A. Davydova p 31–33 refs (See N64-12769 04-16)

6. METHOD OF INFLICTING BURNS ON THE RESPIRATORY TRACT EXPERIMENTALLY V. N. Khrebtovich p 34–37 refs (See N64-12770 04-16)

7. SENSITIVE METHOD FOR DETECTING WEAK ANTIBODIES Ye. A. Zotikov, R. M. Urinson, and L. P. Poreshina p 38–40 (See N64-12771 04-16)

8. THE BLOOD CLOTTING SYSTEM AND ITS DISORDERS (STUDY SCHEME) V. S. Gigauri and R. F. Yurin p 41–44 (See N64-12772 04-16)

N64-12765 Joint Publications Research Service, Washington, D.C.
THE PROBLEM OF HEREDITY
N. T. Shutova *In its* Studies in Burn Treat., Blood Struct., and Radiation Sickness 9 Dec. 1963 p 1–10 refs (See N64-12764 04-16) OTS: $1.25

A survey is presented of the progress that has been made in genetics and the study of heredity. A discussion is given of the importance of the carrier of the hereditary information and the genetic code in the DNA molecule, which is converted into the specific protein structure in the cell by means of RNA and therefore determines the properties of a living system. R.T.K.

N64-12766 Joint Publications Research Service, Washington, D.C.
THE TREATMENT OF SEVERE BURN SHOCK BY INTRA-ARTERIAL INFUSION OF A BLOOD SUBSTITUTE UNDER LOW PRESSURE
V. B. Lemus *In its* Studies in Burn Treat., Blood Struct., and Radiation Sickness 9 Dec. 1963 p 11–16 refs (See N64-12764 04-16) OTS: $1.25

This paper deals with the results of treating severe experimental burn shock in rabbits by intra-arterial injection of Petrov's fluid blood substitute under diverse pressure. The best therapeutic effect was obtained following injection of small amounts of the fluid under pressure exceeding the arterial pressure level by only 10 mm Hg; in these cases the reflex control of the vascular tone was partially restored, and arterial pressure rose from 60 to 86–116 mm Hg. Treatment by this method did not prevent the development of hypothermia, and was often accompanied by further thickening of the blood. Author

N64-12767 Joint Publications Research Service, Washington, D.C.
THE PROPERDIN SYSTEM IN BURNS
A. M. Yakovlev, O. S. Krasnopevtseva, G. G. Komleva, and S. D. Yakovleva *In its* Studies in Burn Treat., Blood Struct., and Radiation Sickness 9 Dec. 1963 p 17–22a refs (See N64-12764 04-16) OTS: $1.25

The content of properdin in the blood serum of 89 patients with burns and 26 donors was investigated. In the days immediately following the burn trauma, there was a reduction of the properdin level in the patients' blood. Reduction of the properdin content corresponded to the severity of the condition and was especially pronounced in the group of patients with extensive burns. In gravely ill patients the properdin titre normalized slowly, was unstable, and at times considerably decreased during the course of the disease. Increase or decrease of the properdin level observed during the course of the disease was in a number of cases connected with infectious complications or bacteremia. Author

N64-12768 Joint Publications Research Service, Washington, D.C.
THE USE OF BLOOD SUBSTITUTES AND OXIDATION OF THE INTERMEDIATE METABOLIC PRODUCTS DURING REANIMATION AFTER CLINICAL DEATH
O. N. Bulanova, and I. O. Zaks *In its* Studies in Burn Treat., Blood Struct., and Radiation Sickness 9 Dec. 1963 p 23–30a refs (See N64-12764 04-16) OTS: $1.25

Complete blood substitution (200 percent of the total blood volume) was carried out in the initial restorative period after clinical death caused by blood loss. The amount of organic acid was determined for the blood plasma of recipient and donor. Blood substitution had a marked positive effect on the restoration of functions and survival of the animals. There was a drop in the concentration of organic acids in the blood of the recipient directly after substitution; however, a rise was noted later, and the concentration was high for a prolonged period of time. A considerable amount of organic acid was eliminated with the blood drained during substitution. Only a transient and insignificant rise of organic acid content ensued after replacement of the blood of healthy animals with the blood of donors that had sustained clinical death. The amount of organic acid in the blood of the latter exceeded the normal value 2.5 to 3 times. It was concluded that the high organic acid content, persisting for a long time in the blood of resuscitated animals, is caused not only by the gradual washing out of the initial amount of acid from the tissues, but also by disturbed oxidation processes. Author

N64-12769 Joint Publications Research Service, Washington, D.C.
THE PROTECTIVE AND THERAPEUTIC EFFECTS OF THE SOMATOTROPIC HORMONE IN ACUTE RADIATION SICKNESS
S. A. Davydova *In its* Studies in Burn Treat., Blood Struct., and Radiation Sickness 9 Dec. 1963 p 31–33 refs (See N64-12764 04-16) OTS: $1.25

Male white rats were irradiated with gamma rays of Co^{60} in doses of 700 to 750 r with a dose rate at the source of 324 to 440 r per minute. For prophylaxis, STH (somatotropic hormone) was given every day for 10 days before irradiation; as a therapeutic agent, for the first 6 days after the irradiation, beginning with the first day of the experiment. After irradiation with a dose of 750 r, in one of the series of experiments, STH was used in combination with biomycin (aureomycin). Prophylactic use of STH failed to exert any protective effect. After irradiation, the weight losses in animals which had first been given STH were less pronounced than in the controls. The radioresistance of rats administered STH during the latent period

and at the beginning of clinical manifestations of radiation sickness showed a statistically significant increase in the survival rate. A combination of STH with biomycin did not increase the survival of irradiated animals. R.T.K.

N64-12770 Joint Publications Research Service, Washington, D.C.

METHOD OF INFLICTING BURNS ON THE RESPIRATORY TRACT EXPERIMENTALLY

V. N. Khrebtovich *In its* Studies in Burn Treat., Blood Struct., and Radiation Sickness 9 Dec. 1963 p 34–37 refs (See N64-12764 04-16) OTS: $1.25

A method is described for inflicting burns on the respiratory tract of animals which have not been anesthetized. The animals are tied to a vivisection stand, and spontaneously inhale the thermal agent. In the series of experiments designed to test the effectiveness of the method, a glass tube was fixed in the mouth with bandages; the glass tube was insulated with a mixture of asbestos and fire clay; for inflicting a flame burn, a tube with an expanded outer end was used. Inhalation of hot air at a temperature of 400° to 450° C caused burns of the upper respiratory tract. On the tongue and upper palate, areas of a deep lesion occurred with necrosis of the mucous membrane. The changes in the lungs were slight. When the temperature of the inhaled air was 500° to 550° C the changes were more pronounced. Inhalation of flames of hot alcohol for 30 seconds was accompanied by extensive injuries to the soft tissues and sometimes to the cartilages of the larynx. The trachea was almost always affected, and in some cases the large bronchi were also affected. R.T.K.

N64-12771 Joint Publications Research Service, Washington, D.C.

SENSITIVE METHOD FOR DETECTING WEAK ANTIBODIES

Ye. A. Zotikov, R. M. Urinson, and L. P. Poreshina *In its* Studies in Burn Treat., Blood Struct., and Radiation Sickness 9 Dec. 1963 p 38–40 (See N64-12764 04-16) OTS: $1.25

A test plan is described that makes it possible to increase the sensitivity of methods for detecting weak antibodies. The test is based on determination of the antiglobulin specifically adsorbed on erythrocytes. Study of the sera containing antibodies in low titer made it possible to note a higher sensitivity for this method than for the Coombs test. R.T.K.

N64-12772 Joint Publications Research Service, Washington, D.C.

THE BLOOD CLOTTING SYSTEM AND ITS DISORDERS (STUDY SCHEME)

V. S. Gigauri and R. F. Yurin *In its* Studies in Burn Treat., Blood Struct., and Radiation Sickness 9 Dec. 1963 p 41–44 (See N64-12764 04-16) OTS: $1.25

A method is described for teaching students the principles involved in blood clotting. R.T.K.

N64-12776 Joint Publications Research Service, Washington, D.C.

PROBLEMS IN EARLY DIAGNOSIS OF ACUTE RADIATION SICKNESS

S. N. Ledanova, ed. 27 Nov. 1963 90 p refs Transl. into ENGLISH of 8 articles and the table of contents from the book "K voprosam ranney diagnostiki ostroy luchevoy bolezni", Kiev, State Med. Publishing House Ukrain. SSR, 1962 (JPRS-22049; OTS-63-41239) OTS: $2.25

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2. EARLY CHANGES IN THE PROTEIN COMPOSITION OF BLOOD SERUM DURING ACUTE RADIATION SICKNESS O. V. Fastyuchenko, L. Ya. Popova, and M. G. Nikolayeva p 17–25 refs (See N64-12778 04-16)

3. CHANGES IN PROTEIN METABOLISM DURING RADIATION SICKNESS I. V. Savitskiy and Ye. M. Vasyutinskaya p 26–35 refs (See N64-12779 04-16)

4. CHANGES IN THE PROTEIN METABOLISM OF DOGS GIVEN COMPREHENSIVE TREATMENT FOR ACUTE RADIATION SICKNESS Ye. Ye. Chebotarev and N. I. Kerova p 36–48 refs (See N64-12780 04-16)

5. CHANGES IN THE NUCLEIC ACIDS OF RAT SPLEEN AND BONE MARROW IN ACUTE RADIATION SICKNESS O. V. Fastyuchenko, L. Ya. Popova, and M. G. Nikolayeva p 49–57 refs (See N64-12781 04-16)

6. LUMINESCENT INVESTIGATIONS OF FORMED ELEMENTS OF THE BLOOD AND BONE MARROW IN THE EARLY STAGES OF RADIATION INJURY Ye. V. Piskareva p 58–67 refs (See N64-12782 04-16)

7. EARLY CHANGES IN THE TOXICITY OF RAT BLOOD PLASMA IN ACUTE RADIATION SICKNESS A. K. Arnautov and G. K. Dzhafarov p 68–76 refs (See N64-12783 04-16)

8. EARLY HUMAN SKIN REACTIONS TO ACUTE LOCAL EXPOSURE TO ROENTGEN AND COBALT GAMMA RAYS V. S. Genes, A. I. Il'yevich, and A. I. Kogan p 77–83 refs (See N64-12784 04-16)

N64-12777 Joint Publications Research Service, Washington, D.C.

CHARACTERISTICS OF EARLY DAMAGE TO BLOOD PROTEIN STABILITY IN THE DEVELOPMENT OF RADIATION INJURY ACCORDING TO THE RESULTS OF INVESTIGATION OF THE HEAT EMISSION OF ITS SOLUTIONS

V. K. Tkach *In its* Probl. in Early Diagn. of Acute Radiation Sickness 27 Nov. 1963 p 1–16 refs (See N64-12776 04-16) OTS: $2.25

The thermal properties of blood solutions were studied in order to determine the origin and development of radiation lesions. Structural-energy features and changes in blood proteins were found to parallel the different stages of development of radiation lesions. The difference in the nature of the changes with time in the coefficients characterizing the thermal properties of solutions of proteins and blood from irradiated and nonirradiated animals showed that the use of thermal investigations to study impairment of protein structure, as well as to make some assumptions concerning the mechanism involved, was possible. R.T.K.

N64-12778 Joint Publications Research Service, Washington, D.C.

EARLY CHANGES IN THE PROTEIN COMPOSITION OF BLOOD SERUM DURING ACUTE RADIATION SICKNESS

O. V. Fastyuchenko, L. Ya. Popova, and M. G. Nikolayeva *In its* Probl. in Early Diagn. of Acute Radiation Sickness 27 Nov. 1963 p 17–25 refs (See N64-12776 04-16) OTS: $2.25

The changes in the total content of proteins in the blood serum (and its fractions) after exposure to whole-body irradiation were studied in animals. Results show that the total blood-serum protein content tends to decrease within an hour after X-irradiation—the total content increases in proportion to the dose and time elapsing following exposure. Soon after exposure to all the doses investigated, the albumins decrease in serum whereas the globulins increase. Besides an increase in the entire globulin fraction, there was also an increase in its individual subfractions (α, β, and γ). R.T.K.

N64-12779 Joint Publications Research Service, Washington, D.C.

CHANGES IN PROTEIN METABOLISM DURING RADIATION SICKNESS

I. V. Savitskly and Ye. M. Vasyutinskaya *In its* Probl. in Early Diagn. of Acute Radiation Sickness 27 Nov. 1963 p 26-35 refs (See N64-12776 04-16) OTS: $2.25

The protein metabolism of rabbits exposed to X-rays and injected with toxic doses of radiophosphorus was investigated. Signs of developing radiation sickness were changes in the blood proteins and in residual nitrogen. Changes in residual nitrogen fibrinogen were more consistent than those in the albumins and globulins. Massive doses of radiation were found to increase the content of blood-serum globulins while lowering the albumin level. Abnormalities in protein metabolism, following external and internal radiation, were demonstrated. In both cases, the concentration of fibrinogen and residual nitrogen rises, and there are some changes in the albumins and globulins. R.T.K.

N64-12780 Joint Publications Research Service, Washington, D.C.

CHANGES IN THE PROTEIN METABOLISM OF DOGS GIVEN COMPREHENSIVE TREATMENT FOR ACUTE RADIATION SICKNESS

Ye. Ye. Chebotarev and N. I. Kerova *In its* Probl. in Early Diagn. of Acute Radiation Sickness 27 Nov. 1963 p 36-48 (See N64-12776 04-16) OTS: $2.25

Whole-body irradiation of dogs with a dose of 600 r was found to cause changes in the ratio of blood-serum protein fractions, with an increase in the globulins and a decrease in the albumins. The albumin-globulin ratio decreased. At the same time, nitrogen metabolism was severely impaired being manifested by hypoproteinemia, azotemia, and increased excretion of total and residual nitrogen in the urine. These changes signified rapid decomposition of proteins in the irradiated organism. The prophylactic injection of an arylthiocarbohydrazide derivative 1 hour before irradiation increased the survival time of the animals, and the characteristic symptoms of radiation sickness were less pronounced in these animals than in the control animals. Regeneration of the blood serum proteins after irradiation took 90 days in the control animals and 30 to 40 days in the experimental animals. R.T.K.

N64-12781 Joint Publications Research Service, Washington, D.C.

CHANGES IN THE NUCLEIC ACIDS OF RAT SPLEEN AND BONE MARROW IN ACUTE RADIATION SICKNESS

O. V. Fastyuchenko, L. Ya. Popova, and M. G. Nikolayeva *In its* Probl. in Early Diagn. of Acute Radiation Sickness 27 Nov. 1963 p49-57 refs (See N64-12776 04-16) OTS: $2.25

Changes in nucleic acid metabolism in the hematopoietic organs (spleen, thigh bone marrow) were investigated after a series of successively larger doses of X-ray. The experiments were performed on white rats irradiated once with doses of 150, 300, 450, 600, 750, 900, 1050, and 1200 r. The organs were investigated 1, 24, 48, and 72 hours after irradiation. After the animals were irradiated with the various doses of X-rays, there was a decrease in the nucleic acid content of the spleen and marrow. The most pronounced decrease occurred 24 hours after exposure. The greatest changes in RNA content of the spleen and marrow occurred 1 to 24 hours after irradiation exposure to 300-, 450, and 1050-r doses, and in DNA contents after exposure to 300-, 450-, 750-, 1050-, and 1200-r doses. The greatest decrease in RNA content occurred 48 to 72 hours after irradiation with 600- and 750-r doses, and in DNA content after 600-, 750-, 1050-, and 1200-r doses. After large doses (900 and 1200 r) the RNA content returns to the original level and occasionally exceeds it. The absence of parallelism between the size of the dose and the resultant effect indicated that different doses affect different systems of the organism. R.T.K.

N64-12783 Joint Publications Research Service, Washington, D.C.

EARLY CHANGES IN THE TOXICITY OF RAT BLOOD PLASMA IN ACUTE RADIATION SICKNESS

A. K. Arnautov and G. K. Dzhafrov *In its* Probl. in Early Diagn. of Acute Radiation Sickness 27 Nov. 1963 p 68-76 refs (See N64-12776 04-16) OTS: $2.25

After single whole-body irradiation of rats with doses ranging from 450 to 1200 r, the blood plasma was found to contain substances toxic to paramecia (*Paramecium caudatum*). Toxicity was found to decrease on the first 2 days after irradiation with 150- and 300-r doses; however, toxicity increased on the third day after irradiation with the 150-r dose. Single whole-body irradiation of rats with a dose of 1500 r caused a decrease in the toxic substances of the rat blood plasma throughout the observation period. R.T.K.

N64-12782 Joint Publications Research Service, Washington, D.C.

LUMINESCENT INVESTIGATIONS OF FORMED ELEMENTS OF THE BLOOD AND BONE MARROW IN THE EARLY STAGES OF RADIATION INJURY

Ye. V. Piskareva *In its* Probl. in Early Diagn. of Acute Radiation Sickness 27 Nov. 1963 p 58-67 refs (See N64-12776 04-16) OTS: $2.25

Fluorescent microscopy (in blue light) was used to study the formed elements of the blood of rats and rabbits and the bone marrow of rats that had been exposed to ionizing radiation. The cells were stained with fluorochromes. Results of the investigation indicated that the changes occurring after irradiation were not specific. The appearance of erythrocyte luminescence was found to occur both in nonirradiated animals as well as in animals that had been subjected to irradiation. The irradiated animals were found to have low leukocyte resistance to heat. The changes that take place in the organism in the early stages of radiation sickness, as determined by various methods, were found to move in the same direction—they are phasic. R.T.K.

N64-12784 Joint Publications Research Service, Washington, D.C.

EARLY HUMAN SKIN REACTIONS TO ACUTE LOCAL EXPOSURE TO ROENTGEN AND COBALT GAMMA RAYS

V. S. Genes, A. I. Il'yevich, and A. I. Kogan *In its* Probl. in Early Diagn. of Acute Radiation Sickness 27 Nov. 1963 p 77-83 refs (See N64-12776 04-16) OTS: $2.25

An investigation was undertaken in order to find simple and clear-cut techniques for detecting early skin changes due to the influence of irradiation doses with different penetrating power. X-rays of 200 kv and a 250-r dose of cobalt gamma rays were used. The following indices of the functional state of elements of the skin and its adnexa were used: (1) tactile and pain sensitivity; (2) skin sensitivity to direct current; (3) skin temperature; (4) perspiration; (5) pilomotor reaction to chilling the skin with ether; (6) capillary fragility; and (7) leukocyte count in capillary blood in the skin areas investigated. The subjects were 32 women suffering from II-II degree cancer of the cervix uteri. The skin reaction was studied in both buttocks before and after either buttock was irradiated. The results of the study indicated that the aforementioned methods cannot be used for early detection of skin changes due to irradiation. R.T.K.

N64-12793 Joint Publications Research Service, Washington, D.C.
SOVIET RESEARCH ON RADIATION EFFECTS
M. D. Pomerantseva et al 29 Nov. 1963 25 p refs Transl. into ENGLISH of four articles from Dokl. Akad. Nauk SSSR, (Moscow), v. 151, no. 1, 1963
(JPRS-22083; OTS-63-41258) OTS: $0.75

1. GENETIC CONSEQUENCES OF THE ACTION OF FAST NEUTRONS ON MOUSE SPERM M. D. Pomerantseva and L. K. Ramayya p 1-5 refs (See N64-12794 04-16)
2. DYNAMICS OF POSTRADIATION RESTORATION OF YEAST CELLS IN RELATION TO THE DOSAGE OF GAMMA RADIATION V. S. Barsukov, O. V. Malinovskiy, and N. M. Mityushova p 6-11 refs (See N64-12795 04-16)
3. REPARATIVE REGENERATION OF RAT LIVER AFTER LOCAL X-IRRADIATION M. M. Kalashnikova p 12-18 refs (See N64-12796 04-16)
4. STUDY OF THE SHIELDING ACTION OF CYSTAMINE ON EHRLICH'S ASCITIC CARCINOMA IRRADIATED IN VIVO AND IN VITRO I. V. Nekrasova p 19-22 refs (See N64-12797 04-16)

N64-12794 Joint Publications Research Service, Washington, D.C.
GENETIC CONSEQUENCES OF THE ACTION OF FAST NEUTRONS ON MOUSE SPERM
M. D. Pomerantseva and L. K. Ramayya *In its* Soviet Res. on Radiation Effects 29 Nov. 1963 p 1-5 refs (See N64-12793 04-16) OTS: $0.75

The rate at which dominant lethal mutations appeared in spermatozoa and spermatids served as an indicator of the genetic effects of the action of fast neutrons on mouse sperm. Results demonstrated that as the dose of fast neutrons increased there was a proportionate increase in the number of dead embryos from the nonirradiated females mated with the irradiated males. There was an exponential relationship between the frequency with which dominant lethal mutations appeared and the dose of fast neutrons. The effectiveness of fast neutrons on spermatozoa was found to be almost four times greater than after X-irradiation. On spermatids, the relative biological effectiveness of fast neutrons was lower than for spermatozoa. R.T.K.

N64-12795 Joint Publications Research Service, Washington, D.C.
DYNAMICS OF POSTRADIATION RESTORATION OF YEAST CELLS IN RELATION TO THE DOSAGE OF GAMMA RADIATION
V. S. Barsukov, O. V. Malinovskiy, and N. M. Mityushova *In its* Soviet Res. On Radiation Effects 29 Nov. 1963 p 6-11 refs (See N64-12793 04-16) OTS: $0.75

The restoration of the capacity for unlimited multiplication of yeast cells, with different ploidy, after gamma irradiation was investigated. The restoration rate was found to decrease as the dose was increased. Throughout the range of doses, the restoration rate for diploid cells was found to be lower than the rate for tetraploids. R.T.K.

N64-12796 Joint Publications Research Service, Washington, D.C.
REPARATIVE REGENERATION OF RAT LIVER AFTER LOCAL X-IRRADIATION
M. M. Kalashnikova *In its* Soviet Res. On Radiation Effects 29 Nov. 1963 p 12-18 refs (See N64-12793 04-16) OTS: $0.75

An investigation was made of the effects of local irradiation on the liver. Male white rats were the experimental animals, and they were exposed to single, local X-irradiation in the liver region with a dose of 1000 r. Irradiating the liver resulted in the formation of small necrotic foci in the liver parenchyma, vacuolation of the cytoplasm, impairment of nuclear structure, and atypical mitoses. The liver was found to react to subtotal hepatectomy and to irradiation in the same way in the form of hyperemia, appearance of mitoses, and hypertrophy of the cunleoli, but in the case of irradiation these processes set in later, and there was atypical mitoses. The effect of irradiation on the liver following partial excision included inhibition of the leukocyte and connective tissue reaction, appearance of atypical mitoses, and, in the younger animals, marked edema. R.T.K.

N64-12797 Joint Publications Research Service, Washington, D.C.
STUDY OF THE SHIELDING ACTION OF CYSTAMINE ON EHRLICH'S ASCITIC CARCINOMA IRRADIATED IN VIVO AND IN VITRO
I. V. Nekrasova *In its* Soviet Res. On Radiation Effects 29 Nov. 1963 p 19-22 refs (See N64-12793 04-16) OTS: $0.75

The results of comparative studies of the antiradiation activity of cystamine and cysteamine on Ehrlich's ascitic carcinoma when irradiated in the abdominal cavity of mice and *in vitro* are discussed. The results demonstrated that both cysteamine and cystamine are almost equally effective in reducing the percentage of cells with chromosomal aberrations caused by irradiation, provided that the tumor cells were irradiated in the animal's abdominal cavity, but only cysteamine exerted protective action when they were irradiated *in vitro*. In this event the cysteamine antiradiation activity was approximately the same as when the cells were irradiated *in vivo*. Cystamine, however, when added to the ascitic fluid *in vitro*, had no perceptible effect on radiation injury according to the criterion under investigation. R.T.K.

N64-12801 Joint Publications Research Service, Washington, D.C.
SOVIET STUDIES OF RADIATION SICKNESS
V. V. Antipov et al 2 Jul. 1963 21 p refs Transl. into ENGLISH of 4 articles from Med. Radiol. (Moscow), v. 8, no. 4, Apr. 1963 p 81-92
(JPRS-19996; OTS-63-31186) OTS: $0.50

CONTENTS:
1. TESTS OF TRYPTAMINE (3-BETA-AMINOETHYLINDOLE HYDROCHLORIDE) FOR ACUTE RADIATION SICKNESS IN MICE V. V. Antipov p 1 (See N64-12802 04-16)
2. THE EFFECT OF ULTRAVIOLET RADIATION ON THE COURSE OF RADIATION SICKNESS V. D. Abdullayev p 2-3 refs (See N64-12803 04-16)
3. REVIEW OF BOOK BY F. M. LYASS, ISOTOPIC MYELOGRAPHY [IZOTOPNAYA MIYELOGRAFIYA] N. K. Muratkhodzhayev p 4-5
4. CONFERENCE ON PROBLEMS OF THE PATHOGENESIS, EXPERIMENTAL PROPHYLAXIS AND THERAPY OF RADIATION INJURY O. V. Popov p 6-18 refs (See N64-12804 04-16)

N64-12802 Joint Publications Research Service, Washington, D.C.
TESTS OF TRYPTAMINE (3-BETA-AMINOETHYLINDOLE HYDROCHLORIDE) FOR ACUTE RADIATION SICKNESS IN MICE
V. V. Antipov *In its* Soviet Studies of Radiation Sickness 2 Jul. 1963 p 1 (See N64-12801 04-16) OTS: $0.50

The effect of tryptamine, when used for a long time, on the formation of hemorrhages (petechiae) in irradiated mice was investigated. Results indicated that tryptamine doses of 10 to

25 milligrams per kilogram of specimen body weight, when injected intraperitoneally for 5 to 7 days, beginning with the second day after irradiation, exerted no effect on the formation of petechiae. I.v.L.

N64-12803 Joint Publications Research Service, Washington, D.C.
THE EFFECT OF ULTRAVIOLET RADIATION ON THE COURSE OF RADIATION SICKNESS
V. D. Abdullayev *In its* Soviet Studies of Radiation Sickness 2 Jul. 1963 p 2-3 refs (See N64-12801 04-16) OTS: $0.50

The effect of high doses of ultraviolet rays in whole-body radiation injuries in white rats was investigated. Results indicate: (1) Ultraviolet irradiation of animals in high doses (total dose of 24,000,000 ergs/cm^2 before and after a single whole-body X-ray irradiation in a sublethal dose, 500 r) aggravates the course of radiation sickness, which was expressed in an increase in the number of animals which died, a shortening of their lifespans, and a less rapid recovery of weight when compared with the controls. (2) The use of a dose of ultraviolet irradiation several times greater than that used heretofore not only fails to contribute to reducing the degree of radiation injury but even enhances its development. I.v.L.

N64-12804 Joint Publications Research Service, Washington, D.C.
CONFERENCE ON PROBLEMS OF THE PATHOGENESIS, EXPERIMENTAL PROPHYLAXIS AND THERAPY OF RADIATION INJURY
O. V. Popov *In its* Soviet Studies of Radiation Sickness 2 Jul. 1963 p 6-18 refs (See N64-12801 04-16) OTS: $0.50

Excerpts from various reports concerning the problems of the pathogenesis, experimental prophylaxis, and therapy of radiation injury are presented. I.v.L.

N64-12811 Atomic Energy Commission, Washington, D.C. Div. of Tech. Information
RESEARCH AND DEVELOPMENT IN PROGRESS, BIOLOGY AND MEDICINE
Nov. 1963 331 p refs
(TID-4201)

AEC-sponsored biomedical research projects in progress at AEC laboratories and major contractor sites are cited. The approximately 600 projects identified, summarized, and indexed herein, along with the offsite projects reported in TID-4200, constitute virtually complete coverage of all research projects administered by the AEC Division of Biology and Medicine during fiscal year 1963. The first section provides a scope note or abstract and identifying information on each project. The second section consists of contractor, principal investigator, contract number, and subject indexes. Major topics of discussion include somatic effects of radiation, radiation genetics, combating detrimental effects of radiation, molecular and cellular level studies, environmental radiation studies, radiological and health physics, chemical toxicity, nuclear-energy civil effects, and cancer research. J.E.T.

N64-12835 Harvard U., Boston Medical School
CATECHOLAMINE RELEASE FROM ADRENAL SLICES AND RATE OF RESPIRATION
P. R. Draskoczy, W. R. Burack, and N. Weiner Brooks AFB, Tex., School of Aerospace Med., Sep. 1963 12 p refs
(Contract AF 41(657)-414)
(SAM-TDR-63-50; AD-421848)

The oxygen consumption of, and the catecholamine release from, incubated fowl adrenal slices were studied under control conditions and during exposure to several chemical agents—i.e., potassium ion, reserpine, tyramine, and 2,4-dinitrophenol. Potassium ion, given as KCl, 0.1 M, and tyramine, 7.3×10^{-3} M, did not alter the respiration rate but did increase the rate of catecholamine release. Reserpine, 3.3×10^{-5} M, depressed the rate of respiration but did not affect the rate of release of catecholamines. The 2,4-dinitrophenol, 7×10^{-5} M, caused an immediate, marked increase in oxygen consumption unaccompanied by any change in the rate of release of catecholamines over a period of 2 hours. Subsequently, the rate of release exceeded control values. Author

N64-12845 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
BIONICS
A. I. Prokhorov 5 Aug. 1963 83 p Transl. into ENGLISH of the book "Bionika", Moscow, Izd. "Znaniya" Vses. obshch. po resprostraneniyu znaniy, 1963 p 1-56
(FTD-TT-63-557/1+4; AD-421190)

Problems of bionics, achievements in the field of bionics, and the outlook for the technical use of bionics are discussed in a nontechnical manner. P.V.E.

N64-12849 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
MAN AND THE COSMOS
V. V. Parin 16 Jan. 1963 4 p Transl. into ENGLISH of an article from the Russian newspaper, Sov. Litva, 31 Mar. 1961 p 4
(FTD-TT-62-1605/1; AD-295783) OTS: $1.10

Professor Parin predicts the occurrence of man's flight into space. The improvement in Soviet technology and the extensive program of biological investigations that will make the flight possible are discussed. R.T.K.

N64-12855 School of Aerospace Medicine, Brooks AFB, Tex.
EFFECT OF VENTILATING AIR FLOW ON HUMAN WATER REQUIREMENTS
B. E. Welch, R. G. Cutler, J. E. Herlocher, J. J. Hargreaves, F. Ulvedal et al Oct. 1963 14 p refs
(SAM-TDR-63-59; AD-426008)

This paper presents the results of a preliminary experiment designed to study water requirements of men wearing partially donned and fully donned pressure suits. The 13-day test was conducted at an altitude of 27,000 ft in an atmosphere of essentially 100% oxygen. The pressure suits were similar to standard pressure garments except the arms and legs were detachable at the middle of the upper arm and leg. Ventilating airflow was provided by means of onboard, high-speed centrifugal compressors. Water requirements were determined by measuring water intake and output, as well as urine osmolarity, specific gravity, blood hematocrit, and urea nitrogen. Water requirements were found to increase over previously noted values at this altitude. This increase was reflected by a slight decrease in urine volume and by an increase in water lost through the lungs and skin. Author

N64-12864 School of Aerospace Medicine, Brooks AFB, Tex.
TIME-CONCENTRATION EFFECTS IN RELATION TO OXYGEN TOXICITY IN MAN
B. E. Welch, T. E. Morgan, Jr., and H. G. Clamann Oct. 1963 16 p refs
(*Its* Aeromed. Rev. 9-63)

This paper attempts to bring together salient features of research conducted at high and low oxygen partial pressure, in an effort to stimulate additional research to fill the many gaps in man's knowledge and understanding of oxygen. C.L.W.

N64-12865 School of Aerospace Medicine, Brooks AFB, Tex.

A RESTRAINT APPARATUS FOR THORACIC ROENTGENOGRAPHIC EXAMINATION OF UNANESTHETIZED PRIMATES

Robert J. Young Nov. 1963 8 p refs

(SAM-TDR-63-93; AD-425542)

An apparatus to immobilize a small primate during chest radiography is described. The use of this apparatus with proper exposure factors will produce radiographs of sufficient clarity to permit the detection of pulmonary tuberculosis. Author

N64-12883 Joint Publications Research Service, Washington, D.C.

STUDIES ON DEOXYRIBONUCLEASE

R. I. Salganik et al 27 Nov. 1963 13 p refs Transl. into ENGLISH of 2 articles from Izv. Sibirsk. Otd. Akad. Nauk SSSR, Ser. Biologo-Med. Nauk (Novosibirsk), no. 8, issue 2, 1963 p 99-107

(JPRS-22050; OTS-63-41240) OTS: $0.50

CONTENTS:

1. ACTION OF DEOXYRIBONUCLEASE ON THE PROPAGATION OF ADENOVIRUS IN TISSUE CULTURE R. I. Salganik and A. A. Trukhachev p 1-4 refs (See N64-12884 04-16)

2. CLINICAL TESTING OF DEOXYRIBONUCLEASE IN ADENOVIRAL CONJUNCTIVITIS N. I. Morozkin and R. Ya. Khersonskaya p 5-10 refs (See N64-12885 04-16)

N64-12884 Joint Publications Research Service, Washington, D.C.

ACTION OF DEOXYRIBONUCLEASE ON THE PROPAGATION OF ADENOVIRUS IN TISSUE CULTURE

R. I. Salganik and A. A. Trukhachev *In its* Studies on Deoxyribonuclease 27 Nov. 1963 p 1-4 refs (See N64-12883 04-16) $0.50

An investigation was made of the capacity of deoxyribonuclease, DNAase, to inhibit the propagation of DNA-containing viruses that are pathogenic for man; one type is the adenovirus which causes lesions of the respiratory tract, severe keratitis, and conjunctivitis. The effect of DNAase was found to inhibit the development of the cytopathogenic effect of the virus. The clinical effectiveness of DNAase in human diseases caused by adenoviruses was also investigated. DNAase was found to be an effective therapeutic agent. R.T.K.

N64-12885 Joint Publications Research Service, Washington, D.C.

CLINICAL TESTING OF DEOXYRIBONUCLEASE IN ADENOVIRAL CONJUNCTIVITIS

N. I. Morozkin and R. Ya. Khersonskaya *In its* Studies on Deoxyribonuclease 27 Nov. 1963 p 5-10 refs (See N64-12883 04-16) OTS: $0.50

The therapeutic effectiveness of deoxyribonuclease, DNAase, in the treatment of patients with adenovirus conjunctivitis was demonstrated clinically. Early use of the enzyme was effective in the treatment of membranous conjunctivitis and keratitis. R.T.K.

N64-12886 Joint Publications Research Service, Washington, D.C.

SOVIET RESEARCH IN RADIOLOGY

T. V. Tarapina et al 29 Nov. 1963 14 p refs Transl. into ENGLISH of 2 articles from Dokl. Akad. Nauk SSSR (Moscow), v. 152, no. 1, 1963 p 202-204 and 215-217

(JPRS-22082; OTS-63-41257) OTS: $0.50

CONTENTS:

1. THE EFFECT OF IONIZING RADIATION ON MAMMALIAN HEART MUSCLE T. V. Tarapina p 1-6 refs (See N64-12887 04-16)

2. DECREASE IN THE EFFECTIVENESS OF THE SHIELDING ACTION OF CYSTEAMINE AFTER REPEATED IRRADIATION S. N. Aleksandrov and K. F. Galkovskaya p 7-11 refs (See N64-12888 04-16)

N64-12887 Joint Publications Research Service, Washington, D.C.

THE EFFECT OF IONIZING RADIATION ON MAMMALIAN HEART MUSCLE

T. V. Tarapina *In its* Soviet Res. in Radiol. 29 Nov. 1963 p 1-6 refs (See N64-12886 04-16) OTS: $0.50

A detailed study was made based on experiments with white rats given whole body irradiation to determine if X-rays have an effect on the heart. Tests revealed that the fiber of the heart undergoes reactive and destructive changes after animals are irradiated with a dose of 600 rads. The destructive changes are most apparent at the climax of the radiation sickness and achieve a maximum in the dying and dead animals between 8 and 16 to 20 days later. An asymptomatic state is then followed by the loss of transverse striation, vacuolation, Zenkers degeneration of muscular fibers, and fatty degeneration. The glycogen level of the muscular fibers is lowered, and the formation of large clumps and drops is observed. C.L.W.

N64-12888 Joint Publications Research Service, Washington, D.C.

DECREASE IN THE EFFECTIVENESS OF THE SHIELDING ACTION OF CYSTEAMINE AFTER REPEATED IRRADIATION

S. M. Aleksandrov and K. F. Galkovskaya *In its* Soviet Res. In Radiol. 29 Nov. 1963 p 7-11 refs (See N64-12886 04-16) OTS: $0.50

Three experiments were performed in which a comparison was made of the effectiveness of cysteamine ascorbate as a shielding agent in animals given primary and secondary irradiation. The experiments confirmed an assumption that an irradiated organism which received an injection of a shielding agent is less protected from subsequent irradiation than an organism which received the shielding agent prior to irradiation. C.L.W.

N64-12895 Joint Publications Research Service, Washington, D.C.

BIOLOGICAL ACTION OF IONIZING RADIATION

G. G. Afanas'yev et al 29 Jul. 1963 11 p refs Transl. into ENGLISH of 2 articles from Dokl. Akad. Nauk SSSR (Moscow), v. 148, no. 5, 11 Feb. 1963 p 1199-1201 and 1207-1209 (JPRS-20375; OTS-63-31393) OTS: $0.50

CONTENTS:

1. SENSITIZATION OF TUMOR CELLS TO THE ACTION OF IONIZING RADIATION BY RADICAL-REACTION INHIBITORS G. G. Afanas'yev, L. P. Lipchina, and I. I. Pelevina p 1-4 refs (See N64-12896 04-16)

2. REACTION OF IRRADIATED PROTEIN RADICALS WITH ALKYLPHENOLS I. I. Sapezhinskiy, M. S. Postnikeva, and N. M. Emanuel' p 5-9 refs (See N64-12897 04-16)

N64-12896 Joint Publications Research Service, Washington, D.C.

SENSITIZATION OF TUMOR CELLS TO THE ACTION OF IONIZING RADIATION BY RADICAL-REACTION INHIBITORS

G. G. Afanas'yev, L. P. Lipchina, and I. I. Pelevina *In its* Biol. Action of Ionizing Radiation 29 Jul. 1963 p 1-4 refs (See N64-12895 04-16) OTS: $0.50

The stable free radicals formed from inhibitors have a radiomimetic action; at the same inhibitor concentrations, this radiomimetic effect appears only in tumor cells, whereas normal cells remain intact. Experimental results indicate that the joint action of free-radical reaction inhibitors and gamma rays, on cells of Ehrlich's ascitic cancer, produces an effect considerably greater than the sum of their individual effects. Radical reaction inhibitors can therefore be used to increase the sensitivity of tumor cells to ionizing radiation. R.T.K.

N64-12897 Joint Publications Research Service, Washington, D.C.
REACTION OF IRRADIATED PROTEIN RADICALS WITH ALKYLPHENOLS
I. I. Sapezhinskiy, M. S. Postnikeva, and N. M. Emanuel' *In its* Biol. Action of Ionizing Radiation 29 Jul. 1963 p 5-9 refs (See N64-12895 04-16) OTS: $0.50

An investigation was made to elucidate the basic possibility of reactions between irradiated protein radicals R· or RO_2· (in the presence of oxygen) and free radical reaction inhibitors InH. A method was developed which makes possible the study of the reaction between previously irradiated protein radicals and various substances by the EPR (electron paramagnetic resonance) method. The EPR spectrum of ionol after reaction with protein radicals and the EPR spectrum of the ionol radical produced during reaction with lead tetraacetate were obtained. Ionol, a free radical reaction inhibitor, was found to react efficiently with irradiated protein radicals. R.T.K.

N64-12898 California U., Los Angeles School of Medicine
INCREASED ENVIRONMENTAL RADIATION IN SOUTHERN NEVADA, OCTOBER-DECEMBER, 1961
William E. Martin and Frederick B. Turner Jul. 1963, 46 p refs (Contract AT (04-1)-Gen-12)
(UCLA-518)

Some of the conclusions from radiochemical and statistical analyses of samples are: (1) The gross beta activity of soils in southern Nevada tended to decrease with increasing distance from the Nevada Test Site and appeared to be related to the general pattern of fallout from nuclear detonations during the 1950's. (2) The gross beta activity of plant samples also tended to decrease with increasing distance from the Nevada Test Site. (3) There was a significant and geographically uniform increase in the beta activity of plants and rabbit stomach contents both at and to the south of the Nevada Test Site. (4) Similarly, there were increases in the radiostrontium content of rabbit bones and in the Cs-137 content of rabbit muscle. (5) Most of the observed increase of environmental radiation in southern Nevada was due to radioisotopes such as Sr-89, Y-91, Ce-141, and Ce-144 having intermediate half-lives. Author

N64-12899 Library of Congress, Washington, D.C.
ABSTRACTS OF CURRENT LITERATURE
Arnold J. Jacobius and Roman Kenk, ed. Repr. from Aerospace Med., v. 34, no. 9, Sep. 1963 p 865-876 refs
(Supported by NASA)

Abstracts of current literature dealing with aerospace medicine are presented. The abstracts are listed according to the following categories: general aspects; biology; general physiology; neurophysiology and sensory physiology; psychology and psychiatry; personnel; medical problems and pharmacology; toxicology; safety, survival, and rescue; and man-machine integration and life-support systems. P.V.E.

N64-12908 Atomic Energy Commission, New York, N. Y. Health and Safety Lab.
FALLOUT PROGRAM Quarterly Summary Report, 1 Sep.-1 Dec. 1962
Edward P. Hardy, Jr., Joseph Rivera, and William R. Collins, Jr. Jan. 1963 262 p refs
(HASL-132) OTS: $3.50

This report presents current data from the HASL Fallout Program, the U. S. Naval Research Laboratory, the New Zealand Department of Scientific and Industrial Research, and the Dominion X-Ray and Radium Laboratory in New Zealand. Radionuclide levels in fallout, milk, tap water, and upper air samples are given in tabular form. Interpretive reports and notes dealing with strontium-90 and stable strontium levels in diet and human bone, fallout at a single gummed film station, strontium-90 in 1961 wheat, cesium-137 to strontium-90 ratios in fallout, and the calculated residence times for cadmium-109 tracer are included. A bibliography of recent literature pertinent to fallout studies is given at the end of the report. Author

N64-12909 Atomic Energy Commission, New York, N.Y. Health and Safety Lab.
FALLOUT PROGRAM Quarterly Summary Report, 1 Dec. 1962-1 Mar. 1963
Edward P. Hardy, Jr., Joseph Rivera, and William R. Collins, Jr. 1 Apr. 1963 316p refs
(HASL-135) OTS: $4.00

This report presents current data from the HASL Fallout Program, the U.S. Naval Research Laboratory, the New Zealand Department of Scientific and Industrial Research, and the Dominion X-ray and Radium Laboratory in New Zealand. Radionuclide levels in fallout, milk, tap water, and upper air samples are given in tabular form. Interpretive reports and notes dealing with worldwide strontium-90 fallout through May 1962, latitudinal spread of 1961 U.S.S.R. nuclear debris, strontium-90 levels in infant and adult diet and bone, and a comparison between two monthly fallout collection devices are included. Author

N64-12915 National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
RESULTS OF THE PROJECT MERCURY BALLISTIC AND ORBITAL CHIMPANZEE FLIGHTS
James P. Henry and John D. Mosely, eds. Washington, NASA, 1963 77 p refs
(NASA SP-39) GPO: $0.45

The objectives of the MR-2 and MA-5 flights were: (1) provision of animal verification of a successful spaceflight prior to manned flight; (2) provision of data on the physical and psychological demands which were to be encountered by the astronauts during spaceflight; (3) provision of a dynamic test of operational procedures and training of support personnel in handling the biomedical program for manned flight; and (4) evaluation of the spacecraft environmental control system and bioinstrumentation under flight conditions. The methods, results, and conclusions drawn as a result of these two flights are presented. J.E.T.

N64-12943 St. Louis U., Mo.
EFFECTS OF X-IRRADIATION DURING HIBERNATION ON TISSUE CATECHOLAMINE CONTENTS
X. J. Musacchia, M. Jellinek, and T. Cooper Repr. from Experienta (Basel), v. 19, no. 418, 1963 5 p refs
(NASA Grant NsG-271-62)

Hibernating *Citellus tridecemlineatus* showed a lowering of the catecholamine concentration in the liver and kidneys 20 hours after irradiation with lethal doses (2000 r). However, the content of myocardial catecholamine appeared unchanged when the changes in the water content of the tissues were considered. I.v.L.

N64-12944 Florida State U., Tallahassee Inst. for Biosciences
AMINO ACID COMPOSITIONS OF PROTEINOIDS
Sidney W. Fox, Kaoru Harada, Kenneth R. Woods, and Charles Ray Windsor (Cornell U.) Repr. from Arch. Biochem. Biophys., v. 102, 1963 p 439-445
(NASA Grant NsG-173-62)
(*Its* Contrib. 8)

Proteinoids prepared by thermal copolymerization of 18 common amino acids have been analyzed. Conditions for quantitative recovery of the total amino acids following hydrolysis have been established. The effects of various amino acid reaction mixtures upon the composition of the polymers obtained have been studied. Author

N64-12962 National Aeronautics and Space Administration, Washington, D.C.
FORMATION OF CONDITIONED REFLEX RESPONSES TO A MAGNETIC FIELD IN FISH [OBRAZOVANIYE USLOVNYKH REFLEKSOV NA MAGNITNOYE POLE U RYB]
Yu. A. Kholodov Jan. 1964 15 p refs Transl. into ENGLISH from Tr. Soveshch. po Fiz. ryb, Akad. Nauk, SSSR no. 8, 1958 p 82-89
(NASA TT F-190) OTS: $0.50

In experiments performed on carp, the possibility of forming reflexes or inhibitions with respect to a magnetic field was established. The threshold of perception of a magnetic field was from 10 to 30 oersteds. Neither denervation of the lateral-line organs nor removal of the eyes disturbed the conditioned response. Author

N64-12967 California U., Los Angeles Brain Research Inst.
SECOND ANNUAL REPORT, JULY 1, 1962-JUNE 30, 1963
[1963] 119 p refs

A report is presented concerning the activities of the Brain Research Institute. A list of the members of the Institute is given, and the Institute's activities, service, facilities, and operational support are discussed. C.L.W.

N64-12968 California U., Davis
RADIATION TECHNOLOGY IN CONJUNCTION WITH POST-HARVEST PROCEDURES AS A MEANS OF EXTENDING THE SHELF LIFE OF FRUITS AND VEGETABLES Annual Report, 1 Feb. 1962-30 Jan. 1963
Washington, AEC Div. of Tech. Inform., 15 Oct. 1963 184 p refs
(Contract AT(11-1)-34)
(TID-19206) OTS: $2.75

The application of ionizing radiation in conjunction with postharvest procedures is discussed as a possible means of controlling deleterious pathological, physiological, and morphological phenomena in fruits and vegetables in an attempt to extend the shelf life of the fruits and vegetables. The methods employed are given along with the results which have occurred. C.L.W.

N64-12975 Royal Inst. of Tech., Stockholm (Sweden)
SPEECH ANALYSIS TECHNIQUES Quarterly Technical Status Report No. 1, 1 Aug.-31 Oct. 1963
1963 4p
(Contract DA-91-591-EUC-3080)
(AD-424609)

Research activities in the following areas are summarized: (1) spectrograms of Swedish stops—a general study of Swedish and English speech material has started in order to collect a representative set of spectrograms and supplementary acoustic records of a selected set of vowel and consonant allophones; (2) spectrum envelopes for synthetic vowels—a computer program has been written which calculates the harmonic specification of a formant pattern directly from the separate formants and, in addition, compares these calculated harmonics with read-in harmonics which may be obtained either from a natural vowel or a machine synthesized vowel; and (3) a study in French intonation—a study is presented of the role of fundamental frequency as determined by systematic variations in synthetic speech. P.V.E.

N64-12997 Army Missile Command, Huntsville, Ala.
NEW MEASURING DEVICES FOR HEALTH PHYSICS
A. Anzani, A. Malvicini, and M. Salvini 25 Oct. 1963 19 p refs Transl. into ENGLISH from Rept. 14.i, Commissione della Comunita Europa dell'Energia Atomica, Jun. 1962
(RSIC-87; AD-422785)

Reasons are summarized which led to the production of a new transistorized instrumentation for measurements in health physics. The operational principles of the circuits and the technical data obtained from the new instruments are also outlined. Author

N64-13004 California U., Los Angeles School of Medicine
SUSPENSIONS OF RADIOALBUMIN AGGREGATES FOR PHOTOSCANNING THE LIVER, SPLEEN, LUNG, AND OTHER ORGANS
G. V. Taplin, E. K. Dore, and D. E. Johnson Nov. 1963 40 p refs
(Contract AT(04-1)-GEN-12)
(UCLA-519)

Current methods of preparing small- and large-size suspensions of radioalbumin aggregates by heat treatment and pH adjustment are presented. The small-size suspensions (10 to 20 mμ) are shown to be superior to other agents for liver-spleen scanning. Radiation exposure to these organs is minimized, and the albumin suspensions can be prepared with relative ease and simplicity. Also the heart, stomach, and salivary glands may be clearly visualized by photoscanning with this material. The techniques and physiological basis for performing and interpretating scans of these organs are described. Their diagnostic value is illustrated. The physiological basis for using large-size suspensions of the same material for visualization of the lungs is presented along with typical scans in dogs produced with suspensions of each of two size ranges (2.5μ and 15μ). The smaller size is preferable because of far less probability of capillary embolization. Author

N64-13005 Radio Corp. of America, Moorestown, N.J. Missile and Surface Radar Div.
FUNCTIONAL DESCRIPTION OF A CONTROLLER/EQUIPMENT MODULE Final Report
A. Bezgin, R. J. Kosich, and R. G. Wolcott Jul. 1963 116 p
(Contract ARDS-612)

A study was conducted to describe and simulate a controller/equipment module; that is, a human controller, a satellite computer, and associated displays and controls. The results, described in this report, show that this modular concept has application in several areas of air traffic control. A simplified simulation model of the module has been developed, and will serve as a test bed for further exploration into air traffic control problems, and also assist in a continued study and definition of a controller/equipment module. The model includes a simulation of the controller, communications, aircraft and pilot response, and the air traffic environment, in addition to the module functions of conflict search, detection and resolution. It also includes the first steps taken in the development of the higher-level functions of adaptive feedback control and automated learning. Author

N64-13006 Joint Publications Research Service, Washington, D.C.
THE EFFECT OF CESIUM CONCENTRATION ON ITS ACCUMULATION IN PLANTS
A. A. Titiyanova 8 Jan. 1964 6 p refs Transl. into ENGLISH of an article from Dokl. Akad. Nauk SSSR (Moscow), v. 152, no. 2, 1963 p 441-442
(JPRS-22656; OTS-64-21238) OTS: $0.50

The absorption of cesium by pea plants (Capital variety) and wheat (Erythrosperium variety) from a feed solution and from the soil was investigated. Cesium was taken in the form of CsCl with the addition of a constant quantity of radioactive Cs^{137}. Serving as a feed solution was a Knop mixture to which a CsCl solution of specific concentration was added. Results indicate: (1) There exists a direct proportional relationship between cesium concentration in the plants and in the solution. (2) A direct proportional relationship between the cesium concentration in the plants and in the soil is preserved in a range from 10^{-9} to 10^{-10} gram-equivalent weights of cesium per kilogram of soil. Beginning with the latter concentration, the relative cesium absorption in plants increases. I.v.L.

N64-13007 Joint Publications Research Service, Washington, D.C.
BIOGEOCHEMISTRY OF SULFUR
S. I. Kuznetsov 9 Jan. 1964 20 p refs Transl. into ENGLISH of an article from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 5, 1963 p 668-680
(JPRS-22672; OTS-64-21249) OTS: $0.50

A schematic survey of the main concepts of V. I. Vernadskiy on the biochemistry of sulfur in the lithosphere is presented, and his idea on the biogenic oxidation of hydrogen sulfide to sulfur and sulfates is confirmed. In addition, the biogenic reduction of sulfates to hydrogen sulfide in petroleum deposits and the oxidation of copper sulfides in carbon and ore deposits, as a result of the activity of *Thiobacillus thiooxidans*, are discussed. I.v.L.

N64-13017 Public Health Service, Washington, D.C.
SMOKING AND HEALTH
Stanhope Bayne-Jones et al 403 p refs Rept. of the Advisory Comm. to the Surgeon Gen.
(*Its* Publ. no. 113) GPO: $1.25

A detailed investigation was conducted to determine the relationships and the effect of smoking on the health of the human body. Thorough qualitative and quantitative analyses were conducted on tobacco, and numerous substances were isolated and studied to determine the possible roles they play in reference to health. The complete metabolic cycle of nicotine in the mammalian body was given, and statistical analyses were made of the mortality rates of both smokers and nonsmokers. Correlation of the data discovered in the investigation established a definite link between smoking and cancer of the lungs and heart diseases. C.L.W.

N64-13078 School of Aerospace Medicine, Brooks AFB, Tex.
LATENT EFFECTS OF CHRONIC IRRADIATION ON LONGEVITY AND THE PERIPHERAL BLOOD ELEMENTS OF THE MONKEY, MACACA MULATTA
Donald R. Anderson Sep. 1963 9 p refs
(SAM-TDR-63-55; AD-423076)

One of the problem areas of radiation biology is concerned with the latent or long-term effects of the biologic damage that might result from chronic low dose levels of ionizing radiation. This report presents data from a study in the primate, *Macaca mulatta*, over a period of several years following a chronic irradiation schedule resulting in accumulated doses of 77 to 614 rep of mixed gamma and neutron radiations. Although the circulating blood elements are considered to be sensitive to radiation damage, they recovered, following the irradiation schedule, to essentially normal condition and showed no long-term decrement due to the radiation exposure. Longevity in the limited number of animals utilized also indicated no change due to radiation. Author

N64-13085 Joint Publications Research Service, Washington, D.C.
THE PRESENT AND FUTURE USES OF CYBERNETICS IN MEDICINE
Yu. Frolov 8 Jan. 1964 7 p ref Transl. into ENGLISH of an article from Med. Rabotnik (Moscow), 16 Aug. 1963 p 3
(JPRS-22647; OTS-64-21230) OTS: $0.50

A discussion is presented of the significance and role of cybernetics in the development of medical sciences and its usefulness in medical practice. R.T.K.

N64-13086 Joint Publications Research Service, Washington, D.C.
ON THE POSSIBILITY OF DIVISION OF CORTICAL NEURONS
R. V. Ivannikova 10 Jan. 1964 7 p refs Transl. into ENGLISH of an article from Byull. Eksptl. Biol. i Med. (Moscow), v. 55, no. 1, Jan. 1963 p 93-95
(JPRS-22690; OTS-64-21258) OTS $0.50

An investigation to determine whether a histological regeneration of cortical neurons takes place during functional restoration following a bilateral extirpation of the occipital lobe, or whether the anatomical restoration proceeded only at the expense of the displacement of adjacent cortical elements into the area of the defect is discussed. From the results it can be assumed that the deciding importance in the restoration of functions can be attributed to the cortex (possibly together with the subcortex) which has been preserved after the operation and which anatomically filled out the defect. The presence of mitoses and amitoses in the neural cells during early stages following the operation and their absence during the period of scar formation attest to the fact that regeneration of the neurons is possible in principle, but that it requires special conditions for its manifestation, and these conditions are ones that would inhibit formation of the scar tissue. P.V.E.

N64-13106 George Washington U., Washington, D.C. Human Resources Research Office
VIGILANCE: A GUIDE TO IMPROVED PERFORMANCE
Bruce O. Bergum Oct. 1963 39 p refs
(Sponsored by Army)
(HumRRO Res. Bull. 10)

The vigilance effect is defined as a systematic decrease in the probability of perceiving a given stimulus over a period of time, a systematic loss in attention. This report is a summary of the research that has been done to: (1) determine the full range of conditions that affect vigilance behavior, such as characteristics of the task and of the environment, differences among individuals, and motivational factors; and (2) describe how variations in these conditions are related to variations in detection responses. R.T.K.

N64-13108 Douglas Aircraft Co., Inc., Long Beach, Calif.
DYNAMIC VISION-III. THE LEGIBILITY OF ALPHANUMERIC SYMBOLS-MODERATELY SPACED
D. M. Lee 30 Jul. 1963 102 p refs
(LB-31403; AD-425035)

Targets subtended an angle of 39 min. at the observer's eye, and were spaced from each other at a distance which subtended 7.5° at the observer's eye. The targets were black on white and moved vertically in the frontal place, from top

to bottom. Experiments were as follows: (1) Equally spaced alphanumeric symbols randomly ordered in three columns, each column containing 26 symbols, were used as stimulus material. It was shown that no significant increase in performance, measured in angular velocity of the stimulus material, was obtained with serial presentation of the columns. (2) Individual criteria and sample means for 100-percent legibility were determined. (3) The stimulus material was presented both by television and by direct viewing. Performance, based on angular velocity at which 100 percent could be scored, was approximately 30 percent lower for television viewing. (4) Individual criteria and sample means for zero legibility were determined. Author

N64-13133 California U., San Francisco School of Medicine
RADIOLOGICAL LABORATORY Annual Progress Report for Period ending September 30, 1963
Robert S. Stone, and Gail D. Adams Nov. 1963 58 p refs (Contract AT(11-1)-GEN-10)
(UCSF-23) OTS: $1.50

The program is divided into three major fields: (1) clinical radiology; (2) radiation physics; and (3) radiation biology. Research was conducted in the following areas: (1) cancer therapy with 70 Mv X-rays—gross survival, carcinoma of the urinary bladder, carcinoma of the cervix uteri, intracranial tumors, and reaction to radiation; (2) synchrotron operation; (3) dosimetry; (4) EEG changes after low-level X-irradiation (dog brain); (5) data processing; (6) influence of magnetic fields on biological systems; (7) somatic effects of X-rays—survival in Chinese hamster, and mouse kidney and intercapillary glomerulosclerosis; (8) radiation genetics—studies of progeny of irradiated male mice and studies relating to histocompatibility loci in mice. R.T.K.

N64-13139 Yale U., New Haven, Conn. School of Medicine
THE ROLE OF ARGON METASTABLE ATOMS IN THE IONIZATION OF ORGANIC MOLECULES
M. M. Shahin and S. R. Lipsky Repr. from Anal. Chem., v. 35, Oct. 1963 p 1562–1566 refs
(NASA Grant NsG-192-61)

A microionization chamber of coaxial design, previously described as a detection system for gas chromatography, has been used to investigate the mechanisms by which argon carrier gas provides high sensitivities to organic molecules with ionization potential below 11.6 ev. It is shown that for vapor concentrations (ethylene) up to 3 to 4 pp 10^4 in the carrier gas the Penning Effect is the sole reaction mechanism for the response of the detector. Beyond this concentration, the collisions of the secondary electrons with sample molecules become important, and the response is either increased or decreased depending on the ionization potential of the test molecule and the field strength which determines the electron energy. The decrease is affected by quenching of the electron energy, while the increase is brought about by ion multiplication of the test molecule. Author

N64-13149 Naval Medical Research Inst., Bethesda, Md.
ANIMAL CALORIMETRY: ITS FUTURE
T. H. Benzinger Repr. from Trans. Am. Soc. Agr. Eng., v. 6, no. 2, 1963 p 119–122 refs Presented at the Ann. Meeting of ASAE, Washington, D.C., June 1962
(NASA Order R-38)
(ASAE Paper 62-422)

The future of animal calorimetry is reviewed. It is quite possible that the secrets of excessive leanness or obesity, the secrets of efficient or poor utilization of food lie in the coupling or uncoupling of oxidative phosphorylation. The measurement of oxygen consumed and calorimetry of heat evolved should be an important key to new knowledge of these relations. A tendency of tissues toward excessive breakdown, or toward excessive synthesis, may in turn be the primary cause for high consumption of oxygen and food. Thus, increased food intake may be a consequence, more than a cause, of obesity. Calorimetric studies on metabolic breakdown and synthetic activities may shed light on the chemical compounds which produce, or the absence of which, produces the chemical sensations on which the intake of food depends. In addition, calorimetry may prove useful in studying the phenomenon of thermal homeostasis in farm animals. Perhaps minute deviations from normality in warm animals. Perhaps minute deviations from normality in warmth or cold may be important, and they may influence the productivity of animals for milk or eggs or meat. I.v.L.

N64-13161 Joint Publications Research Service, Washington, D.C.
REASONS FOR THE FAILURE OF ANTIBIOTIC THERAPY OF AUTOINFECTION IN RADIATION SICKNESS
I. D. Meter 7 Jan. 1964 13 p refs Transl. into ENGLISH from Med. Radiol. (Moscow), v. 8, no. 8, Aug. 1963 p 58–65
(JPRS-22625; OTS-64-21219) OTS: $0.50

Antibiotic therapy of autoinfection in radiation sickness in X-irradiated mice was investigated. Results indicate: (1) Streptomycin is the most effective antibiotic for treating the autoinfection associated with radiation sickness. Under optimum conditions, it saves some 85% of the animals that would otherwise die (with 70% mortality in the controls). It is maximally effective in a narrow range of doses. (2) The success of antibiotic therapy varies with the time it is started. The optimum time, with the optimum dose, is between the third and fifth days after irradiation, i.e., in the period when bacteremia sets in. (3) The factors that impair the effectiveness of antibiotics for radiation autoinfection include change in the nature of the microflora in mice caused by treatment; the presence of resistant forms of bacteria and their rapid adaptation to antibiotics in the irradiated organism; and death due to nonbacterial causes (interference with hematopoiesis, etc.). (4) The combined use of streptomycin with cortisone as a detoxicating hormone is a promising method of treating radiation sickness. I.v.L.

N64-13163 Joint Publications Research Service, Washington, D.C.
COMPARATIVE RADIOSENSITIVITY OF INHERITED STRUCTURES OF CELLS OF MAMMALIA IN VITRO
L. I. Lebedeva et al 14 Jan. 1964 5 p refs Transl. into ENGLISH of an article from Dokl. Akad. Nauk SSSR (Moscow), v. 152, no. 5, 1963 p 1225–1226
(JPRS-22719; OTS-64-21280) OTS: $0.50

The radiation sensitivity of the chromosomes of the embryonic fibroblasts of guinea pigs and mice of the line CC 57 BR was investigated. Fresh cultures of the fibroblasts of one to one-and-a-half-month-old guinea pig embryos and 15- to 17-day old mouse embryos. Serving as a criterion for evaluating the degree of radiation sensitivity of the nuclear structures was the percentage of cells with chromosome rearrangement observed in the anaphases and telophases. The radiation doses were 10 and 50 r for the guinea pig and 50 r for the mouse. Results indicate that the chromosomes in cells *in vitro* taken from more radiation-resistant animals prove to be more radiation-resistant than the chromosomes in the cells of radiation-sensitive animals. I.v.L.

N64-13165 Los Alamos Scientific Lab., N. Mex.
RADIATION HAZARD RESULTING FROM TRITIUM DIFFUSION IN GLOVE BOX OPERATIONS

George N. Krebs, Jr., 10 Dec. 1963 15 p refs
(Contract W-7405-eng-36)
(LMS-2962) OTS: $0.50

Tritium exposure to personnel handling tritium compounds in glove boxes can be significantly reduced by the wearing of surgeon's gloves while working in the dry-box gloves. To investigate this reduction quantitatively and to determine criteria for the frequency of glove change, mathematical analyses of the diffusion of HTO through dry-box rubber gloves with and without surgeon's gloves are made. The relative amounts of HTO absorbed by the worker as a function of time in the two cases are then compared. For tritium concentrations of one curie per cubic meter in the glove-box atmosphere, a change of surgeon's gloves every 15 to 20 minutes is recommended as a safe working procedure. Author

N64-13168 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SYNTHESIS OF ADENOSINE TRIPHOSPHATE UNDER POSSIBLE PRIMITIVE EARTH CONDITIONS
Cyril Ponnamperuma, Carl Sagan (Harvard U.), and Ruth Mariner Repr. from Nature (London), v. 199, no. 4890, 20 Jul. 1963 p 222–226
(NASA RP-94)

Materials and the experimental techniques are given which were used in the synthesis of adenosine triphosphate. Four categories of experiments were performed. In the first the starting material was adenine, in the second adenosine, in the third to adenosine monophosphate, and in the fourth adenosine diphosphate. The conversion of adenine to adenosine, adenosine to monophosphate, adenosine monophosphate to adenosine diphosphate, and adenosine diphosphate to adenosine triphosphate has been established. C.L.W.

N64-13186 Naval School of Aviation Medicine, Pensacola, Fla. Naval Aviation Medical Center
THE DECEMBER 1962 REPORT OF THE RBE COMMITTEE TO THE ICRP AND ICRU IN ITS IMPLICATIONS FOR THE ASSESSMENT OF PROTON RADIATION EXPOSURE IN SPACE Research Report
Hermann J. Schaefer 18 Oct. 1963 16 p refs Joint Report–NASA and Naval School of Aviation Med.
(NASA Order R-75)
(NASA CR-55189; Bur. Med. and Surgery 26) OTS: $1.60 ph, $0.80 mf

Some of the implications of new rules set forth in the report named in the title concerning exposure to proton radiations in space are discussed. The proposed formulae assigning precise values of relative biological effectiveness (RBE) and quality factor (QF) to any given linear energy transfer (LET) are evaluated for typical spectra of X-rays, flare produced protons, and neutron recoil protons. The results essentially reconfirm earlier assessments. Since the report reemphasizes the basic difference between low LET and high LET radiation with regard to residual damage from low dose rate exposures, it seems advisable that dosimetric instrumentation for manned space operations provides ways and means for separate measurement of the two fractions of exposures to proton beams. Author

N64-13199 Martin Co., Baltimore, Md. RIAS
PHOTOSYNTHETIC ELECTRON TRANSPORT
Bessel Kok Repr. from "Photosynthesis Mech. in Green Plants", Nat. Acad. Sci. -Nat. Res. Council, Publ., no. 1145, 1963 p 35–44 refs
(NASA Contract NASw-747)

The first photoreaction of photosynthesis mediated by the long-wave pigment P700; the photoreduction and photooxidation of indophenol dye, site of phosphorylation; and the photooxidation of cytochromes and plastocyanin by detergent-treated chloroplasts were investigated. The results in the same sequential order are: (1) P700 is the photoconverter of photosystem I in photosynthesis. (2) DCPIP is reduced at the same locus as TPN by the primary reductant X^- made in the first photoact. Thus, in the absence of the second photoact (DCMU or long wave light) indophenol dye mediates a vigorous cyclic electron transport. (3) The kinetics of plastocyanin photooxidation do not necessarily differ from those of cytochrome f oxidation. This suggests that not only cytochrome f but also plastocyanin has a fixed locus in the chloroplast matrix and can operate in a complex with P700. I.v.L.

N64-13204 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ON THE EARLY ONSET OF THYMINELESS DEATH OCCURRING AFTER EXPOSURE TO ULTRAVIOLET LIGHT
Ronald E. Rasmussen and Robert B. Painter Repr. from Biochim. Biophys. Acta, v. 76 1963 p 157–159
(PN-6117)

Gallant and Suskind have presented data indicating that death due to lack of thiamine and irradiation with ultraviolet light act on the same sites in *Escherichia coli* strain B-3. This report confirms their observations and shows additional features of the cooperative action of ultraviolet light and the lack of thiamine in this bacterial strain. Results of the present investigation indicate: (1) Early loss of viability is still apparent if the ultraviolet-light-irradiated organisms are subjected to photoreactivation, but the slope of this loss is about one-half of that of organisms held in the dark room. (2) Ultraviolet-light lesions, contributing to the early onset of thiamineless death, may be partially photoreactivated. (3) A comparison of the curves of photoreactivated cultures with those of nonphotoreactivated cultures showed that early death may be reversed by either photoreactivation or the presence of thiamine; however, later death can be prevented only by thiamine, and the lag before onset is unaffected by photoreactivation. I.v.L.

N64-13229 Joint Publications Research Service, Washington, D.C.
VARIATIONS OF RNA IN GIANT CHROMOSOMES OF *CHIRONOMUS DORSALIS* DURING METAMORPHOSIS AND EXPERIMENTAL EFFECTS
I. I. Kikhadze and I. T. Filatova 9 Jan. 1964 9 p refs Transl. into ENGLISH of an article from Dokl. Akad. Nauk SSSR, (Moscow), v. 152, no. 2, 1963 p 450–453
(JPRS-22666; OTS-64-21245) OTS: $0.50

A regular variation in the function of the RNA synthesizing section of the giant chromosomes of *Chironomus dorsalis* was found to take place during the course of metamorphosis. Under the influence of TA (thioacetamide), the activity of RNA production by chromosomes was found to vary. The chromosomes showed varying sensitivity to TA at different stages of metamorphosis. The selective influence of TA on individual chromosomes and their sections was established. R.T.K.

N64-13230 Joint Publications Research Service, Washington, D.C.
CYTOLOGICAL ANALYSIS OF THE RADIOSENSITIVITY OF SIMILAR TISSUES IN DIFFERENT SPECIES OF MAMMALS
G. A. Chudinovskaya and O. N. Kitayeva 16 Jan. 1964 15 p refs Transl. into ENGLISH of an article from Zh. Obshch. Biol. (Moscow), v. 24, no. 6, 1963 p 435–444
(JPRS-22778; OTS-64-21316) OTS: $0.50

A cytological analysis was made of the radiosensitivity of bone marrow and lymph node cells in irradiated mice, rats, golden hamsters, and guinea pigs. Results indicate: (1) The general nature of the changes in mitotic activity of bone marrow

and lymph node cells is the same in irradiated mice, rats, golden hamsters, and guinea pigs. There is a sharp drop in the mitotic index in these animals the first 1 1/2 to 2 hours after exposure to 100 r of irradiation. Mitotic activity increased within 2 to 3 hours after exposure, sometimes exceeding the level of the non-irradiated control (supercompensation). Mitotic activity was more or less normal after 144 hours (end of investigation). (2) The degree of supercompensation was less than that of the initial depression with a single, whole-body exposure to 100 r. This may be due to partial destruction of cells in the tissues of the irradiated animals. (3) The animals can be listed as follows, judging by the decrease in mitotic activity noted 2 to 3 days after whole-body irradiation (100 r):

bone marrow—mouse > rat > golden > guinea pig; lymph nodes—hamster

mouse > guinea pig > golden hamster.

I.v.L.

N64-13305 Lockheed Missiles and Space Co., Sunnyvale, Calif.

THE BIOLOGY OF SPACE FLIGHT: AN ANNOTATED BIBLIOGRAPHY [1958-1962]

Charlie M. Pierce, comp. Apr. 1963 317 p refs

(Contract AF 04(695)-136)

(Special Bibl. SB-63-20; Rept. 8-55-63-2; AD-425912)

The topics included are food provisions, atmosphere control, waste control and water recovery, emergency survival systems, psychology, radiation and meteoroids, gravitation, magnetic fields, and exobiology. Author

N64-13320 Joint Publications Research Service, Washington, D.C.

INTERNATIONAL CONFERENCE ON THE DIAGNOSIS AND TREATMENT OF CONTAMINATION BY RADIOACTIVE ISOTOPES, VIENNA, 15-18 OCTOBER 1962

Yu. I. Moskalev 3 Jan. 1964 28 p Transl. into ENGLISH of an article from Med. Radiol. (Moscow), v. 8, no. 8, Aug. 1963 p 77-78

(JPRS-22610; OTS-64-21214) OTS: $0.75

Reports were presented that included: (1) methods of detecting radioactive substances in the body of man, both by measuring the external γ radiation as well as by means of determining the activity in secretions; (2) experimental investigations of the distribution and kinetics of removal of radioactive isotopes, on the effect of complexing agents and a number of other preparations in removing them from the organism and the magnitude of absorption from the gastrointestinal tract; (3) results of clinical observations on the distribution of Sr^{90}, Cs^{137}, Ra^{226}, Pu^{239}, and mixtures of fission products in the body of man, on speeding up their removal from the organism, and of the diagnosis and therapy of several conditions caused by the striking of radioactive isotopes on the skin and inside the organism. R.T.K.

N64-13329 Atomic Energy Commission, New York, N.Y. Health and Safety Lab.

FALLOUT PROGRAM QUARTERLY SUMMARY REPORT, SEPTEMBER 1, 1963-DECEMBER 1, 1963

Edward P. Hardy, Jr., Joseph Rivera, and William R. Collins, Jr. 1 Jan. 1964 244 p refs

(HASL-142) OTS: $4.00

Radionuclide levels in fallout, milk, tap water, diet, and upper air samples are given in tabular form. Also included are interpretive reports and notes dealing with fission product concentrations in the upper atmosphere, cumulative strontium-90 deposition levels from analyses of soils collected in 1962, and measurements of cesium-137 in the 1962 wheat crop. Author

N64-13337 Royal Aircraft Establishment, Farnborough (Gt. Brit.)

A THEORETICAL INVESTIGATION INTO THE CIRCULATION NEEDED TO CONTROL THE CARBON DIOXIDE CONCENTRATION IN A SPACE CAPSULE CABIN

G. F. Rowlands and K. R. Maslen Aug. 1963 23 p refs

(RAE-TM-ME-273)

The minimum ratio of purifying circulation flow to breathing flow needed to obtain an acceptable CO_2 concentration in the breathing atmosphere of a space capsule has been calculated. Equations have been derived for the main gas constituents and for the three possible systems, namely, open circuit (no mask), part-closed circuit (mask with either the inhalation or exhalation port open to the cabin, the other piped through the purification circuit), and closed circuit (mask with both inhalate and exhalate piped into the purification circuit). The equations give the time constant of the extraction process and the steady-state conditions achieved. Author

N64-13344 Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

THE DEVELOPMENT OF A CONTINUOUS CELL LINE FROM NORMAL DOG LIVER AND ITS SUSCEPTIBILITY TO VIRUSES Technical Progress Report

Frank F. Pindak and William E. Clapper Aug. 1963 26 p refs

(Contract AT(29-2)1013)

(LF-10) OTS $0.50

A continuous line of cells was developed from a primary culture of new-born dog liver. The cells were inoculated with five types of Coxsackie B virus, three types of poliovirus, nine types of ECHO virus, and six miscellaneous viruses. Nineteen of these produced cytopathic effect without need of adaptation to the cells. One virus became adapted after four passages, one lost its ability to destroy the cells after the first passage, and two failed to grow even after several blind passages. Author

N64-13350 Joint Publications Research Service, Washington, D.C.

ULTRASONICS – PHYSICOCHEMICAL AND BIOLOGICAL ACTION

I. Ye. El'piner 21 Jan. 1964 37 p refs Transl. into ENGLISH of the Table of Contents and Chapt. 11 from the book "Ul'trazvuk—Fiziko-Khimicheskoye Biologicheskoye Deystviye", Moscow, 1963 p 3-4 and 381-411

(JPRS-22840; OTS-64-21356) OTS: $1.00

Data are presented that demonstrate how modern ultrasonic techniques can be used successfully to study the macrostructure of organs and tissues, and in clinical practice for their visualization. The successful development of methods for determining the acoustic parameters of various media has led to new possibilities in the study of the structural characteristics of biological liquids, cells, and tissues. A table is included that gives the absorption coefficient and depth of penetration for water and the following tissues at an ultrasonic frequency equal to 1 megacycle per second: blood plasma, blood, skeletal muscles, liver, kidneys, and adipose tissue. R.T.K.

N64-13353 Joint Publications Research Service, Washington, D.C.

THE SUBJECTAND METHODS OF MODERN BIOPHYSICS

Yu. N. Polyanskiy 21 Jan. 1964 9 p refs Transl. into ENGLISH from Vopr. Filosofil (Moscow), v. 17, no. 6 p 155-158

(JPRS-22830; OTS-64-21349) OTS: $0.50

This report of a conference presents a discussion of modern biophysics. An attempt is made to give a definitive statement of what the science of biophysics includes, and what methods are to be used in biophysical investigation. Opinions of conference participants and discussions of their remarks are given. E.W.

N64-13370 Martin Co., Baltimore, Md. RIAS Div.
PHOTOREACTIONS AND RESPIRATION
George Hock and Olga V. H. Owens Repr. from "Photosynthesis Mech. in Green Plants", Nat. Acad. Sci.-Nat. Res. Council, Publ., no. 1145, 1963 p 409-420 refs
(Sponsored by NASA)

The determination of the relationship between oxidation (as evidenced by respiration) and light utilization was investigated. Results indicate that respiratory changes can and do cause many anomalies when the net rate of gas exchange is taken as a measure of photosynthesis. A remarkable linearity of actual oxygen production, as a function of light intensity, over the lower intensity regions was observed. These respiratory effects are clearly the source of many discrepancies in the measurement of the quantum yield of photosynthesis as a function of wavelength. The effects also provide an explanation for the puzzling phenomenon of negative enhancement. It appears that photosynthesis and respiration are not mutually exclusive processes within the cell but are interrelated, allowing the cell to function as an entity. I.v.L.

N64-13376 Joint Publications Research Service, Washington, D.C.
ELECTROMYOGRAPHY OF HUMAN SKELETAL MUSCLE TONE IN THE NORMAL AND PATHOLOGICAL STATE
Yudif' Samoylovna Yusevich 17 Jan. 1964 29 p Transl. into ENGLISH of the Conclusion and Table of Contents from the book "Elektromiografiya tonusa skeletnoy muskulatury cheloveka v norme i patologii" Moscow, Medgiz, 1963 p 109-129 and 162
(JPRS-22782; OTS-64-21319) OTS: $0.75

The following topics are discussed: (1) basic principles of muscular electrogenesis during tonic reactions in the normal and pathological state; (2) clinical significance of electromyographic examinations of muscle tone; and (3) the role of electromyographic examinations in the neurophysiology of human muscle tone. R.T.K.

N64-13452 Deutsche Versuchsanstalt für Luftfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin
THE HUMAN CENTRIFUGE AND ITS APPLICATION TO PILOT SELECTION
S. Ruff *In* Advisory Group for Aeron. Res. and Develop., Paris Bio-Assay Tech. for Human Centrifuges and Physiol. Effects of Acceleration 1961 p 1-13 refs FRENCH summary (See N64-13451 05-01) Pergamon Press: $10.00

The human centrifuge had to fulfill various technical demands: (1) a maximum acceleration of 40 g; (2) a wide range of acceleration rates, from 0.01 g/sec to about 20 g/sec, adjustable by hand as well as automatically; (3) a diameter not wider than 16 m; (4) different arms provided for different purposes; (5) a sufficient quantity of collector rings provided for transmission. A short survey is given of the special technical devices chosen in order to satisfy these demands. The paper also deals with the centrifuge as selection instrument. A choice reaction-time test with visual and auditory stimuli was used to study efficiency impairment under acceleration. The purpose of the studies was to predict blackout-level time by means of reaction-time increase. The findings under acceleration were mostly negative. Most of the subjects showed no sign of disorder compared with their response in a nonstress situation; only some of the subjects showed greater decrement shortly before they experienced blackout or collapse.
Author

N64-13453 Royal Canadian Air Force, Toronto
SOME RECENT DEFINITIONS OF THE ACCELERATION PROBLEM
W. R. Franks *In* Advisory Group for Aeron. Res. and Develop., Paris Bio-Assay Tech. for Human Centrifuges and Physiol. Effects of Acceleration 1961 p 14-22 refs FRENCH summary (See N64-13451 05-01) Pergamon Press: $10.00

Accumulated experience with accelerations and means of protection against these have served to define more closely some of the limiting factors concerned with this variant of modern man's environment. With the present g suit, body-surface protection where adequate hydrostatic gradient is accomplished still implies an increased load on the unprotected heart which may be limiting, although gaseous increased intrathoracic pressure can minimize this. Complete fluid protection imposes problems of tactile sensation and orientation which can be troublesome. Discomfort from anatomical distortions within the thoracic cage can be limiting, especially from transverse accelerations. Other differences in specific gravity within the body also must be considered, especially with high or prolonged acceleration. These include difference in specific gravity between brain and cerebrospinal fluid, possible centrifugal sludging of blood, and reciprocal shifts in body fluids generally. Reflex endocrine and vasomotor responses to these shifts may prove embarrassing when an increased g subsides.
Author

N64-13454 Defense Research Medical Labs., Toronto (Canada)
A REVIEW OF THE PHYSIOLOGICAL EFFECTS OF ANGULAR ACCELERATIONS
W. H. Johnson and N. B. G. Taylor *In* Advisory Group for Aeron. Res. and Develop., Paris Bio-Assay Tech. for Human Centrifuges and Physiol. Effects of Acceleration 1961 p 23-34 refs FRENCH summary (See N64-13451 05-01) Pergamon Press: $10.00

The known and possible physiological effects of angular (rotational) accelerations are reviewed in relation to the production of motion-sickness, spatial disorientation and "blackout" by centrifugal acceleration. The characteristic accelerations of physiological significance produced by swings, turntables, centrifuges and a linear vertical accelerator are described. The bearing of these factors on present flying conditions and on some proposals for future operations are discussed, and a preliminary report is given on some recent experiments in cats to clarify the function of the utricle and the saccule.
Author

N64-13455 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio
HUMAN TOLERANCE AND LIMITATIONS TO ACCELERATION
Robert N. Headley *In* Advisory Group for Aeron. Res. and Develop., Paris Bio-Assay Tech. for Human Centrifuges and Physiol. Effects of Acceleration 1961 p 35-41 refs FRENCH summary (See N64-13451 05-01) Pergamon Press: $10.00

Work being conducted concerning accleration effects on primates is discussed. Some results are presented of work with the following types of acceleration: headward acceleration (positive g), forward acceleration, sideward or lateral acceleration, footward acceleration (negative g), backward acceleration, and complex accelerations (combinations of various accelerations and oscillations). P.V.E.

N64-13457 Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.
CENTRIFUGE METHODS AND TECHNIQUES IN THE U.S. NAVY
F. K. Smith *In* Advisory Group for Aeron. Res. and Develop., Paris Bio-Assay Tech. for Human Centrifuges and Physiol. Effects of Acceleration 1961 p 52-58 refs FRENCH summary (See N64-13451 05-01) Pergamon Press: $10.00

The following are discussed: (1) the characteristics of the centrifuge and its use as a flight simulator, (2) terminology, (3) current survey on the subject with reference to testing,

mounting and means of restraint, (4) physiological measurements, and (5) performance evaluation. Author

N64-13458 Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.
END POINTS FOR ACCELERATION TOLERANCES ON THE CENTRIFUGE
M. G. Webb *In* Advisory Group for Aeron. Res. and Develop., Paris Bio-Assay Tech. for Human Centrifuges and Physiol. Effects of Acceleration 1961 p 59-64 refs FRENCH summary (See N64-13451 05-01) Pergamon Press: $10.00

A discussion is presented of ways in which man's physical tolerance to acceleration can be increased. It is concluded that the results of preliminary tests with water-immersion systems indicate that not only man's physical tolerance but his task performance as well will be increased with refinements in such advanced protective systems. P.V.E.

N64-13459 Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.
A DISCUSSION ON RESTRAINT AND PROTECTION OF THE HUMAN EXPERIENCING THE SMOOTH AND OSCILLATING ACCELERATIONS OF PROPOSED SPACE VEHICLES
Carl C. Clark and R. Flanagan Gray *In* Advisory Group for Aeron. Res. and Develop., Paris Bio-Assay Tech. for Human Centrifuges and Physiol. Effects of Acceleration 1961 p 65-95 refs FRENCH summary (See N64-13451 05-01) Pergamon Press: $10.00

The thesis maintained in this report is as follows: It is not the forces resulting from acceleration or deceleration (up to about 30g) that are harmful to man, but it is the asymmetrical reactions on the body resulting from the lack of equilibrium in the action of those forces. Owing to adequate external protection, the tolerance of the human being depends to a greater extent on the effects of local compression or expansion on the tissues than on the results of generalized displacements or distortions of the tissues and organs. Author

N64-13460 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio
THE EFFECTS OF FORWARD ACCELERATION ON RESPIRATION
William G. Blanchard *In* Advisory Group for Aeron. Res. and Develop., Paris Bio-Assay Tech. for Human Centrifuges and Physiol. Effects of Acceleration 1961 p 96-100 refs FRENCH summary (See N64-13451 05-01) Pergamon Press: $10.00

Respiratory embarrassment has previously been found to limit human tolerance to prolonged transverse acceleration. Various aspects of the respiratory abnormalities engendered by headward and transverse acceleration have been studied. Quantitative measurements have been made of the degree of respiratory impairment, and roentgenographic study made of the abnormal intrathoracic organ relationships. These experimental results and roentgenograms are reviewed, and their implications discussed. Author

N64-13461 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio
THE PHYSIOLOGICAL EFFECTS OF ACCELERATION ON RESPIRATION AND PROTECTIVE MEASURES
Alvin S. Hyde *In* Advisory Group for Aeron. Res. and Develop., Paris Bio-Assay Tech. for Human Centrifuges and Physiol. Effects of Acceleration 1961 p 101-106 refs FRENCH summary (See N64-13451 05-01) Pergamon Press: $10.00

Numerous alterations in respiratory physiology occur during forward $+a_x$ acceleration. All lung volumes decreased proportionately with the exception of residual volume which does not change at 4 g. The midpulmonary position falls, and maximum breathing capacity and functional residual capacity decrease. Although alveolar ventilation is maintained, arterial desaturation occurs due to venous admixture, probably resulting from unequal perfusion-ventilation relationships. Intrapulmonic pressure increases for a constant volume, thus shifting static relaxation pressure volume curves progressively to the right, resulting in an increase in the elastic work of breathing. Dynamic pulmonary compliance decreases as a result of the fall in pulmonary midposition and functional residual capacity. Positive pressure breathing has significantly corrected some aspects of the abnormal physiology and has significantly increased time tolerance to forward $+a_x$ accelerations. Studies of optimal back angle suggest that 10° to 15° of forward inclination will require the least respiratory work. Author

N64-13462 Centre d'Enseignement et de Recherches de Medecine Aeronautique, Paris (France)
EFFECTS OF REPEATED POSITIVE ACCELERATIONS OF LOW INTENSITY AND LONG DURATION. ANATOMICAL STUDY ON THE DOG KIDNEY [EFFETS DES ACCELERATIONS POSITIVES REPETEES DE FAIBLE INTENSITE ET LONGUE DUREE ETUDE ANATOMIQUE SUR LE REIN DE CHIEN]
R. Senelar, R. Loubiere, and F. Violette *In* Advisory Group for Aeron. Res. and Develop., Paris Bio-Assay Tech. for Human Centrifuges and Physiol. Effects of Acceleration 1961 p 107-118 refs In FRENCH; ENGLISH summary (See N64-13451 05-01) Pergamon Press: $10.00

Repeated exposures of dogs to a positive acceleration of 2.5 g a day, up to a total of 10 to 60 hr, produced macroscopic and microscopic injuries in the kidneys, marked by venous and capillary congestion, glomerular congestion, and tubular vacuolization, especially in the low nephron, with infiltration of iron ochre pigment from the blood. Three months later, instead of these injuries, an invading sclerosis is observed, which leads eventually to the disappearance of the glomerule. This process offers three stages: relative tolerance, submission, aggravation. Author

N64-13463 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio
CARDIOVASCULAR EFFECTS OF FORWARD ACCELERATION
Gustave C. E. Mueller *In* Advisory Group for Aeron. Res. and Develop., Paris Bio-Assay Tech. for Human Centrifuges and Physiol. Effects of Acceleration 1961 p 119-129 refs FRENCH summary (See N64-13451 05-01) Pergamon Press: $10.00

During forward acceleration, the venous return afforded by body positioning is sufficient for the heart to perform adequately. There appears to be no impairment of the central blood pump's ability to maintain an adequate blood pressure and volume flow. The systemic distribution of cardiac output may cause small degrees of insufficiency, for example, ischemic neuropathy in elevated legs, but so far, no major problems have been encountered. The pulmonary blood flow distribution is probably one of the most critical factors limiting tolerance to forward accelerations of longer duration. The arterial blood desaturation now observed seems most probably due to regional variations in the ventilation-perfusion ratio, normal maintenance of which is necessary for proper arterialization. Defects in pulmonary diffusion may be equally disabling, although they seem to persist only during acceleration and are probably not impaired permanently. Author

N64-13464 Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.
HOST FACTORS IN RESISTANCE TO ACCELERATION STRESS
E. R. Stiehm *In* Advisory Group for Aeron. Res. and Develop., Paris Bio-Assay Tech. for Human Centrifuges and Physiol. Effects of Acceleration 1961 p 130-139 refs FRENCH summary (See N64-13451 05-01) Pergamon Press: $10.00

Four methods to increase resistance to acceleration stress are drugs, conditioning, hypophysectomy, and reticuloendothelial stimulation. Reticuloendothelial stimulation is a simple, relatively safe method to increase acceleration tolerance without radical alteration in physiology. This method is discussed, and a common mechanism for increased acceleration tolerance is proposed involving alterations in steroid metabolism mediated via the hypophyseal-adrenal channel. Author

N64-13465 Centre d'Enseignement et de Recherches de Medecine Aeronautique, Paris (France)

ADVANTAGE AND LIMITS OF RESEARCHES CARRIED OUT ON ANIMALS AND ON MAN BY MEANS OF CENTRIFUGES [INTERET ET LIMITES DES RECHERCHES EFFECTUEES SUR L'ANIMAL ET SUR L'HOMME AU MOYEN DES CENTRIFUGEUSES]

R. Grandpierre, F. Violette, R. Flandrois, and J. B. Tosan *In* Advisory Group for Aeron. Res. and Develop., Paris Bio-Assay Tech. for Human Centrifuges and Physiol. Effects of Acceleration 1961 p 140–146 In FRENCH; ENGLISH summary (See N64-13451 05-01) Pergamon Press: $10.00

Following a brief history of the centrifuge since Darwin (1794), the use of centrifuges for studying long duration g is discussed, as well as the technical limitations, especially when extremely rapid accelerations are involved. The limitations of the evaluation of data obtained are emphasized. The difference between the 2-foot vertical attitude of man and the 4-foot horizontal attitude of the animal is not only of an anatomic nature, but orthostatism physiologically results in important vascular regulations; this implies much caution in the evaluation of data obtained. Author

N64-13466 Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

MEDICAL MACHINE RECORD CARDS – THEIR DEVELOPMENT AND USE IN THE ASTRONAUT SELECTION PROGRAM

A. H. Schwichtenberg, Donald D. Flickinger (AFSC, Andrews AFB, Md.), and W. Randolph Lovelace II *In* Advisory Group for Aeron. Res. and Develop., Paris Bio-Assay Tech. for Human Centrifuges and Physiol. Effects of Acceleration 1961 p 147–173 refs FRENCH summary (See N64-13451 05-01) Pergamon Press: $10.00

Special-mark sense-type machine record cards were developed to record complete medical history, special aviation history, physical examination and various specialists examinations, radiological and laboratory tests, as well as physiological data. In order to similarly record the results of stress tests, cards were developed for recording heat tolerance, tolerance to g forces on the centrifuge, altitude tolerance in a partial pressure suit, tilt table test, cold pressor test, and tracking under high noise levels. Cards were also developed to record complete anthropological data and various psychological variables. All data on the astronaut candidates were recorded in this manner. Author

N64-13474 Argentina. Comision Nacional de Energia Atomica, Buenos Aires

DETERMINATION OF THE SOLUBILIZED PHOSPHORUS IN THE MICROORGANISMS OF THE SOIL [SOLUBILIZACION DE FOSFATOS POR MICROORGANISMOS DEL SUELO]

Anibal H. Merzari, Sergio Flores Suarez and Alicia Godoy 1963 8 p refs In SPANISH; ENGLISH Summary
(*Its* Informe 93)

A rapid and simple technique has been developed for the quantitative determination of solubilized phosphorus by *B. subtilis* and *B. megatherium* from tricalcic phosphate. Using tricalcic labelled with P^{32}, the activity in the liquid medium is measured after a period of 8 days, and this result is related to the specific activity of the radioactive substance to obtain the amount of phosphorus brought into solution. Author

N64-13493 Advisory Group for Aeronautical Research and Development, Paris (France)

ESCAPE AND SURVIVAL, CLINICAL AND BIOLOGICAL PROBLEMS IN AERO SPACE MEDICINE

P. Bergeret, ed. New York, London, Pergamon 1961 121 p refs Book
(AGARDograph-52) Available from Pergamon Pr. $6.50

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N64-13499 Dornier-Werke G.m.b.H., Friedrichshafen (W. Germany)

PILOTAGE OF HELICOPTERS WITH REACTION PROPULSION [PILOTIER-BARKEIT DES REAKTIONGSHUBSCHRAUBERS]

Laufer 24 Sep. 1963 17 p refs in GERMAN Presented at the meeting of the Wiss. Ges. Luft- u. Raumfahrt, Munich, 1963

Pilotage, a man–machine concept, concerns the attitude of the helicopter in response to the pilot during various maneuvers on the ground and in the air, as well as the handling required for accomplishing certain flight figures. This report discusses: pilot selection, attitude of the aircraft on the ground, hovering, forward flight, reverse flight, sideward flight, wind effects on the propellers, autorotations, and altitude flight with overloading during starting. I.v.L.

N64-13501 Chicago U., Ill. USAF Radiation Lab.

Quarterly Progress Report No. 49 [RESEARCH ON CERTAIN BIOLOGICAL AND MEDICAL ASPECTS OF ATOMIC ENERGY]

Kenneth P. Du Bois 15 Oct. 1963 125 p refs
(Contract AF 41(609)-1693)
(AD-422960)

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2. INFLUENCE OF X-IRRADIATION ON THE DEVELOPMENT OF A THIOPHOSPHATE OXIDIZING ENZYME SYSTEM IN THE LIVERS OF YOUNG MALE RATS B. E. Hietbrink and M. Keshmiri p 25-33 refs (See N64-13503 05-16)

3. THE INFLUENCE OF ORAL ADMINISTRATION OF MIXTURES OF VARIOUS RADIO-PROTECTIVE COMPOUNDS ON RADIATION-INDUCED CHANGES IN ENZYME ACTIVITIES IN CERTAIN RAT TISSUES B. E. Hietbrink, M. Keshmiri, and M. E. Hayward p 34-44 refs (See N64-13504 05-16)

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4. THERAPY OF RADIATION INJURY IN MICE USING VARIOUS CHEMICAL AGENTS J. Dilley and J. Doull p 45-56 refs (See N64-13505 05-16)

5. HISTOPATHOLOGICAL FINDINGS IN THE TISSUES OF MICE PROTECTED AGAINST THE LETHAL EFFECTS OF WHOLE-BODY X-RAY EXPOSURE BY THE POST-IRRADIATION ADMINISTRATION OF SODIUM SULFITE OR A THIAZOLIDINE DERIVATIVE D. Vesselinovich, J. Dilley, J. Meskauskas, F. Fitch, and J. Doull p 57-69 refs (See N64-13506 05-16)

6. THE INFLUENCE OF VARIOUS CHEMICAL COMPOUNDS ON RADIATION LETHALITY IN MICE V. Plzak, M. Root, and J. Doull p 70-91 refs (See N64-13507 05-16)

INFLUENCE OF EXPOSURE TO LOW LEVELS OF GAMMA AND FAST NEUTRON IRRADIATION ON THE LIFE SPAN OF ANIMALS

7. EFFECTS OF PARTIAL BODY SHIELDING ON THE ACETYLATION OF SULFANILAMIDE IN CHRONICALLY IRRADIATED MICE A. Sandberg and J. Doull p 92-103 refs (See N64-13508 05-16)

8. CAGING AND HOUSING EFFECTS ON MORTALITY IN X-RAYED MICE D. G. Oldfield, V. Plzak, E. L. Simmons, and J. Doull p 104-114 (See N64-13509 05-16)

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N64-13502 Chicago U., Ill. USAF Radiation Lab.

THE INFLUENCE OF X-IRRADIATION AND CHEMICAL AGENTS ON DETOXIFICATION MECHANISMS

Kenneth P. Du Bois and Florence Kinoshita *In its* Quart. Progr. Rept., No. 49 [Research on Certain Biological and Medical Aspects of Atomic Energy] 15 Oct. 1963 p 1-24 refs (See N64-13501 05-16)

A summary is presented of research activities. Results include the following: (1) A procedure was developed for using the anticholinesterase action of DMP in adult female rats as a measure of the effects of chemicals and radiation on detoxification enzymes. (2) Administration of phenobarbital at a dose level of 25 mgm/kgm two times per day to adult female rats caused a marked decrease in the effectiveness of DMP as an inhibitor of cholinesterase. (3) The intraperitoneal administration of 100 mgm/kgm of nikethamide to adult female rats resulted in the development of a detoxification mechanism which markedly reduced the anticholinesterase action of DMP. (4) The intraperitoneal administration of 3,4-benzpyrene (25 mgm/kgm) to adult female rats caused induction of a detoxification mechanism. (5) The administration of puromycin (35 mgm/kgm), an inhibitor of protein synthesis, prevented induction of the detoxification mechanism for DMP in adult female rats by phenobarbital and nikethamide. (6) The administration of nikethamide (100 mgm/kgm) or phenobarbital (25 mgm/kgm/day) to 23-day-old male rats caused a marked increase in the resistance to the anticholinesterase action of DMP. P.V.E.

N64-13503 Chicago U., Ill. USAF Radiation Lab.

INFLUENCE OF X-IRRADIATION ON THE DEVELOPMENT OF A THIOPHOSPHATE-OXIDIZING ENZYME SYSTEM IN THE LIVERS OF YOUNG MALE RATS

Bernard E. Hietbrink and Marjorie Keshmiri *In its* Quart. Progr. Rept. No. 49 [Research on Certain Biological and Medical Aspects of Atomic Energy] 15 Oct. 1963 p 25-33 refs (See N64-13501 05-16)

The results of studies concerning the influence of exposing relatively small areas of the body to X-irradiation on the development of phosphorothioate-oxidizing enzymes in the livers of young male rats are discussed. The results indicated that shielding the head and liver area provided a substantial reduction in the degree of inhibition caused by 200 r of X-irradiation. It was found that the administration of 200 r of X-ray to the testes area while shielding the remainder of the body caused a significant reduction in the normal rate of development of microsome oxidase activity. The development of the enzyme activity of the livers of animals given 400 r to the testes area was inhibited to an extent similar to that caused by 200 r of total-body radiation. Shielding the head while exposing the remainder of the body to 200 r of X-ray failed to reduce the inhibitory effect caused by a similar amount of total-body exposure. Administration of 200 r to the head while shielding the remainder of the body inhibited development of the drug metabolizing enzyme to a degree similar to that observed following 200 r or 400 r of total-body X-ray exposure. P.V.E.

N64-13504 Chicago U., Ill. USAF Radiation Lab.

THE INFLUENCE OF ORAL ADMINISTRATION OF MIXTURES OF VARIOUS RADIOPROTECTIVE COMPOUNDS ON RADIATION-INDUCED CHANGES IN ENZYME ACTIVITIES IN CERTAIN RAT TISSUES

Bernard E. Hietbrink, Marjorie Keshmiri, and Mary E. Hayward *In its* Quart. Prog. Rept. No. 49 [Research on Certain Biological and Medical Aspects of Atomic Energy] 15 Oct. 1963 p 34-44 refs (See N64-13501 05-16)

The summary of a study undertaken to obtain information concerning the influence of oral administration of serotonin and mixtures of serotonin and compounds containing sulfur on the radiation-induced changes in enzymes activities of the spleens, thymus glands, and small intestines of rats, and to determine the influence of certain orally administered agents on the 30-day survival of rats given lethal doses of X-irradiation included the following. (1) It was found that 20 mgm/kgm of serotonin, given from 3 to 15 minutes before irradiation, provided significant reductions in the biological effects of X-ray in the spleens, thymus glands, and intestines of rats. (2) The oral administration of a mixture of serotonin and AET failed to reduce the damaging effects of X-irradiation in the tissues studied to the extent afforded by serotonin alone—a mixture of serotonin and MEA provided substantial protection in the spleen when given 15 or 30 minutes before 400 r of X-ray, but failed to reduce the radiation-induced changes in the intestines. (3) Oral administration of 40 mgm/kgm of serotonin permitted survival of one of five rats given 850 r; oral injections of mixtures of 40 mgm/kgm of serotonin plus 500 mgm/kgm of MEA before exposure protected 20% of the animals against the lethal effects of 850 r of X-irradiation. P.V.E.

N64-13505 Chicago U., Ill. USAF Radiation Lab.

THERAPY OF RADIATION INJURY IN MICE USING VARIOUS CHEMICAL AGENTS

J. Dilley and J. Doull *In its* Quart. Prog. Rept. No. 49 [Research on Certain Biological Medical Aspects of Atomic Energy] 15 Oct. 1963 p 45-56 refs (See N64-13501 05-16)

Studies carried out to determine the effects on mice of cyanide and related nitriles alone and in combination, when given after lethal whole-body X-ray exposure, are summarized. It is concluded that postirradiation administration of cyanide, potassium sulfite plus cyanide, sodium azide, cysteine hydantoin, and 2-imino-thiazolidene-4-carboxylic acid significantly

increased the survival time of female CF_1 mice exposed to lethal doses of whole-body X-ray. P.V.E.

N64-13506 Chicago U., Ill. USAF Radiation Lab.
HISTOPATHOLOGICAL FINDINGS IN THE TISSUES OF MICE PROTECTED AGAINST THE LETHAL EFFECTS OF WHOLE-BODY X-RAY EXPOSURE BY THE POST-IRRADIATION ADMINISTRATION OF SODIUM SULFITE OR A THIAZOLIDINE DERIVATIVE
D. Vesselinovitch, J. Dilley, J. Meskauskas, F. Fitch, and J. Doull *In its* Quart. Prog. Rept., No. 49 [Research on Certain Biological and Medical Aspects of Atomic Energy] 15 Oct. 1963 p 57–69 refs (See N64-13501 05-16)

Discussion is presented of research concerning gross and microscopic changes in the tissues of CF_1 mice given therapeutic dosage levels of 2-imino-thiazolidine-4-carboxylic acid or sodium sulfite, 30 minutes after exposure to various doses of whole-body X-irradiation. Sulfite and, to a lesser extent, 2-imino-thiazolidine-4-carboxylic acid reduced the radiation-induced changes in body weight and in the spleen of mice given 600 r or 700 r of whole-body X-irradiation. Recovery of the hematopoietic system was enhanced in X-rayed mice treated with sodium sulfite or 2-imino-thiazolidine-4-carboxylic acid 30 minutes after radiation exposure (both the myeloblastic and erythroblastic series appeared to be stimulated in the treated irradiated animals but the myeloblastic series appear to recover earlier). Bone marrow hypocellularity was less pronounced in the X-rayed mice that were treated with sodium sulfite and the appearance of gelatinous marrow was less frequent in these animals. Repopulation of the bone marrow in the X-rayed mice treated with sodium sulfite or 2-imino-thiazolidine-4-carboxylic acid was stimulated. P.V.E.

N64-13507 Chicago U., Ill. USAF Radiation Lab.
THE INFLUENCE OF VARIOUS CHEMICAL COMPOUNDS ON RADIATION LETHALITY IN MICE
V. Plzak, M. Root, and J. Doull *In its* Quart. Prog. Rept. No. 49 [Research on Certain Biological and Medical Aspects of Atomic Energy] 15 Oct. 1963 p 70–91 refs (See N64-13501 05-16)

An investigation of the survival time and mortality of male CF_1 mice treated with various chemical compounds immediately prior to the administration of a lethal dose of whole-body X-irradiation is discussed. Of 54 compounds evaluated, 13 were significantly protective in that they permitted 10% more of the animals to survive for 30 days after an otherwise lethal dose (750 r) of whole-body irradiation. Six derivatives gave 20% 30-day survival: 2-(3-hydroxypropyl)-2-thiopseudourea, monohydrobromide, 1,4-dihydro-1-(o-mercaptophenyl)-4,4,6-trimethyl-2-pyrimidinethiol, 6-amino-3-pyridazinethiol, 2-amino-5-(p-aminophenyl-mercapto)-1,3,4-thiadiazole, 5-anilino-1,3,4-thiadiazole-2-thiol, and 5-benzylidene-3-pyridazinethiol 5-benzylidene-3-benzylideneamino-rhodanine. P.V.E.

N64-13508 Chicago U., Ill. USAF Radiation Lab.
EFFECTS OF PARTIAL BODY SHIELDING ON THE ACETYLATION OF SULFANILAMIDE IN CHRONICALLY IRRADIATED MICE
A. Sandberg and J. Doull *In its* Quart. Prog. Rept. No. 49 [Research on Certain Biological and Medical Aspects of Atomic Energy] 15 Oct. 1963 p 92–103 refs (See N64-13501 05-16)

The effect of chronic irradiation on the ability of CF_1 female mice to acetylate sulfanilamide was investigated while the animals received 50 r per day, 100 r per day, and 200 r per day of whole-body X-irradiation, irradiation of the liver area only, or irradiation when the liver area was shielded. The acetylating capacity of the liver was not destroyed when a total of 1,400 r had been accumulated in the groups of mice receiving 200 r per day. After an accumulated dose of 1,300 r in the groups receiving 100 r per day, acetylation of sulfanilamide remained unchanged. There was no impairment of acetylating ability in mice receiving 1,100 r, given in daily doses of 50 r, even though those animals which were given whole-body irradiation were in a moribund condition. Author

N64-13509 Chicago U., Ill. USAF Radiation Lab.
CAGING AND HOUSING EFFECTS ON MORTALITY IN X-RAYED MICE
D. G. Oldfield, V. Plzak, E. L. Simmons, and J. Doull *In its* Quart. Prog. Rept. No. 49 [Research on Certain Biological and Medical Aspects of Atomic Energy] 15 Oct. 1963 p 104–114 refs (See N64-13501 05-16)

An investigation into the time course of mortality in groups of mice given a single dose of X-rays and housed, after irradiation, in different but comparable animal quarters, is discussed. The animals were caged, with four in a plastic cage or eight in a metal cage. The investigation indicated that X-rayed animals caged four per plastic cage show an ST_{50} (median survival time) which is 5% to 30% longer than animals caged eight per metal cage; however, the 30-day mortality rate was nearly the same in all groups. P.V.E.

N64-13510 Chicago U., Ill. USAF Radiation Lab.
THE ANALYSIS OF RADIOPROTECTIVE EFFECTS IN PROTON- OR X-RAY-IRRADIATED MICE PRE-TREATED WITH CHEMICAL PROTECTORS
D. G. Oldfield, V. Plzak, and J. Doull *In its* Quart. Prog. Rept. No. 49, [Research on Certain Biological and Medical Aspects of Atomic Energy] 15 Oct. 1963 p 115–123 refs (See N64-13501 05-16)

An initial analysis is discussed of maximum likelihood estimates of 30-day mean lethal dose and other parameters calculated, using a computer, for mice total-body irradiated by high-energy (440 Mev) protons or by median energy (250 kvp) X-rays with and without preirradiation treatment with 2-mercaptoethylamine hydrochloride (MEA) or p-aminopropiophenone (PAPP). Based on DRF's (dose-reduction factors) and the specific drug dosage levels used, MEA is a better protector than PAPP against high-energy proton irradiation, but a poorer protector than PAPP against medium-energy X-ray irradiation. P.V.E.

N64-13575 Joint Publications Research Service, Washington, D.C.
DESIGN OF ISOPLANETIC SYSTEMS
A. P. Dmitriyev *In its* News of Higher Educ. Inst. Min. of Higher and Secondary Educ., USSR. Instr., Bldg. Ser., Vol. 6, No. 2, 1963 30 Dec. 1963 p 115–124 refs (See N64-13565 05-01) OTS: $3.00

Equations are presented to facilitate the design of isoplanetic systems from surfaces which are aplanetic and concentric to the pupil of the eye. Methods of calculating are given that require the use of logarithmic tables. Author

N64-13582 Joint Publications Research Service, Washington, D.C.
SOVIET RESEARCH ON FACTORS AFFECTING MAN'S VISUAL AND AUDITORY ANALYZERS
A. O. Navakatikyan et al 14 Jan. 1964 23 p refs Transl. into ENGLISH of two articles from Fiziol. Zh. SSSR (Moscow), v. 49, no. 9, Sep. 1963
(JPRS-22735; OTS-64-21292) OTS: $0.75

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1. ANALYSIS OF THE EFFECT OF PHYSICAL STRAIN, HIGH ENVIRONMENTAL TEMPERATURE AND HIGH OXYGEN CONTENT IN INSPIRED AIR ON THE EXCITABILITY OF THE VISUAL ANALYZER IN MAN A. O. Navakatikyan, V. V. Lebedeva, I. N. Blagoveshchenskaya, and S. A. Pevnyy p 1–11 refs (See N64-13583 05-16)

2. ADEQUATOMETRIC INVESTIGATION OF THE VISUAL AND AUDITORY ANALYZERS OF MAN IN THE PROCESS OF ADAPTATION TO CLIMATIC CONDITIONS B. A. Funtikov p 12–20 refs (See N64-13584 05-16)

N64-13583 Joint Publications Research Service, Washington, D.C.

ANALYSIS OF THE EFFECT OF PHYSICAL STRAIN, HIGH ENVIRONMENTAL TEMPERATURE AND HIGH OXYGEN CONTENT IN INSPIRED AIR ON THE EXCITABILITY OF THE VISUAL ANALYZER IN MAN

A. O. Navakatikyan, V. V. Lebedeva, I. N. Blagoveshchenskaya, and S. A. Pevnyy *In its* Sov. Res. on Factors Affecting Man's Visual and Auditory Analyzers 14 Jan. 1964 p 1-11 refs (See N64-13582 05-16) OTS: $0.75

The environmental conditions to which man is subjected when attempting a mining rescue were simulated, and the effect of these conditions on man was investigated. Results indicated that a high environmental temperature, physical strain, and an increased oxygen concentration in the inhaled air significantly influence the excitability of the visual mechanism. The hour-long effect of high temperature, physical strain, and oxygen content resulted in an increase of the minimum amount of stimulus energy necessary to the production of a response. R.T.K.

N64-13584 Joint Publications Research Service, Washington, D.C.

ADEQUATOMETRIC INVESTIGATION OF THE VISUAL AND AUDITORY ANALYZERS OF MAN IN THE PROCESS OF ADAPTATION TO CLIMATIC CONDITIONS

B. A. Funtikov *In its* Sov. Res. on Factors Affecting Man's Visual and Auditory Analyzers 14 Jan. 1964 p 12-20 refs (See N64-13582 05-16) OTS: $0.75

The effect of climatic factors on the excitability of the visual and auditory organs of man was investigated. A study was undertaken in order to determine adequate optical and auditory stimuli under these conditions. Results indicated that, in comparison with the excitability in the temperate zone, there is a regular lowering of the excitability of the visual and auditory organs of man in the tropics and an increase in their excitability in the Arctic. R.T.K.

N64-13608 Human Factors Research, Inc., Los Angeles, Calif.

GEOGRAPHIC ORIENTATION IN AIRCRAFT PILOTS: A PROBLEM ANALYSIS

James J. Mc Grath and Gail J. Borden Nov. 1963 114 p refs (Contract Nonr-4218(00))
(Tech. Rept. 751-1; AD-426256)

The initial phase of a research program, having an ultimate goal of identifying the factors that produce geographic disorientation in aircraft pilots and of developing a body of empirical data relevant to the design of navigation displays and aeronautical charts, is discussed. Major problem areas for pilots, as indicated by the causes of geographic disorientation under low-altitude, VFR flight conditions, included the following: (1) faulty selection, detection, and identification of visual checkpoint references; (2) faulty dead-reckoning procedures and poor aircraft control in flight; (3) deficiencies in chart information, chart interpretation, and chart handling; (4) adverse weather conditions; (5) inadequate preflight planning; (6) deficiencies in flight-instrument design and in instrument reading; and (7) individual differences in pilot skills, attitudes, and judgment. An outline of a program of research on these problems is described. P.V.E.

N64-13615 National Academy of Sciences-National Research Council, Washington, D.C. Committee on Hearing, Bioacoustics, and Biomechanics

CRITICAL EVALUATION OF METHODS OF TESTING AND MEASUREMENT OF NONORGANIC HEARING IMPAIRMENT Report of Working Group 36

Bernard Anderman, Jozef J. Zwislocki, Hallowell Davis, Leo Doerfler, Meyer Fox et al Nov. 1963 26 p refs
(Contract Nonr 2300(05))
(AD-425085)

Nonorganic hearing impairments include all of the classes of abnormal auditory function for which no plausible anatomical or physiological basis can be found or inferred. The basis for such impairments is presumably in the more complex activities of the central nervous system, which are better understood in psychological terms such as lack of cooperation, neurotic behavior, or deliberate deceit. A nonorganic impairment is usually presumed to have existed when auditory performance improves significantly on a subsequent test without any known change in the auditory system. The improvement must, however, be greater than the range of variation to be expected for the particular test. Nonorganic hearing impairment often appears as an "overlay" combined with a definite organic hearing loss. Some of the best tests are limited to the detection of monaural nonorganic impairments. Some other tests lose effectiveness when the subject has learned their principles. Routine audiometry can and should include a few simple indicator tests such as consistency of thresholds on repeated trials or agreement of the speech reception threshold with the prediction from the pure tone audiogram. Author

N64-13629 Bryn Mawr Coll., Pa.

EFFECT OF EXPOSURE TO LOW TEMPERATURE ON BLOOD CLEARANCE OF CARBON AND BACTERIA IN MICE

L. J. Berry Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Jul. 1963 15 p refs
(Contract AF 41(657)-340)
(AAL-TDR-63-1; AD-427166)

Mice housed at 5° C clear carbon from the blood more slowly than animals at 25° C, but those in the cold clear at the same rate even after exposures of 2, 18 or 72 hr prior to the test. Bacteria are also cleared uniformly at the two temperatures when a highly virulent strain of *Salmonella typhimurium* is injected intravenously, but not when one of low virulence is used. Mice at 25° C show a steady decline in bacteremic level, but not those at 5° C. The LD_{50} dose of bacteria via the intravenous route is higher than the intraperitoneal dose, with strains of each virulence in mice kept at 25° C, but it is clearly lower for the mice housed at 5° C. In line with these findings is the observation that exposure to 5° C for 8 hr post infection followed by 16 hours at 25° C yields mortalities similar to continuous exposure to 25° C and vice versa. Author

N64-13630 Harvard U., Boston, Mass. Medical School

EFFECT OF LOW TEMPERATURE ON THE ISOLATED HEARTS OF *CITELLUS LEUCURUS* AND *C MOHAVENSIS*

C. P. Lyman Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Sep. 1963 8 p refs
(Contract AF 41(657)-380)
(AAL-TDR-63-4; AD-427054)

The perfused, isolated hearts of two desert-living ground squirrels, *Citellus mohavensis* and *C. leucurus*, were exposed to temperatures between 25° and 0° C. Although *C. mohavensis* hibernates and aestivates and *C. leucurus* does neither, the temperature-rate curves were very similar, and typical of hibernators in general. *C. leucurus* is highly adapted to a diurnal existence in hot arid regions and has a high critical and lethal temperature, yet its heart has not changed its ability to tolerate low temperatures. Author

N64-13631 Washington, U., Seattle

CELL PROLIFERATION IN THE ADRENAL OF CONTROL AND COLD EXPOSED RATS

N. V. Everett and Shirley J. Weber Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Aug. 1963 11 p refs
(Contract AF 41(657)-309)
(AAL-TDR-63-7; AD-427040)

Tritiated thymidine coupled with high-resolution radioautography was employed to assess new cell formation in the

adrenal of control rats and of animals after different periods of cold exposure. Evidence is presented for new cell formation in each of the three cortical zones of controls and of experimental rats during all periods of cold exposure. Cold exposure effected an increase in new cell formation within the glomerular and fasciculate zones but not in the reticular zone. The results support the concept of functional independence of the three cortical zones. A small percentage of the chromaffin cells of the adrenal medulla was labeled in both control and experimental animals, indicating a slow rate of renewal that seemed not to be changed by cold exposure.

Author

N64-13632 Aerospace Medical Div., Arctic Aeromedical Labs., Fort Wainwright, Alaska

METABOLIC STUDIES OF AN AMINO ACID IMBALANCE IN COLD EXPOSED RATS

G. J. Klain and R. L. Winders Aug. 1963 14 p refs

(AAL-TDR-63-33; AD-427201)

Young rats fed an amino acid-imbalanced diet based on 6% fibrin, and supplemented with 0.4% DL-methionine and 0.6% DL-phenylalanine had increased activities of liver arginine synthetase and arginase, and increased plasma levels of a number of amino acids. However, the activities and levels of these metabolites were decreased in a comparable group of animals exposed to 7° C. The activity of the expired CO_2, originating from intraperitoneally administered 2 μc each of carbon-labeled methionine, phenylalanine or alanine, indicated that the rats kept at room temperature could not effectively oxidize the two imbalancing amino acids to maintain a proper balance in the amino-acid pool for the protein synthesis. In contrast, the cold-exposed animals were able to catabolize the excessive levels of methionine and phenylalanine and utilize them for energy purposes. The remaining balanced portion of the amino acid pool was then apparently used for the formation of new tissues, as also indicated by greater gains in body weight.

Author

N64-13633 Aerospace Medical Div., Arctic Aeromedical Labs., Fort Wainwright, Alaska

RECTAL TEMPERATURE OF THE WORKING SLED DOG

C. J. Eagan, J. L. Durrer, and W. M. Millard Oct. 1963 11 p refs

(AAL-TDR-63-40; AD-427041)

Rectal temperatures were measured on Husky sled dogs doing hard work (sled pulling) at ambient temperatures of 0° C and lower. Even in efforts that seemed maximal, rectal temperature usually increased no more than 1° C above the mean resting temperature range of 38.5° to 38.9° C. In exceptional cases it increased as much as 2° C. The mean rectal temperature measured on 17 dogs at the end of a 30-mile (48.3 km) championship race was 39.7° C. It is concluded that the dissipation of body heat produced during heavy work in the cold imposes no physiological strain on the Husky sled dog.

Author

N64-13645 John B. Pierce Foundation of Connecticut, New Haven

THERMAL AND METABOLIC RESPONSE OF THE KALAHARI BUSHMEN TO MODERATE COLD EXPOSURE AT NIGHT

H. T. Hammel, J. A. Hildes, D. C. Jackson, and H. T. Andersen Sep. 1963 32 p refs

(Contract AF 41(657)-415)

(AAL-TDR-62-44; AD-427039)

Studies were made of 10 adult male Bushmen and 4 Europeans during night-long exposure to ambient temperatures of approximately 6° C using only single-blanket sleeping bags. Rectal temperature of both groups started at about 36.8° C, but in the Bushmen fell 0.7° C lower than in the Europeans during the cold night. Calculated mean body temperature also fell lower in the Bushmen. Mean skin temperature of the Bushmen started higher but was the same as that of the Europeans at the end of the night, although the foot temperatures of the Bushmen were lower. The heat production of both groups was the same at the start, expressed as kcal per kg lean body mass per hour (approximately 1.5). Both rose during the cold night but the Bushmen increase was only half as great as that of the Europeans. Shivering in the Bushmen was less than in the Europeans and sleep was interrupted less in the Bushmen.

Author

N64-13653 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio

ATTENUATION OF NONUNIFORM SUIT TEMPERATURES FOR SPACE SUITS IN ORBIT

Kenneth R. Cramer and Thomas F. Irwine, Jr. (State U. of N.Y.) Sep. 1963 15 p refs

(AMRL-TDR-63-80; AD-425812) OTS: $0.50

A cylindrical model of a water-jacket space suit exposed to solar and metabolic heating was examined to determine the waterflow rates required to reduce large equilibrium suit-temperature differences. Analytical results demonstrate that variations in the metabolic heating rate are unimportant, and only moderate waterflow rates are required to reduce the maximum suit temperature difference to a few degrees Fahrenheit.

Author

N64-13656 Cutler-Hammer, Inc., Deer Park, N.Y. Airborne Instruments Lab.

FORM PERCEPTION IN VIDEO VIEWING: EFFECTS OF RESOLUTION DEGRADATION AND STEREO ON FORM THRESHOLDS

Norman E. Freeberg Bedford, Mass., AF Systems Command, Dec. 1962 48 p refs

(Contract AF 19(628)-328)

(ESD-TDR-63-136; AD-285491)

Thresholds for video viewing of randomly constructed forms are determined under conditions of pictorial degradation and stereoscopic presentation. Form recognition is not significantly enhanced by stereo viewing, but discrimination threshold is reduced. All form thresholds are highly sensitive to video image degradation. Video acuity is not significantly related to video form thresholds and can be affected by orientation of a pattern in relation to video scan lines.

Author

N64-13661 Harvard U., Boston, Mass. Medical School

HIBERNATION IN MAMMALS AND BIRDS

C. P. Lyman Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Aug. 1963 16 p refs

(Contract AF 41(657)-380)

(AAL-TDR-63-3; AD-427053)

Hibernation in mammals and birds, from its initiation through the long dormancy to the violent arousal, is a controlled process, developed through evolution to permit the animal to escape from an unfavorable environment. The same type of hibernation, using the same basic physiological modification, occurs in mammals which are so remotely related phylogenetically, that one must conclude that hibernation developed separately in several groups as the environmental stress arose. It is not a primitive return to the cold-blooded state, indicating a vestigial reptilian type of temperature control, but rather a specialized temperature regulation with precise control of its own.

Author

N64-13662 Bryn Mawr Coll., Pa.

THE IMPLICATION OF TRYPTOPHAN PYRROLASE IN ENDOTOXIN POISONING

L. J. Berry Ft. Wainwright, Alaska, Sep. 1963 24 p refs
(Contract AF 41(609)-1764)
(AAL-TDR-63-13; AD-427167)

An attempt has been made to relate the protective effect of cortisone against lethality of bacterial endotoxins in mice to changes in activity of liver tryptophan pyrrolase (TP), an enzyme known to be activated by the hormone. In mice maintained at 25° C, TP activity remained normal under conditions associated with survival and diminished in activity when animals were not protected. In addition, nicotinamide and diphosphopyridine nucleotide (DPN) were found to protect mice at 25° C against lethality of endotoxin about as effectively as cortisone. At 5° C, however, mice could not be protected against death from endotoxin by DPN, and even cortisone and nicotinamide were less effective than at 25° C. Mice in the cold die sooner than, and with different symptoms from, those at room temperature. Author

N64-13692 Joint Publications Research Service, Washington, D.C.
STUDIES IN REACTION OF CELLS TO THE EFFECTS OF EXTREME CONDITIONS
6 Jan. 1964 54 p refs Transl. into ENGLISH of 4 articles from the publ. "Reaktsiya Kletok na Ekstremal'nyye Vozdeystviya", Moscow, Acad. of Sci. USSR, 1963 p 6-13, 114-124, and 126-133
(JPRS-22613; OTS-64-21215) OTS: $1.50

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4. RADIORESISTANCE OF THERMOTOLERANT STRAINS OF *ESCHERICHIA COLI* V. D. Zhestyanikov p 40-51 refs (See N64-13696 05-16)

N64-13693 Joint Publications Research Service, Washington, D.C.
EFFECT OF CRYOLYSIS AND ULTRASONIC VIBRATIONS ON ACTOMYOSIN
M. A. Khenokh, G. P. Pinayev, and Ye. A. Kovalova *In its* Studies in Reaction of Cells to the Effects of Extreme Conditions 6 Jan. 1964 p 1-11 refs (See N64-13692 05-16) OTS: $1.50

This paper shows that the aggregation of macromolecules, reversible alterations of the ATP-ase activity, and changes of the number of SH-groups in actomyosin solutions occur under the influence of extremely low temperatures (78° F). Ultrasonic waves cause a decrease in structural viscosity, catalytic activity, and number of SH-groups. Author

N64-13694 Joint Publications Research Service, Washington, D.C.
CHANGE IN THE DESOXYRIBONUCLEASE ACTIVITY DURING X-RAY IRRADIATION
K. I. Pravdina *In its* Studies in Reaction of Cells to the Effects of Extreme Conditions 6 Jan. 1964 p 12-28 refs (See N64-13692 05-16) OTS: $1.50

The DNA-ase II activity has been studied in the mitochondria and supernatant liquid of the liver and spleen. In the spleen, DNA-ase II was most active. In experiments in vitro and in vivo, X-ray irradiation increased the DNA-ase II activity in the supernatant liquid of the spleen. The anaerobic irradiation of the mitochondria suspension prevented, only slightly, an increase in DNA-ase activity of the supernatant liquid of the spleen. Author

N64-13695 Joint Publications Research Service, Washington, D.C.
ON THE MECHANISM OF CYSTEAMINE PROTECTIVE ACTION
E. A. Val'dshteyn *In its* Studies in Reaction of Cells to the Effects of Extreme Conditions 6 Jan. 1964 p 29-39 refs (See N64-13692 05-16) OTS: $1.50

The protective effect of cysteamine has been studied on two strains of *E. coli* B and B/r. Postirradiation cysteamine protection was observed; irradiation and addition of cysteamine after irradiation took place in strictly anoxic conditions. Cysteamine protects bacteria from: (1) short-lived oxygen-dependent primary injuries, (2) long-lived oxygen-dependent primary injuries, and (3) short-lived oxygen-independent injuries. The effect of oxygen was observed. Author

N64-13696 Joint Publications Research Service, Washington, D.C.
RADIORESISTANCE OF THERMOTOLERANT STRAINS OF *ESCHERICHIA COLI*
V. D. Zhestyanikov *In its* Studies in Reaction of Cells to the Effects of Extreme Conditions 6 Jan. 1964 p 40-51 refs (See N64-13692 05-16) OTS: $1.50

Thermotolerant variants of bacteria which are able to form macrocolonies at 50° F. have been obtained by a prolonged cultivation of *E. coli* B, B/r, and K_{12} on agar with eosine-methylene blue, with gradually increasing temperatures. The radioresistance of thermotolerant strains of *E. coli* B, B/r, and K_{12} does not differ from that of the initial cultures. The exception is a thermotolerant variant of *E. coli* B bred on the simple nutrient agar at 46° F.; the increase in radioresistance of this strain is connected with the formation of elongated forms. The experiments on heat reactivation of thermotolerant *E. coli* B and B/r do not reveal any difference in survival curves obtained with the strains incubated after X-ray irradiation.
Author

N64-13714 North American Aviation, Inc., Downey, Calif. Space and Information Systems Div.
GENERAL PRINCIPLES OF BIOLOGICAL REGENERATION FOR LUNAR BASE LIFE SUPPORT
R. H. Mattoni *In its* Proc. of the [13th] Lunar and Planetary Exploration Colloq., Vol. 3, No. 3 Nov. 1963 p 101-109 refs (See N64-13701 05-01)

This paper concludes that a biological regeneration system is ideal for a lunar base of extended duration and will be reliable. Primary limitation would be atmospheric leakage, and some power and water reservations. Simple to complete bioregenerative systems are evaluated, and functions of bacteria and algae in a system are explained. A theory is offered of strain-selectivity and stabilization in operation, and a complete bioregenerative system employing chickens is described.
Author

N64-13715 Martin-Marietta Corp., Denver, Colo
ALGAL PHOTOSYNTHETIC GAS EXCHANGERS
Robert D. Gafford *In* North American Aviation, Inc. Proc. of the [13th] Lunar and Planetary Exploration Colloq., Vol. 3, No. 3 Nov. 1963 p 111-117 (See N64-13701 05-01)

Closed ecological systems developed to support manned space operations will employ some bioregenerating components. One of the most likely of these is the photosynthetic

gas exchanger, which has the potential capability of producing oxygen and consuming carbon dioxide, while simultaneously converting human wastes to useful food. The determination of when and how to employ photosynthetic gas exchangers will depend on the development of prototype systems from which engineering data can be obtained. Preliminary studies indicate that the electrical power required per man for illuminating photosynthetic gas exchangers will be from 3 to 5 kw; that solar-illuminated systems are feasible, and will require approximately 6 m^2 of exposed surface per man under continuous illumination; and that harvested algae can provide part of the food for an astronaut. Author

N64-13716* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
ENVIRONMENTAL CONTROL DEVELOPMENT AND LUNAR BASE SUPPORT MODULES
D. M. Perry *In* North American Aviation, Inc. Proc. of the [13th] Lunar and Planetary Exploration Colloq., Vol. 3, No. 3 Nov. 1963 p 119-126 (See N64-13701 05-01)

This paper reviews the changing concepts on environmental control systems developed through Mercury missions and Apollo planning and includes approaches necessary to establishing a closed environment. An additional concept is reviewed covering the use of prefabricated modules to be soft-landed on the lunar surface. The modules would have long-term standby capabilities and would provide facilities support for basic survival purposes, through extended stays and permanent lunar and planetary basing. Author

N64-13812 Army Missile Command, Huntsville, Ala. Redstone Scientific Information Center
THE INFLUENCE OF ELECTROSLEEP ON THE THERMOREGULATION REFLEX AND ELECTRIC RESISTANCE OF THE SKIN IN PATIENTS WITH PRURITIC DERMATOSIS
L. D. Butovetsky 13 Dec. 1963 10 p refs Transl. into ENGLISH from Vestn. Dermatol. i Venerol. (Moscow), v. 34, 1960 p 19-21
(RSIC-105; AD-426803)

The change in the thermoregulation reflex and the electric resistance of the skin under the influence of electrosleep was studied in 33 patients with various dermatoses. The thermoregulation reflex was found to be disturbed in the majority of patients with eczema. A normalization of the reflex, which coincided with an improvement of the skin process through the influence of electrosleep, was noted in seven patients. The results of the effect of treatment by electrosleep of patients with a disturbed thermoregulation reflex were inconclusive. The electric resistance of the skin was found to be lower in a majority of patients with eczema, even in areas distant from the focal section. Under the influence of electrosleep, the electric resistance did not undergo any essential change. R.T.K.

N64-13827 Texas A and M. U., College Station
INCAPACITATION OF THE GOAT FOLLOWING MASSIVE DOSES OF MIXED NEUTRON AND GAMMA RADIATION
Earl Rudder, Wayne C. Hall, and Sidney O. Brown Kirtland AFB, N. Mex., AF Weapons Lab., Dec. 1963 234 p refs
(Contract AF 29(601)-5211)
(RTD-TDR-63-3077; AD-426777)

Hematological, physiological, and psychological response data resulting from massive doses of mixed gamma and neutron irradiation are presented. Four exposure series are described involving 120 Spanish goats, 8 Angora goats, and 8 sheep. Doses and dose rates range from 158 rads to 50,694 rads at rates of 316 to 633 rads per minute. The doses are recorded as midline air doses. A review of the open literature relating to incapacitation doses is furnished that describes in detail the physical features under which exposures have been carried out. Author

N64-13830 Johns Hopkins U., Baltimore, Md.
THE EFFECT OF COLD ON SOME ASPECTS OF PROTEIN METABOLISM
Bacon F. Chow Fort Wainwright, Alaska Arctic Aeromedical Lab., Aug., 1963 10 p
(Contract AF 41(657)-299)
(TN-62-11; AD-427202)

The effect of cold on some aspects of protein metabolism in rats was investigated. Results include: (1) The urinary excretion of rats on a protein-free diet increased when the animals were placed at temperatures of 2° ± 2° C and 25° ± 3° C and also increased to some extent at 37° C. The catabolic process of the animals' own tissue, at the decreased environmental temperature, proceeded with a mechanism independent of any increased caloric requirement. (2) An increase in caloric intake on an isoproteinic diet significantly reduced proteinuria at 4° C. Paper electrophoretic analyses of the protein in the urine indicated that this protein was distinct from albumin in rat serum, having a mobility about 25% larger than that of albumin. (3) The increase in urinary nitrogen excretion following exposure at 2° C was mediated through a mechanism different from that induced by an administration of cortisone. (4) The nitrogen balance indices of lactalbumin, casein, and soybean protein in animals exposed to 4° C indicate that the nutritive values of protein were dependent on the temperature of the environment under which the test was carried out, and that the nitrogen indices were reduced upon lowering of the temperature from 25° C. I.v.L.

N64-13831 Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.
THE EFFECT OF POSITIVE PRESSURE BREATHING ON ARTERIAL OXYGEN SATURATION AND PULMONARY VENTILATION IN SUBJECTS EXPOSED TO HIGH TRANSVERSE ACCELERATION
John H. Reed, Jr., B. F. Burgess, Jr., and Harold Sandler 15 Nov. 1963 26 p 13 refs
(NADC-MA-6323; AD-424922)

Twenty-two centrifuge runs were performed on eight subjects in whom arterial oxygen saturation was continually monitored with a Waters cuvette while the subjects were exposed to various transverse accelerations, $+G_x$ at a seat angle of 6° head up. Conditions for breathing during the runs were: air (control), air positive pressure, pure oxygen (control), and pure oxygen positive pressure. The positive pressure was metered automatically to provide 3 mm Hg per g above ambient pressure. The results show that the slope of the oxygen saturation curve plotted against time for air and air positive pressure decreased approximately 3 percent every 10 seconds, beginning 10 to 20 seconds after the onset of the acceleration. During the oxygen breathing studies, a lowering in arterial oxygen saturation was observed approximately 100 seconds after the onset of acceleration. A method is suggested for estimating physiological limits for theoretical profiles of acceleration G plotted against time. Author

N64-13846 Hughes Aircraft Co., Fullerton, Calif.
A STUDY OF VISUAL DISPLAY ENHANCEMENT AND TECHNIQUES OF COLOR FILTERING
Robert J. Hall, James G. Miller, Dennis Musselman, Robert Earl, and Marvin H. Detambel Bedford, Mass., Decision Sci. Lab., Dec. 1963 47 p refs
(Contract AF 19(628)-2906)
(FR-63-11-287; ESD-TDR-63-635; AD-426265)

This report describes an investigation of target detection as a function of the spectral partitioning of light energy received from multicolored scenes which contain the targets and as a function of observer opportunity to manipulate certain viewing conditions. One group of observers viewed black and white photographs taken without optical filtering. Two others viewed black and white photographs taken through

blue and orange-yellow filters. Observers in one of the latter groups were given complete control of the display facilities, permitting them to view the orange-yellow and blue filtered images singly, alternately, or superimposed. Observers in the other group had more limited control of the display: they could view the two filtered images singly, changing from one to the other as often as desired, but with a brief pause between images. Viewing the two filtered photographs proved superior to viewing the unfiltered one. Differences resulting from the two degrees of display control were small but favored the condition of more complete observer control. Author

N64-13852 Boeing Co., Seattle, Wash.
HESTIANIC ACID—A BIOLOGICALLY RESISTANT PIGMENT FROM AEROBIC WASTE DIGESTERS
Carl Emanuel Brooks AFB, Tex., School of Aerospace Med., Oct. 1963 15 p refs
(Contract AF 41(657)-387)
(SAM-TDR-63-57; AD-425940)

The isolation and chemical properties of a brown copper-containing pigment which arises from aerobic, biologic degradation of human waste are described. This pigment, called hestianic acid, was shown to possess a formidable structural complexity and heterogeneity. It was also notable for its chemical and biologic inertness and, therefore, represented the main bulk of the residual organic material in the well-digested, activated sludge-process effluent. The present evidence indicates, but does not prove, that hestianic acid derives from the ubiquitous melanine pigments in natural food stuffs. The pigment also possesses several properties in common with the humic acids and would, under less artificial conditions, be incorporated into the humic acids of the soil. Author

N64-13854 Ohio State U., Columbus
THE EFFECTS OF PSYCHOMOTOR AROUSAL, HEMORRHAGE, AND THE UPRIGHT POSTURE ON THE CIRCULATION OF THE YOUNG CHIMPANZEE
Arnold M. Weissler, Clyde D. Schoenfeld, Vernon L. Carter, Sidney Cohen, and Alden E. Stilson, Jr. et al Holloman AFB, N. Mex., 6571st Aeromed. Res. Lab., Dec. 1963 30 p refs
(Contract AF 29(600)-3468)
(ARL-TDR-63-28; AD-296941)

In the present study employing standard techniques of cardiac catheterization and the indicator dilution method for cardiac output, baseline hemodynamic observations were made in the young chimpanzee. Determinations of pressure in the pulmonary and systematic circulation and cardiac output were obtained with the animals at rest in the supine position and during the altered hemodynamic states accompanying psychomotor arousal, hemorrhage, and head-up tilt. All studies were performed without pharmacologic preparation of the animals. Comparison of the circulation of the chimpanzee with that in the human demonstrated a tendency for heart rate, cardiac output, and arterial pressure to be higher, whereas pressures in the pulmonary circulation were in a range similar to that in the human of comparable size and age. These observations demonstrate that the chimpanzee is a convenient laboratory primate for hemodynamic studies in whom circulatory responses can be observed with techniques commonly employed in the human. Author

N64-13865 School of Aerospace Medicine, Brooks AFB, Tex.
MICROORGANISMS IN HUMAN GINGIVAL TISSUES
William A. Gibson and Ira L. Shannon Oct. 1963 7 p refs
(SAM-TDR-63-88; AD-425477)

Gingival strip biopsies were taken from areas of obvious inflammation in 191 systemically healthy young adult males. For 72 of these subjects, a thorough oral prophylaxis was performed 24 hours prior to experimental participation. The remaining 119 subjects received no dental treatment of any type and served as controls. Serial sections were stained by four different methods: hematoxylin-eosin, the Brown and Brenn modification of the Gram stain, the Grocott modification of the Gomori's methenamine-silver nitrate technic, and a combined Gram and Twort's staining technic. Bacteria were found in the gingival tissues of approximately 10% of the non-treated subjects and 60% of those who received oral prophylaxis. These findings were held to be inconsistent with the premise of active bacterial invasion in gingival inflammation. Author

N64-13869 Chicago U., Ill.
FROG LABYRINTHINE EFFERENT IMPULSES
R. S. Schmidt Brooks AFB, Tex., School of Aerospace Med., Sep. 1963 15 p refs
(Contract AF 41(609)-1479)
(SAM-TDR-63-66; AD-425564)

Efferent impulses were recorded from the free ends of nerves detached from the ampullae, sacculus, utriculus, and lagena in the leopard frog (*Rana pipiens*). These impulses were found to be initiated by stimulation of any ampulla or a variety of unidentified extralabyrinthine proprioceptors. None were evoked in response to stimulation of the auditory or otolith organs. There was no spontaneous resting activity in the efferent fibers. Author

N64-13872 RCA Service Co., Inc., Camden, N.J.
TECHNIQUES OF PHYSIOLOGICAL MONITORING. VOLUME II: COMPONENTS
Richard Alnutt and Philip T. Weinberg Wright-Patterson AFB, Ohio, Biophysics Lab., Nov. 1963 272 p refs
(Contract AF 33(657)-9252)
(AMRL-TDR-62-98(2); AD-426816) OTS: $4.00

This volume surveys the components used in physiological monitoring systems, primarily those suitable for aerospace applications. Discussion includes performance characteristics and capabilities, plus some background theory, on basic components such as electrodes and transducers, signal modifiers, and graphic recording and display devices. The use of magnetic tape recorders in instrumentation is described. Wire and radio transmission equipment is discussed, plus various schemes of modulation and multiplexing. The capabilities of digital and analog computers and other data processing equipment are described, and the analysis of physiological data with such equipment is briefly discussed. Author

N64-13873 Air Force Systems Command, Wright-Patterson AFB, Ohio
WALKING RESPONSES UNDER LUNAR AND LOW GRAVITY CONDITIONS
James F. Roberts (M.S. Thesis—AF Inst. of Tech., 1962) Nov. 1963 127 p refs
(AMRL-TDR-63-112; AD-426837) OTS: $2.75

A motion picture (time-displacement) walking experiment was conducted at various artificial gravity levels in an aircraft flying in parabolic trajectories. Two subjects walked on a floor-marked distance scale. Successive lowering of the gravity level from 1.0 g to 0.1 g produced the following effects. The subjects maintained within 10 percent of their normal 1-g velocity to gravity levels of 0.25 g or below. The most consistent effect of the reduction of gravity was the increased swinging time of the leg, which varied inversely as the sixth root of the gravity level. The increasing swing-to-support ratio indicates the decreasing control of progression. The discontinuity in the performance curves in the region of 0.2 g tends to substantiate previous estimates of the lower gravity limit for walking. Author

N64-13931 School of Aerospace Medicine, Brooks AFB, Tex.
URINARY CATECHOLAMINES IN MOTION SICKNESS AND TURBULENT FLIGHT
Joseph L. Borowitz, Elmer J. Schultz, and William W. Lackey Nov. 1963 8 p refs
(SAM-TDR-63-9; AD-426121)

Urine samples were collected from 65 young airmen, both before and after they were subjected to turbulent motion in C-47 aircraft. Similar samples were collected from 31 young airmen who were taken on flights during which no turbulence was voluntarily induced. The acidified but unboiled urines were analyzed for "free" catecholamines. Neither norepinephrine nor epinephrine output in urine was related to vomiting or sweating during the turbulent flights. The output of norepinephrine and epinephrine was significantly greater during turbulent flights than during flights in which no turbulence was induced. Urinary epinephrine output was also significantly increased during the turbulent flights as opposed to the preflight period. Changes in urinary catecholamine output during flying are therefore associated with tubulence, but appear to be distinct from the motion-sickness syndrome. Author

N64-13968 Magna Corp., Anaheim, Calif. Research and Development Div.
BIOCHEMICAL FUEL CELLS Fifth Quarterly Progress Report, 1 Jul.-30 Sep. 1963
J. M. Brake, W. R. Momyer, and H. P. Silverman [1963] 38 p refs
(Contract DA-36-039-SC-90866)
(AD-426937)

The electro-oxidation of hydrogen and formic acid was investigated under conditions compatible with, but independent of, biological systems. The best performance was obtained with formic acid. This electrode supported 10 ma/cm^2 at a polarization of 260 mv under conditions compatible with *E. coli*. Improved and more consistent growth of *Cl. butyricum* was obtained with AC broth supplemented with thioglycollate. Hydrogen production as a function of growth, as well as the best time to harvest cells for optimum hydrogen production, was also determined. The electrochemical behavior of *E. coli*-glucose and *Cl. butyricum*-glucose systems, two potentially useful bioelectrodes, was investigated using dispersed suspensions of the bacteria. The limiting current density and the rate of hydrogen production were determined as a function of bacterial concentration. Preliminary indications are that higher current densities are possible with the integrated *E. coli*-glucose system, in which the electrochemical and biological reactions are combined, than can be obtained by simply oxidizing the hydrogen from the biological fermentation of glucose by this organism. Author

N64-13972 Philco Corp., Palo Alto, Calif. Western Development Labs.
HUMAN ENGINEERING DESIGN CHECK LIST
1 Feb. 1963 56 p refs
(Contract AF 04(695)-113)
(WDL-TR1968; AD-299282)

A test checklist is presented, which provides an indication of the extent to which the equipment detail design complies with human-engineering criteria specified in MIL-STD-803 (USAF), that is a part of the acceptance test plan for MUSAP. The visual-inspection checklist is concerned with the mechanical operation, location, arrangement, form, readability, and coding of controls and displays. Power is applied to the equipment to check control interlocks and multicolor displays. The function checklist is concerned with the functions and the interaction of controls and displays. Equipment acceptance-test specifications are used as the reference for monitoring this portion of the test. The test includes monitoring of equipment activation, checkout, normal operation, manual override operation, and shutdown. Particular attention is given to the operations sequence and information feedback. In addition, the test checklist is to be used as a human-engineering design guide. I.v.L.

N64-13988 New Hampshire U., Durham
RELATIONSHIP OF COLD UPON THE BIOLOGICAL PROPERTIES PECULIAR TO INFLUENZA VIRUS AND ITS CAPACITY FOR INVASIVENESS AND MULTIPLICATION
T. G. Metcalf Fort Wainwright, Alaska, Arctic Aeromed. Lab., Aug. 1963 7 p
(Contract AF 41(657)-350)
(TN 62-12; AD-427169)

Alaskan ground squirrels have been examined for their excretion of animal and bacterial viruses. Eighty-one separate fecal samples from 25 animals yielded negative findings for bacterial viruses reactive against five strains of *Escherichia coli*. Sixty-six individual fecal samples from 24 animals failed to show the presence of animal viruses capable of causing cytopathogenic effects in HeLa, Human Amnion, and the $LLMK_2$ strain of monkey kidney monolayers. Neuraminidase activity of influenza virus was demonstrated at 25° C. The amount of neuraminic acid split from the substrate by enzyme action at 25° C was less than that observed at 37° C. Ovomucin obtained from fresh hens' eggs was prepared and shown capable of serving as a suitable substrate for influenza neuraminidase. Author

N64-14044 Worcester Foundation for Experimental Biology, Shrewsbury, Mass.
BIOCHEMICAL RESPONSE OF IMMATURE CHIMPANZEES TO SEVERE ENVIRONMENTAL STRESS
D. S. Layne, F. Elmadjian, G. Pincus, and T. L. Gleason III Holloman AFB, N. Mex., 6571st Aeromed. Res. Lab., Nov. 1963 81 p refs
(Contract AF 29(600)-3336)
(ARL-TDR-63-26; AD-425859)

Further information on the response of chimpanzees to severe environmental stress by biochemical examination of urine and plasma samples was obtained. The effects of various conditions of temperature and humidity were studied. Tests were conducted in a centrifuge simulating the conditions present during launch acceleration and reentry deceleration of orbital flight, and one experiment was carried out involving an actual orbital flight. In addition, a test was conducted simulating the environmental conditions of orbital flight using an advanced biomedical capsule. Plasma samples were collected from animals subjected to a temporal delay task which involved pacing behavior. A discussion of results and conclusions is included. J.E.T.

N64-14046 Sandia Corp., Albuquerque, N. Mex.
HEALTH PHYSICS ASPECTS OF OPERATION ROLLER COASTER
William D. Burnett, Harold L. Rarrick, and George E. Tucker, Jr. Jan. 1964 35 p refs
(SC-4973(RR)) OTS: $0.75

Discussed are the radiological safety problems related to the joint AEC-DOD-UK research program, Roller Coaster, for the evaluation of the storage, handling, and transportation criteria of plutonium-bearing weapons and to the post-test cleanup. The program included four experimental detonations: Double Tracks, in which the biological hazard of scattered plutonium was investigated and Clean Slates One, Two, and Three, in which the scavenging effect of earth covering of storage structures was evaluated. Author

N64-14074 Joint Publications Research Service, Washington, D.C.
SOME DATA ON THE USE OF MUSCLE RELAXANTS

V. Ya. Orlov 30 Jan. 1964 6 p Transl. into ENGLISH from Eksperim. Khirur. i Anesteziol (USSR), no. 6, 1963 p 66-67
(JPRS-22995; OTS-64-21439) OTS: $0.50

Results of an analysis of 1,271 operations in which muscle relaxants were used indicate the following: (1) Spirography and oxyhemography should always be used to control restoration of adequate pulmonary ventilation after the repeated administration of muscle relaxants. (2) Intravenous administration of calcium chloride solution leads to an increase in pulmonary ventilation which is usually transient. R.T.K.

N64-14133 Joint Publications Research Service, Washington, D.C.

CHANGES OF THE MORPHOLOGICAL AND FUNCTIONAL PROPERTIES OF THE BLOOD AND HEMODYNAMICS DURING WORKING WITH EXTRACORPOREAL CIRCULATION APPARATUS OF NIIEKhA AND I (AIK-59) AND BALYUZEK (ISL-2) SYSTEMS

V. I. Kolesov et al 27 Jan. 1964 11 p refs Transl. into ENGLISH of an article from Grudnaya Khirurgiya (Moscow), v. 5, no. 6, 1963 p 34-39
(JPRS-22914; OTS-64-21397) OTS: $0.50

In experimental and clinical investigations during perfusion and in the postoperative period, the authors assessed changes of the morphological (leukocyte count, leukocyte formula, red blood, hemolysis) and functional properties of the blood, in particular its enzymatic systems (the content of peroxidase in granulocytes, osmotic resistance of leukocytes, activity of the respiratory enzyme-carbonic anhydrase in erythrocytes). Also under study were alterations of the blood coagulation system and hemodynamic shifts occurring during the use of apparatus of extracorporeal circulation. Author

N64-14134 Joint Publications Research Service, Washington, D.C.

THE EFFECT OF G-FORCE ON THE STRUCTURE OF THE VASCULAR SYSTEM

M. G. Prives 28 Jan. 1964 17 p refs Transl. into ENGLISH of an article from Arkh. Anat., Gistol. i Embriol. (Moscow), v. 45, no. 11, Nov. 1963 p 3-13
(JPRS-22956; OTS-64-21420) OTS: $0.50

The effect of g-force on the structure of the vascular system of rabbits and albino rats was investigated. Results indicate that: (1) The effect of considerable g-force, causing the animals' death, produces morphological changes in the vascular system as expressed by dilatation of the vessels, increase in the number of visible vessels, especially of the fine ones, with increase in their diameter, appearance of tortuosity, and change in angioarchitectonics. Muscle sheath atrophy and elastic structure dystrophy are observed in the arterial walls. These changes, under the effect of head-pelvis g-force, are more pronounced in the hind extremity than in the front one. With pelvis-head g-force, they are more pronounced in the anterior extremities. (2) The described changes are functional inasmuch as they disappear a certain time after termination of exposure to g-force. However, even one year later some changes remain in the arterial wall that are indicative of relatively severe changes of vascular structure, especially of the tunica elastica. I.v.L.

N64-14142 Joint Publications Research Service, Washington, D.C.

CYBERNETICS IN THE SCIENCES, ENGINEERING AND ECONOMY OF THE GERMAN DEMOCRATIC REPUBLIC

Hermann Klare et al 28 Jan. 1964 203 p refs Transl. into ENGLISH of the publ. "Uber Wissenschaftliche Grundlagen der Modernen Technik: Kybernetik in Wissenschaft, Technik und Wirtschaft der DDR", E. Berlin, 1963 p 1-186 Presented at the Conf. of the Comm. for Cybernetics, E. Berlin, 16-17 Oct. 1962
(JPRS-22931; OTS-64-21406) OTS: $3.50

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13. MEDICINE, BIOLOGY AND CYBERNETICS H. Drischel (Karl Marx U., Leipzig) p 158-195 refs

N64-14143 Joint Publications Research Service, Washington, D.C.

BIOLOGY AND CYBERNETICS

Aleksand'r Goranov 29 Jan. 1964 17 p refs Transl. into ENGLISH of an article from Biol. Khim. (Bulgaria), v. 6, no. 5, 1963 p 1-8
(JPRS-22963; OTS-64-21424) OTS: $0.50

Biology and cybernetics are reviewed. Biology, by using the attainments of cybernetics, will be enriched with new ideas. Cybernetic devices will aid in the discovery of new biological secrets, which, as they are analyzed and applied in cybernetics, will lead to still greater progress in this science. Cybernetics, as it discloses the general laws for the coordination and regulation of the internal processes in living organisms and modern cybernetic devices, is already in a position to simulate biological processes and to create complex devices which even reproduce certain functions of the second signal system of man. The theory of feedback "afferentiation" includes within it the theory of feedback evolved by cybernetics, so that it may serve for analysis of all forms of self-regulating processes as well as for the construction of analogous self-regulating cybernetic devices. The theory of feedback in physiology and cybernetics does not contradict Pavlov's conception of the reflex but develop it further. I.v.L.

N64-14147 Joint Publications Research Service, Washington, D.C.

PHYSIOLOGY OF THE ACT OF ATTENTION

V. I. Patrushev and V. G. Zhukov 24 Jan. 1964 10 p refs Transl. into ENGLISH of an article from Vop. Psikhologii (Moscow), no. 5, 1962 p 70-74
(JPRS-22892; OTS-64-21386) OTS: $0.50

The physiology of the act of attention was investigated. Students between the ages of 12 and 17 were the test subjects. Results indicate that: (1) The level of excitation of the

nervous system fluctuates regularly within short time intervals. (2) This large-scale study of juveniles under uniform conditions revealed three types of changes in the duration of latent periods of motor reaction in response to successive stimuli causing the act of attention: (a) successive reduction of the duration of long latent responses, (b) insignificant variations of latent responses of medium duration, and (c) successive increase of short latent periods. The preponderance of the second type of change, (b), for all subjects studied, and also the dampening of extreme durations of latent periods in the course of perception, suggests that the optimum excitation of the subjects for perception lies in the limits of medium values of latent periods of motor reaction. I.v.L.

N64-14148 Joint Publications Research Service, Washington, D.C.

THE NATURE OF MICRONECROTIC FOCI OF HEMOPOIETIC ORGANS OF ANIMALS EXPOSED TO RADIATION

M. N. Meysel' and V. M. Manteyfel' 27 Jan. 1964 14 p refs Transl. into ENGLISH of an article from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 6, 1963 p 871-878
(JPRS-22915; OTS-64-21398) OTS: $0.50

The rapid drying in air of smears from hemopoietic organs of white rats, which have been fluorochromed *in vivo* and supravitally, makes it possible to preserve a number of features in the luminescence of normal and pathological cells. By using this method, the micronecrotic foci that arise in the hemopoietic organs of radiated animals were identified as the macrophages which phagocytize the cells and their fragments. The dynamics in the appearance, quantitative growth, and fall of the micronecrotic foci, after the irradiation of the animals, reflects the dynamics in the mobilization of the macrophages and the activation of their phagocytic function. Micronecrotic foci were also experimentally produced by injecting damaged lymphocytes in the spleen and lymph nodes of normal rats. The changes observed in the character of the ultraviolet luminescence emitted by the macrophages and phagocytized cells reflect the different stages in the intracellular digestion of these cells. I.v.L.

N64-14149 Joint Publications Research Service, Washington, D.C.

PROSPECTS OF THE USE OF OPTICAL QUANTUM OSCILLATORS IN BIOLOGY AND MEDICINE

A. A. Vishnevskiy and S. N. Braynes 30 Jan. 1964 8 p Transl. into ENGLISH of an article from Eksperim. Khirur. i. Anesteziol. (Moscow), no. 6, 1963 p 3-5
(JPRS-22994; OTS-64-21438) OTS: $0.50

The use of lasers in experimental biology is very promising. Since lasers are a source of high-intensity radiation in a narrow spectral range, it is possible that they will prove to be an effective agent for delicate instrumentation in metabolic processes by the selective stimulation of molecules involved in these processes. Also, that laser radiation will display mutagenic properties is not out of the question. Mutations under such circumstances could be the result of the interaction of infrared and visible radiation with molecular complexes, the carriers of heredity. Lasers have been successfully used in eye surgery. A beam was focused onto a small point on the retina, and detached parts of the retina were "welded" without damage to surrounding tissue. Malignant tumors have been cauterized with lasers. It is expected that lasers will play a large part in heart and nerve surgery and in the study of carcinomatous diseases. I.v.L.

N64-14168 Washington School of Psychiatry, D. C.

THE EFFECT OF A PARTICULAR STRESS ON ONE MAN'S PERFORMANCE OF VARIOUS TRACKING TASKS Interim Report

Hamilton Mowbray, Lewis Durr (Applied Physics Lab.), Elizabeth De Socio, and Norman K. Walker Sep. 37 p refs
(Contract DA-49-193-MD-2369)
(AD-428112) OTS: $3.60

The present report investigates the effect for an acceleration control tracking task over a wide range of control stiffnesses (8.3 to 915.0 mils/sec^2) and control lag (0.0 to 1.255 sec). The results indicate, as a working hypothesis: (1) that the percentage increase in error due to control lag, and due to auditory shadowing is independent of control stiffness. (2) that the effect of auditory shadowing is small (40% to 50% increase in error) with no lag, but very great (over 200% increase in error) if the lag is 0.3 sec or more; (3) that under conditions where severe degradation of the tracking task occurs, the accuracy of the auditory shadowing is also seriously degraded. Author

N64-14180 RAND Corp., Santa Monica, Calif.

MAN'S THERMAL BALANCE IN SPACE ENVIRONMENTS

Herman P. Roth Oct. 1963 16 p refs Presented at the SAE Natl. Aeron. and Space Eng. Meeting, Los Angeles, 23-27 Sep. 1963
(NASA Contract NASr-21(08))
(NASA CR-55279; P-2810) OTS: $1.60 ph, $0.80 mf

Flight to the moon and man's personal exploration of its surface will impose thermal-control problems of both design and reliability of performance considerably beyond those required in an orbital-flight vehicle. Additional knowledge is vitally needed in a number of fields bearing directly on the problem of designing space vehicles and space suits. Questions raised concern the effect of true space environment on the materials which must protect man, the environmental control in the capsule, special problems of air circulation in the space suit and of equalizing the thermal condition between the shaded and nonshaded sides of the suit when man goes outside the space vehicle, the variability of heat production according to activity, and the problems caused by water. Achieving essentially 100% reliability is a matter of early design, thorough and complete testing with avoidance of change for a considerable period prior to critical use, and attention to the human factor. R L K

N64-14251 Joint Publications Research Service, Washington, D.C.

CHANGES IN EPITHELIUM UNDER THE INFLUENCE OF RADIATION

K. M. Svetikova et al 31 Dec. 1963 29 p refs Transl. into ENGLISH of 2 articles from Arkh. Anat., Gistol. i Embriol. (Moscow), v. 45, no. 10, Oct. 1963 p 51-66
(JPRS-22556; OTS-64-21184) OTS: $0.75

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1. REPARATIVE REGENERATION OF CUTANEOUS AND INTESTINAL EPITHELIA AT THE ANAL JUNCTION IN ACUTE RADIATION SICKNESS K. M. Svetikova p 1-13 refs (See N64-14252 06-16)

2. CHANGES IN THE TRANSITIONAL EPITHELIUM AFTER THE ACTION OF IONIZING RADIATION A. V. Zhuravlev p 14-26 refs (See N64-14253 06-16)

N64-14252 Joint Publications Research Service, Washington, D.C.

REPARATIVE REGENERATION OF CUTANEOUS AND INTESTINAL EPITHELIA AT THE ANAL JUNCTION IN ACUTE RADIATION SICKNESS

K. M. Svetikova *In its* Changes in Epithelium Under the Influence of Radiation 31 Dec. 1963 p 1-13 refs (See N64-14251 06-16)

In nonirradiated and in some irradiated animals, a wall of leukocytes was formed very quickly after thermal injury to the epithelia at the site of the anal junction, creating a barrier which

prevented the penetration of the infection into the wound. In the majority of irradiated rats, the formation of the leukocyte wall was delayed. During this time, the infection, encountering no resistance, managed to develop both on the wound surface and in its depths. Under the influence of microbe toxins, tissue necrosis occurred at the base and edges of the wound. In both irradiated and nonirradiated animals, local differentiation of immature granulation tissue occurred differently, depending on the type of epithelium covering it. R.T.K.

N64-14253 Joint Publications Research Service, Washington, D.C.
CHANGES IN THE TRANSITIONAL EPITHELIUM AFTER THE ACTION OF IONIZING RADIATION
A. V. Zhuravlev *In its* Changes in Epithelium Under the Influence of Radiation 31 Dec. 1963 p 14-26 refs (See N64-14251 06-16)

X-radiation in doses from 2400 r causes well-expressed radiation changes in the cutaneous epithelium. Taking into consideration the genetic similarity between cutaneous and transitional epithelia, a dose of 3000 r was selected for the irradiation of white rats in order to compare the times of the radiation changes in the transitional epithelium with changes in epithelium of the abdominal skin exposed to irradiation at the same time. Data on the following are included in tabular form: (1) the change in the mitotic coefficient and number of binucleated cells in the transitional epithelium of the bladder and the mitotic coefficient of the epidermis of the skin of the abdomen after a single irradiation dose of 3000 r, and (2) the change in the nuclear volume of transitional epithelial cells after local X-rays irradiation of 3000 r. R.T.K.

N64-14304 Spacelabs, Inc., Van Nuys, Calif.
METHOD OF PRESERVING FROZEN FOOD DURING AN AEROSPACE MISSION Final Report, Feb.-Nov. 1962
Robert R. Reddy and Eugene B. Zwick Wright-Patterson AFB, Ohio, Biomedical Lab., Apr. 1963 36 p refs
(Contract AF 33(657)-8019)
(AMRL-TDR-63-31; SR-62-1047; AD-407423) OTS: $1.00

Analyses of three nonelectrical methods for maintaining frozen foods between −10° and +5°F during aerospace missions of 1 to 28 days are presented. The methods considered are: (1) a heat sink, (2) active refrigeration, and (3) radiation cooling. All methods appear feasible. The heat sink method appears to be the simplest and most reliable. A design study of a heat sink system for a 3-man, 14-day mission is included. Author

N64-14324 Texas U., Galveston Medical Branch
SIMPLIFIED STANDARDIZED TREATMENT OF BURNS UNDER EMERGENCY CONDITIONS WITH PARTICULAR REFERENCE TO ALLIED HEALTH PERSONNEL
T. G. Blocker Jr. and Virginia Blocker [1963] 65 p
(Contract OCD-OS-62-129)
(AD-426228)

Guidelines are presented for simplified austere medical care for victims of thermal injuries during a national disaster. The report is designed to assist in emergency planning and for training of members of the allied health professions. The program covers the identification of allied health personnel and suggests the carrying of proper identification cards. Diagnosis and triage was also covered and included treatment for different types of burns. An outline was then given for austerity therapy and included a general plan of management, local treatment, and fluid therapy. C.L.W.

N64-14333 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
NEW METHODS IN MEDICINE
V. D. Timakov (Akad. Med. Nauk SSSR) 10 Oct. 1963 68 p Transl. into ENGLISH from "Novyye Puti Meditsiny", Moscow, Izd "Znaniye", 1963 p 1-48
(FTD-TT-63-732/1+4; AD 423604)

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4. CYBERNETICS APPROACHES THE FUTURE V. D. Timakov p 39-48 (See N64-14334 06-16)
5. POLYMERS IN MEDICINE V. D. Timakov p 49-53 (See N64-14335 06-16)
6. THE LAND OF LONGEVITY V. D. Timakov p 54-63

N64-14334 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
CYBERNETICS APPROACHES THE FUTURE
V. D. Timakov *In its* New Methods in Med. 10 Oct. 1963 p 39-48 (See N64-14333 06-16)

The future of cybernetics in the field of medicine is reviewed. Cybernetic computers will be used for the diagnosis of diseases and the quick and accurate processing of a large volume of often changing information. The value of the cybernetic diagnostic computer consists of the fact that it supplements the memory of the doctor by its electronic "memory", which never forgets anything. Cybernetic computers will solve such complicated problems as rapid, accurate interpretations of special studies of the brain (electroencephalograph) and of the heart (electrocardiograph). They will be able to "read" and "interpret" the data of radiographic investigations including such complicated ones as angiography and tomography, and also the results of laboratory analysis of blood, cerebrospinal fluid, bone marrow, gastric juice, etc. The computers will be able to quickly receive the information from instruments about the changing condition of the patient being operated on and will simultaneously note and evaluate the first signs of alarm. I.v.L.

N64-14335 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
POLYMERS IN MEDICINE
V. D. Timakov *In its* New Methods in Med. 10 Oct. 1963 p 49-53 (See N64-14333 06-16)

The uses of plastics in medicine include the following: (1) to make an artificial prosthesis of the head of the femur; (2) to eliminate the so-called relaxation of the diaphragm by using a plastic flap made of polyvinyl alcohol; (3) to sew up wounds of the chest and abdominal cavity; (4) to replace a section of damaged or worn blood vessels; (5) to fill the cavities of hollow-bone transplants, thus aiding complicated osteoplasty; and (6) to synthesize a blood substitute, into which drugs can be incorporated, that is retained by the organism for a rather long period of time. I.v.L.

N64-14351 Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.
THE NON-PROTEIN AMINO ACIDS AND RELATED COMPOUNDS OF RAT LIVER MITOCHONDRIA
Herman W. Shmukler 18 Oct. 1963 23 p refs
(Rept. 21; NADC-MA-6318; AD-428381) OTS: $2.60

The nonprotein amino acids and related compounds of rat liver mitochondria have been analyzed by automatic ion exchange chromatography. Twenty-seven ninhydrin positive peaks were obtained. The identity of these chromatographic peaks is discussed. Mitochondria frozen at −20° for 24 hours showed no change in the free amino acid composition; however, a fourfold increase in the free peptide content was observed. Storage of fresh mitochondria at 0° for 6 days resulted in a sevenfold increase in the free amino acid content with a fifteenfold increase in the free peptide content. Author

N64-14372 Dynamic Science Corp., South Pasadena, Calif.
A GENERAL REVIEW OF CHEMICAL STERILIZATION IN SPACE RESEARCH
John B. Opfell 1963 18 p refs Presented at the COSPAR 4th Intern. Space Sci. Symp., Warsaw, 3-12 Jun. 1963

In space research in the United States, recent work on chemical sterilization has laid heavy emphasis on the identification and exploration of principles of engineering sciences which control sterilization effectiveness. These principles are reviewed, and their significance in chemical sterilization is discussed in terms of the engineering factors involved. Among these factors are: consequence of sterilant polymerization or reaction with the object to be sterilized; criteria for chemical sterilization process effectiveness; depletion of the concentration of the sterilant by evaporation or chemical reaction, including polymerization; obstacles to the diffusion or convection of the sterilizing chemical to the immediate vicinity of the microorganisms to be destroyed; protection of the microorganisms from direct contact with the sterilant; phase behavior of the sterilant in the environment of the sterilization process; presence of water or water vapor; the nature, sources, and numbers of microorganisms which survive standard chemical sterilization processes; and the length of exposure required to sterilize at each temperature. Author

N64-14375 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CERTAIN PROBLEMS OF SPACE PSYCHOLOGY
F. D. Gorbov 7 Oct. 1963 23 p Transl. into ENGLISH from Vopr. Psikhologii (Moscow), no. 6, 1962 p 3-13
(FTD-MT-63-68/1+3+4; AD-428547) OTS: $2.60

On the basis of results obtained in special loading tests applied in the training of flying personnel, the "principle of reproduction" is advanced as one of fundamental importance for space psychology. Some new methods of psychological research founded on this principle are proposed, such as diagnoses of suggestivity and noise immunity. The use of a homeostatic method in the study of group psychology permits differentiating several patterns of individual strategy in the integrative performance of operators. Author

N64-14395 Brookhaven National Lab., Upton, N.Y.
1962 ENVIRONMENTAL RADIATION LEVELS AT BROOKHAVEN NATIONAL LABORATORY
A. P. Hull May 1963 16 p refs
(BNL-807(T-310)) OTS: $0.50

Measurements made of "natural background" radiation levels (including fallout contributions) during 1962, and perturbations in this natural background attributable to laboratory operations (radiation from the Ar^{41} content of the Brookhaven Graphite Research Reactor, BGRR, cooling-air effluent, from an ecology field gamma source, and from the discharge of low-level liquid wastes) are discussed. The natural background increased from an average of 2.84 mr/wk during January 1962 to 3.96 mr/wk during December 1962. The highest yearly average on-site radiation level from Ar^{41} was 3.1 mr/wk (for 168 hr). No activity attributable to laboratory operations was detected in air-particulate monitoring samples. The activity in rain and settled-dust collection averaged 325.2 $\mu\mu C/m^2$/month. The average concentration in measurable precipitation was 1,340 $\mu\mu C$/liter. Except for periods when recently produced fallout isotopes were prevalent, the results of a monthly milk-sampling program were generally below 10 $\mu\mu C$/liter for I^{131} P.V.E.

N64-14409 Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.
THE MITIGATION OF PHYSICAL FATIGUE WITH "SPARTASE"
Francis J. Nagle, Bruno Balke, Richard V. Ganslen, and Audie W. Davis, Jr. Jul. 1963 12 p refs
(CARI-63-12)

Pharmacological and clinical observations have indicated that Spartase—the aspartic acid salts of potassium and magnesium—takes part in the intermediary metabolism and moderates physical fatigue. In this study, attempts were made to evaluate effects of the drug on work capacity before and after episodes of physically fatiguing exercises. Work capacity was determined by a standardized treadmill test. The test was repeated after the subject had been running cross-country for a period of 60 min, and again after another such period of 40 min. In this way, effects of fatigue upon functional adaptability to stress became apparent. Spartase was taken orally in a prescribed dose for 2 weeks, whereupon the same testing procedure was reapplied. The results indicated that Spartase improved the endurance performance of untrained individuals engaging in extremely fatiguing physical work. It appeared to have no effect on highly trained individuals. Author

N64-14410 Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.
A CENTRAL FACTOR IN PURE TONE AUDITORY FATIGUE
Joel S. Wernick and Jerry V. Tobias Sep. 1963 8 p refs
(CARI-63-19)

The present study was designed to evaluate the possibility that a listener's level of mental activity constitutes an adequate central factor. Subjects were presented with a 4000 cps, 40 db SL or 90 db SL tone for 3 minutes under conditions of a mental task or of reverie. Pre- and post-fatigue thresholds were measured with a switched (0.2 sec on, 0.2 sec off) tone. For low level (40 db) fatigue the frequency of the test tone was 4,000 cps and for high level (90 db) fatigue, 5,656 cps. Subjects consistently showed greater temporary threshold shift and longer recovery time when the fatiguing tone was presented in the mental task condition. Results thus indicate a central factor in pure tone auditory fatigue. It is suggested that the degree of effect of a fatiguing tone is a function of the listener's degree of mental activity during stimulation. Author

N64-14411 Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.
APPLICATION OF A "RELATIVE" PROCEDURE TO A PROBLEM IN BINAURAL BEAT PERCEPTION
Jerry V. Tobias Aug. 1963 10 p refs
(CARI-63-17)

The existence of binaural beats has long been considered an indication of binaural interaction for timing and periodicity information. In the past, bilaterally matched sound pressure or sensation levels have been used in the investigation of these beats, and the measuring technique was one which may be termed "absolute." However, the present study, in investigating with a "relative" technique the limits of dichotic intensity that permit binaural beats, shows that listeners respond to the presence of beats whenever the tones to both ears are above threshold. It is suggested that this new result fits more neatly into current theoretical formulations. The frequencies investigated ranged from 100 to 2000 cps. As other authors have previously reported, the best performance occurred in the 400 to 600 cps range. The present findings strengthen the case for an auditory nervous system with timing channels independent of other transmission lines. Author

N64-14423 North American Aviation, Inc., Downey, Calif. Space and Information Systems Div.
SPACECREW SELECTION AND TRAINING, A SURVEY [OF LITERATURE, 1957-1963]
14 Jun. 1963 37 p refs
(SID-63-707)

Literature, from 1957 to the present, on selecting and training personnel for orbital and space flight is surveyed. Although most of the references are to American publications, a special effort has been made to include all Soviet material so far released to the West. Author

N64-14428 California U., Berkeley. Lawrence Radiation Lab.
ANALYSIS OF X-RAY-INDUCED MITOTIC DELAY IN SEA URCHIN EGGS
Bhashini Rao (Ph.D. Thesis) 20 Aug. 1963 69 p refs
(Contract W-7405-eng-48)
(UCRL-10979) OTS: $1.50

Detailed cytological analysis showed that sublethal doses of X-rays affected the process of chromosome condensation in the eggs. The delay in chromosome condensation corresponded directly to the delay in cell division. Rate and time course of DNA synthesis in these cells was studied over two division cycles by following the incorporation of tritium-labeled thymidine. X-ray doses that caused reversible mitotic delay had no effect on the time or rate of DNA synthesis in these cells; delay of DNA synthesis in the second division was a result of interference with mitosis. Variation of mitotic delay with dose and time of irradiation was studied. A critical point existed in prophase. If cells were irradiated before this point, there was a delay in the first cleavage. Cells irradiated after this point did not show any delay in the first cleavage, but the second cleavage was delayed. Shortly before the onset of the visible prophase, there was a stage in which the delay produced by a given dose was maximum. Author

N64-14442 Oak Ridge National Lab., Tenn. Health Physics Div.
CHROMOSOMAL ABERRATIONS IN A NATURAL POPULATION OF CHIRONOMUS TENTANS EXPOSED TO CHRONIC LOW-LEVEL ENVIRONMENTAL RADIATION
B. G. Blaylock, S. I. Auerbach, and D. J. Nelson. 29 Jan. 1964 86 p refs
(Contract W-7405-eng-26)
(ORNL-3531)

The salivary gland chromosomes of *Chironomus tentans* larvae collected from White Oak Creek, an area contaminated by radioactive waste, and from six uncontaminated areas were examined for chromosomal aberrations. Chromosomal maps were constructed to make a general comparison of the banding pattern of the chromosomes in the East Tennessee area with those of Canada and Europe. These maps were used as a reference in scoring aberrations. Fifteen different chromosomal aberrations were found in 365 larvae taken from the irradiated population as compared with five different aberrations observed in 356 larvae from six control populations, but the mean number of aberrations per larvae did not differ in any of the populations. Also, five different inversions were found in both irradiated and control populations; three inversions—1Ra, 2Lab, and 3Ra—were found at a relatively high frequency and were used in testing the seasonal and geographic distribution. I. v. L.

N64-14469 Information International, Inc., Maynard, Mass.
INVESTIGATION INTO THE SPECIAL PROGRAMMING NEEDS FOR AN AUTOMATED LABORATORY FOR PSYCHOLOGICAL RESEARCH
Edward Fredkin. Bedford, Mass., Decision Sci. Lab., 30 May 1963 50 p refs
(Contract AF 19(628)-1662)
(ESD-TDR-63-353, AD-427103)

This report contains a summary of studies evaluating the relative importance to an automated psychological laboratory and the feasibility of the following: (1) development of a statistical package for real-time data analysis to permit modifications of an on-going experiment; (2) development of a statistical package for conventional data analysis and display; (3) using a computer as a teaching machine to prepare subjects for experiments; (4) using a computer to train programers and experimenters; and (5) using a computer to investigate the strategy of experimentation, e.g., simulation of subjects to allow exploration of experimental design. Author

N64-14470 North American Aviation, Inc., Downey, Calif. Space and Information Systems Div.
SPACE VEHICLE THERMAL AND ATMOSPHERIC CONTROL RESEARCH PROGRAM
R. E. Sexton. [1962] 37 p refs
(Contract AF 33(616)-8953)
(AD-428573) OTS: $3.60

General problems associated with selection of environmental control systems for space vehicles and analytical techniques that have been developed which will be of general interest to persons concerned with this type of work are discussed. The following areas of thermal and atmospheric control problems are discussed: (1) thermal control systems—external heat flux, configuration factors, transient thermal solutions, transient thermal tests, space radiators; and (2) atmospheric control systems—nonregenerative and regenerative systems. P. V. E.

N64-14519 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MINIMUM CREW SPACE HABITABILITY FOR THE LUNAR MISSION
George A. Rathert, Jr., Norman M. Mc Fadden, Richard F. Weick, R. Mark Patton, Glen W. Stinnett et al. Washington, NASA, Feb. 1964 64 p refs
(NASA TN D-2065) OTS: $1.75

Two experienced and highly motivated test subjects, an NASA test pilot and a physiologist, performed a 4-hour-on, 4-hour-off work schedule for 7 days in a capsule providing 61.5 cubic feet per man. The purpose was to consider the feasibility of reducing the booster requirements for the lunar mission by using only a two-man crew and a small capsule. The subjects performed a work schedule comprised of engineering, psychological and physiological monitoring, and research tasks. The effects of the stresses produced by the small size of the work space and by the work schedule were studied. The ecological system was not closed and a "shirt sleeve" environment was provided. No phenomena were encountered that would preclude the use of a small capsule and a 7-day mission. Both subjects sustained expected levels of performance throughout the test and were in condition to continue at its conclusion. Author

N64-14523 Joint Publications Research Service, Washington, D.C.
SOVIET RESEARCH IN PHYSIOLOGY, BIONICS, AND BIOPHYSICS
31 Jan. 1964 12 p refs Transl. into ENGLISH of 3 articles from Kommunist (Yerevan), 1963
(JPRS-23022, OTS-64-21453) OTS: $0.50

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N64-14526 Joint Publications Research Service, Washington, D.C.
STUDIES ON TOXIC CHEMICALS AND LABOR HYGIENE IN THE CHEMICAL INDUSTRY
3 Feb. 1964 26 p refs Transl. into ENGLISH from Gigiena Truda i Prof. Zabolevaniya (Moscow), no. 11, 1963 p 3-8, 17-20, 41-43, and 60-64
(JPRS-23045, OTS-64-21468) OTS: $0.75

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1. TECHNICAL PROGRESS IN THE CHEMICAL INDUSTRY OF THE USSR AND LABOR HYGIENE A. S. Arkhipov (Central Inst. for the Advanced Training of Physicians, Moscow) p 1-7

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4 CHANGES IN THE CEREBRAL BIO-ELECTRICAL ACTIVITY IN WORKERS FROM THE EFFECT OF MERCURY K. Kiryakov (Transport Med. Lab., Sofia) p 17-23 refs

N64-14529 Joint Publications Research Service, Washington, D.C.

TEMPERATURE DEPENDENCE OF LUMINESCENT BACTERIOVIRIDIN AND ITS STATE IN PHOTOSYNTHETIC BACTERIA

A. A. Krasnovskiy et al. 4 Feb. 1964 9 p refs Transl. into ENGLISH of an article from Dokl. Akad. Nauk SSSR (Moscow), v. 152, no. 5, 1963 p 1231-1234

(JPRS-23054; OTS-64-21471) OTS: $0.50

The temperature dependence of bacterioviridin luminescence intensity at various maxima in pyridine solution, in solid film, and in green sulfur bacteria (*Chloropseudomonas ethylicum*, strain T) was investigated. Results indicate that the different intensity of fluorescence is related to the density and packing type of the pigment and to the content of solvent molecules present. The more densely packed forms attain maximum values of luminescence intensity in freezing earlier and more rapidly compared to the less densely packed pigment forms. Upon reducing the temperature to −196° C, the fluorescence maxima of aggregate bacterioviridin forms always shift strongly toward the long-wave side, since the position of the maximum of the "monomeric" form is practically independent of temperature. I.v.L.

N64-14530 Joint Publications Research Service, Washington, D.C.

SOME PHILOSOPHICAL PROBLEMS OF THE INTERRELATIONSHIP OF PHYSIOLOGY AND CYBERNETICS

O. F. Makarchenko and M. L. Gorbach 4 Feb. 1964 14 p Transl. into ENGLISH of an article from Fiziol. Zh. Akad. Nauk Ukr. RSR (Kiev), v. 9, no. 6, 1963 p 707-715

(JPRS-23060; OTS-64-21477) OTS: $0.50

Problems are discussed concerning the precise objective definition of the nature of life and thought in connection with modeling them on cybernetic machines. I.v.L.

N64-14536 Joint Publications Research Service, Washington, D.C.

MIRACLE OF OUR TIME, CYBERNETICS AND PROBLEMS OF DEVELOPMENT

B. V. Akhlibininskiy and N. I. Khralenko 7 Feb. 1964 111 p Transl. into ENGLISH of the book "Chudo nashego vremeni, kibernetica i problemi razvitiya", Leningrad, Lenizdat Publishing House, 1963 p 1-140

(JPRS-23132; OTS-64-21517) OTS: $2.50

This report contains discussions on the following: (1) the basic concepts of cybernetics; (2) development and information; (3) cybernetics and the essence of life; (4) time in cybernetics; (5) the method of modeling processes; and (6) progress and entropy. I.v.L.

N64-14542 Joint Publications Research Service, Washington, D.C.

THE NATURE OF THE DERMO-OPTICAL SENSE IN MAN

A. S. Novomeyskiy 4 Feb. 1964 26 p refs Transl. into ENGLISH of an article from Vopr. Psikhologii (Moscow), v. 9, no. 5, Sep.-Oct. 1963 p 99-117

(JPRS-23068; OTS-64-21481) OTS: $0.75

Various experiments on the nature of the dermo-optical sense in man are described. Results indicate that, under the effect of illumination on the surface of a particular color, differences in electrical potentials are created that interact differently with the electricized skin of the hand. There is a connection between the electricized skin and the field of the colored surface of the paper that, in turn, causes variations in degree of slickness and retention when the fingers are moved along the colored surface. When the lighting is changed, the nature of this connection changes; it becomes either stronger or weaker. There is a corresponding change in the nature of arising tactile sensations of smoothness or roughness. In total darkness this connection disappears, and tactile perception of color becomes impossible. Thus it appears that dermo-optical sensations send mediated signals about the particular properties of the colored surface—the electrical potentials of every color. The positive results obtained with the use of the insulator setup with the blind and visually handicapped, under conditions of illumination, confirmed the theory on the electrical nature of dermo-optical sensations. I.v.L.

N64-14544 Federal Aviation Agency, Oklahoma City, Oklahoma. Civil Aeromedical Research Inst.

PRIMARY, SECONDARY, AND CALORIC NYSTAGMUS OF THE CAT FOLLOWING HABITUATION TO ROTATION

William E. Collins Jul. 1963 21 p refs

(CARI-63-13)

Ten cats were exposed to a series of above-threshold accelerations and subthreshold decelerations. Unilateral caloric irrigations, provoking nystagmus in the same direction as the above-threshold rotational stimuli preceded and followed the set of accelerations. A marked adaptation of nystagmus, characterized by specific changes in early trials, resulted from repeated rotation. Although neither duration nor total slow-phase eye displacement to caloric stimulation was affected, the intervening rotational experience produced some reduction in the frequency of the nystagmic beats. The data indicate that clinical (caloric) responses to vestibular stimulation may not give an accurate indication of a subject's state of adaption to "practiced" levels of angular acceleration. Such findings provide cautions in the establishment of appropriate testing techniques for the analysis of vestibular function in aircraft or space vehicle crew members. Author

N64-14568 Atomic Energy Commission, Washington, D.C.

MARINE SCIENCES RELATED TO AEROSPACE USES OF NUCLEAR POWER

Arnold B. Joseph *In* Sandia Corp. Aerospace Nucl. Safety Jan. 1964 p 195-207 refs (See N64-14551 06-01) OTS: $4.50

Studies to define the risks of radioactivity in the marine environment are discussed. The following are considered: source-term studies, marine studies, structure of the ocean environment, physical studies, biological studies, and concentration guides for sea water. R.T.K.

N64-14580 Council for International Organizations of Medical Sciences (CIOMS), Paris (France)

SELECTIVE VULNERABILITY OF THE BRAIN IN HYPOXAEMIA Symposium

J. P. Schade (Neth. Central Inst. for Brain Res.) and W. H. Mc Menemey (Maida Vale Hosp. for Nervous Diseases), eds. Oxford, Blackwell, 1963 407 p refs Symp. held in Baden, Switz.

(NASA Grant NsG-180-61)

Available from Blackwell: 70s

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N64-14581 Cologne U. (W. Germany)

CRITICAL BLOOD PRESSURE IN THE CEREBRAL CIRCULATION

M. Schneider *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 7-20 refs (See N64-14580 06-16) Available from Blackwell: 70s

The critical blood pressure is the range of mean arterial pressure where blood flow in the brain reaches a critical level inasmuch as the average O_2 uptake begins to decrease and severe mental disturbances occur. The mean venous O_2 pressure then lies around 19 mm Hg, from which can be calculated that the O_2 pressure in the parts of the tissue poorest supplied falls to about 4 mm Hg, a range at which the respiratory enzymes are already undersaturated. It can be calculated that in acute oligemia, severe mental disturbances already occur when only a small fraction of the cells is rendered anoxic. This stage is critical because a depression of respiration begins, and the hypoxidosis is continuously increased. When the blood pressure is lowered slowly below the normal level, blood flow at first does not change because of the autoregulation of cerebral circulation. The development of the autoregulation in the brain is a slow process. Therefore, when the blood pressure falls rapidly below the normal level, the brain blood flow also falls, and a critical level is reached with a mean arterial pressure of 60 to 70 mm Hg. I v L

N64-14582 Johns Hopkins U., Baltimore, Md.

REGIONAL CIRCULATION OF THE BRAIN UNDER PHYSIOLOGICAL CONDITIONS. POSSIBLE RELATIONSHIP TO SELECTIVE VULNERABILITY

Seymour S. Kety *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 21-26 refs (See N64-14580 06-16) Available from Blackwell: 70s

A new method for the measurement of local circulation in physiological states is discussed. Diffusible substances introduced into the arterial circulation pass freely into the various tissues. In the case of certain lipid soluble substances, the entire capillary wall is available for diffusion and in the most active tissues, of which the brain is one, the intercapillary distances are sufficiently small for equilibrium, with arterial concentrations to be achieved almost immediately. Under such circumstances, it can be shown that the tissue concentration (C_i) at the end of a definite time (T) can be described by the

expression: $C_i(T) = \lambda_i k_i \exp(-k_i T) \int_o^T C_a \exp(k_i t) dt$ where C_a refers to the arterial concentration, λ_i refers to the tissue:blood partition of the substance, and $k_i = F_i/\lambda_i V_i$, or capillary blood flow per unit quantity of tissue, divided by the partition coefficient. Diffusible substances labeled with I^{131} have been used to permit the continuous monitoring of their concentration in arterial blood by means of a scintillation counter, and their concentrations have been determined in various tissue regions at the end of a measured time period by autoradiography. I.v.L.

N64-14583 Neue U., Kiel (W. Germany)
IMPLICATIONS TO PHYSIOLOGY AND PATHOLOGY OF OXYGEN DIFFUSION AT THE CAPILLARY LEVEL
G. Thews *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 27-35 refs (See N64-14580 06-16) Available from Blackwell: 70s

The determination of the values of oxygen tension in the grey matter of the brain was investigated. The model used was based on the following: The average oxygen tension within the capillary amounts to 95 mm Hg at the arterial end, and to 34 mm Hg at the venous end. The oxygen diffuses radially from the capillary into the surrounding tissue and supplies a cylindrical region. The radius of the capillary is approximately 2.5 to 3μ; the radius of the surrounding tissue cylinder is 30μ. (There are two adjacent tissue cylinders, each containing a capillary.) The oxygen consumption is assumed to be $5 \cdot 10^{-2}$ [ml O_2/ml tissue/min]. Results are as follows: The oxygen tension in the region of the lowest supply (lethal corner) was approximately 17 mm Hg; under conditions of hypoxaemia it was 11 mm Hg at the reaction threshold, 4 mm Hg at the critical threshold, and 0 mm Hg at the lethal threshold. Thus it can be concluded that a critical analysis of the processes of diffusion shows that the values of oxygen tension in the grey matter are lower than was previously assumed. Under conditions of hypoxia, the effects of the reduced oxygen supply set in whenever the oxygen tension as the lethal corner was not sufficient for a complete saturation of the cytochrome oxidase. I.v.L.

N64-14584 Oxford U. (Gt. Brit.) Nuffield Inst. for Medical Research
COMMENTS ABOUT BRAIN CIRCULATION, OXYGEN SUPPLY, AND ANOXIC SURVIVAL
G. S. Dawes *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 37-40 refs (See N64-14580 06-16) Available from Blackwell: 70s

Survival in the extreme case of acute anoxia depends upon: (1) the minimal energy requirements and (2) the substrate availability for energy supply by anaerobic glycolysis that are (a) local carbohydrate reserves (these are certainly low but they may be variable in different parts of the brain) and (b) the diffusion of glucose from the bood. Also to be considered are (a) the susceptibility of local enzymes to the fall in tissue pH produced by acid metabolites and (b) the buffering power of the local tissues and the ability of the circulation to remove acid metabolites. Thus it appears that the maintenance of an adequate cerebral circulation prolongs survival in anoxia. Hence, the density of local blood supply may have a particular significance not only in supplying O_2 but, during hypoxia, in providing carbohydrate and removing hydrogen ions. It may well be that the limiting factors to which attention should be directed in acute total hypoxia are not so much the diffusibility of O_2, but the diffusibility of glucose and hydrogen ions during hypoxaemia. I.v.L.

N64-14585 Royal Aircraft Establishment, Farnborough (Gt. Brit.)
SOME EFFECTS OF BRIEF PROFOUND ANOXIA UPON THE CENTRAL NERVOUS SYSTEM
J. Ernsting *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 41-45 refs (See N64-14580 06-16) Available from Blackwell: 70s

The effects of brief profound anoxia upon the nervous system were investigated by noting the changes reported by the subjects, by recording their performance on a sequential motor task, and by EEG. The subjects, after a period of 5 minutes at 8,000 ft, were decompressed to 38,000 ft. in 1.5 sec. They breathed air at 8,000 ft; oxygen was delivered after compression. Results are as follows: (1) All subjects reported some mental confusion, and some subjects reported either a general dimming of vision or loss of peripheral vision. (2) Significant impairment of motor task performance was reported. (3) A change in the EEG was noted, commencing at 15.4 sec. (mean value). In five out of six subjects, this change consisted of the appearance of 8 to 13 c/s activity similar in amplitude to the alpha rhythm produced by eye closure. This change occurred in all four channels and persisted until 24.7 sec (mean value) after decompression. In the sixth subject, high-voltage 3 to 4 c/s activity appeared, in addition to the 8 to 13 c/s activity. I.v.L.

N64-14586 Toronto U. (Canada)
MEASUREMENT OF POST-MORTEM LACTIC ACID CONCENTRATIONS IN ASSESSING AN ANTE-MORTEM HYPOXIA
W. R. Franks *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 47-54 refs (See N64-14580 06-16) Available from Blackwell: 70s

During ante mortem hypoxia there is an increased accumulation of lactic acid precursors plus a varying increase in this end product of glycolysis itself. When the hypoxia leads to fatal termination, suitable post mortem examination should record these changes. After such a death, surviving glycolytic enzymes break down the persisting lactate precursors, mobilized during life in increasing amounts, to lactic acid that is added to any lactate already accumulated as a result of the ante mortem asphyxia. It is thus necessary to measure only (total) lactate concentration to indicate the extent of this biphasic response to the hypoxia. By using a modification of the Barker and Summerson method (1941) for lactate measurement, which modification consists of preserving the pathological specimens by freezing during transportation to the laboratory, an adequate determination can be carried out on approximately 100 milligrams of fresh tissue. It was found that, in the intact skull, the brain is sufficiently protected from the atmosphere to allow useful samples to be recovered at autopsy many hours after death. I.v.L.

N64-14587 Lund U. (Sweden)
STUDIES OF THE REGIONAL METABOLISM AND CIRCULATION OF THE CEREBRAL CORTEX
D. H. Ingvar *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 55-61 refs (See N64-14580 06-16) Available from Blackwell: 70s

Selective vulnerability to anoxaemia within the central nervous system apparently depends upon regional differences in the metabolism and circulation. It then follows that a greater vulnerability of one region, in comparison to another, would be related to regional differences in circulatory homeostatic mechanisms, i.e., all factors pertaining to the tissue and its vessels that tend to secure an adequate oxygen supply. In this report new methods are discussed by which the regional cerebral blood flow and metabolism can be quantitatively studied *in vivo* in circumscribed parts of the gray matter of the cerebral cortex. The regional cerebral blood flow is quantitatively measured based upon the measurement of the rate of clearance of an inert radioactive gas Kr^{85}, which is brought to the cerebral tissue by intracarotid injection of small amounts of saline in which Kr^{85} is dissolved. The regional cerebral metabolism is calculated from the above blood flow measurement plus a representative arterio-venous difference of oxygen (and of carbon dioxide). I.v.L.

N64-14588 Buffalo U., N.Y.
CENTRAL NERVOUS SYSTEM VULNERABILITY IN HYPOXAEMIC STATES. ISOTOPE UPTAKE STUDIES

L. Bakay and H. H. Bendixen *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 63-78 refs (See N64-14580 06-16) Available from Blackwell: 70s

The exchange of trypan blue, radioactive serum albumin, Na^{24}, and P^{32} between blood and the central nervous system was studied in cats. Experimental conditions included hypoxia with hypercapnia, hypoxia without CO_2 accumulation, hypercapnia with normal oxygenation, and increased venous and CSF pressure with normal oxygenation and CO_2 elimination. Changes in arterial, venous, and CSF pressure were recorded and analyzed. The blood-brain barrier remained impermeable to trypan blue and serum albumin during the experiments. The combination of severe hypoxia and CO_2 accumulation increased the cerebral uptake of sodium as well as phosphate; neither hypoxia nor hypercapnia alone produced a similar effect. The increase in Na^{24} and P^{32} concentration was caused by a true absorption by the nervous tissue rather than by a mere increase in cerebral blood content. Author

N64-14589 Göteborg U. (Sweden)
COMMENTS ABOUT THE BLOOD-BRAIN BARRIER IN HYPOXIA AND HYPOCAPNIA

T. Broman *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 79-88 (See N64-14580 06-16) Available from Blackwell: 70s

Experiments were conducted concerning the passage of certain test substances through the blood-brain barrier into the normal and into the chemically damaged brain, *in vivo* and *post mortem*. Three different test substances were chosen that under normal conditions cannot pass through the barrier, viz., trypan blue, prontosil, and radioactive chromium in a citrate buffer solution. Preliminary results showed that all three test substances behaved in the same way and that there were no significant differences if the experiments were made *in vivo* or during a *post mortem* perfusion. This means that the barrier effect is still at work after death, i.e., during a state of maximal hypoxia. Experiments on the possible effect of hypercapnia on the blood-brain barrier in rabbits demonstrated that the breakdown of the barrier was limited to the (late) hypercapnic state and that the barrier was normalized in a very short time after the cessation of the CO_2 inhalation. The breakdown effect in long-standing hypercapnia appears earliest and seems to be most pronounced in the brain stem and is associated with a tendency to small capillary bleedings. I.v.L.

N64-14590 Netherlands Central Inst. for Brain Research, Amsterdam
FUNCTIONAL CORRELATES OF IONIC MOVEMENTS IN THE CEREBRAL CORTEX

J. P. Schade *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 89-99 refs (See N64-14580 06-16) Available from Blackwell: 70s

(NIH Grant B-3048; Neth. Organ. for Pure Res. Grant ZWO-563-15)

The impedance of a tissue such as the cerebral cortex is mainly a function of the extraneuronal electrolytes, assuming that the membranes of the neurons have infinite resistance. Movement of ions from the extraneuronal to the intraneuronal compartment and vice versa can be detected by changes in the electrical impedance. After asphyxiation, a transport of sodium chloride, accompanied by water, into the apical dendrites of the cortical neurons takes place. A rapid impedance rise is observed accompanying this asphyxiation. During spreading depression similar, though smaller, impedance changes and ionic movements are seen. Spreading depression is accompanied by a wave of vasoconstriction and a drop in oxygen tension. During hypothermia minor movements of ions are observed. The transport of sodium chloride after circulatory arrest is significantly delayed. Author

N64-14591 Naval Submarine Base, New London, Conn.
THE EFFECTS OF CO_2 AND ELECTROLYTE SHIFTS ON THE CENTRAL NERVOUS SYSTEM

K. E. Schaefer *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 101-123 refs (See N64-14580 06-16) Available from Blackwell: 70s

Studies in human subjects who inhaled 3.3, 5.4, and 7.5 percent CO_2 over a period of 15 minutes demonstrated a dissociation of effects on the central nervous system and the autonomic nervous system. The sympathetic division of the autonomic system was stimulated as shown in an increase of oxygen consumption, pulse rate, and muscle potentials, while the central nervous system was depressed as indicated in the decrease in flicker fusion threshold and an increase in latent time of alpha blocking following light stimulus. A time-concentration relationship of CO_2 effects on brain excitability was established using metrazol-induced seizures in rats during prolonged exposure to 10 percent CO_2 and 30 percent CO_2. Acid-base balance and electrolyte shifts were studied in rats during exposure to various high concentrations of CO_2 and during withdrawal seizures. A relationship between convulsive activity, change in pCO_2 (blood), and decrease in ultrafiltrable calcium was observed. Author

N64-14592 Max-Planck-Institut für Hirnpathologie Munich (W. Germany)
ELECTRON MICROSCOPICAL OBSERVATIONS ON THE EARLY CHANGES IN NEURONS CAUSED BY HYPOXIDOSIS AND ON THE ULTRASTRUCTURAL ASPECTS OF NEURONAL NECROSIS IN THE CEREBRAL CORTEX OF MAMMALS

Hermann Hager *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 125-136 refs (See N64-14580 06-16) Available from Blackwell: 70s

Syrian hamsters were exposed to conditions of acute hypoxia by repeated nitrogen asphyxiation. Histotic hypoxidosis, due to suppression of the cytochrome oxidase system, was produced by intoxication with potassium cyanide. Electron microscopical observations on necrotic neurons were made in the cerebral cortex by means of experimental traumatic lesions. After repeated episodes of nitrogen asphyxiation, alterations in the neurons were fairly well defined. The nucleus and the nuclear membrane remained relatively intact. The cytoplasm showed distinct alteration. As a rule the Nissl substance near the nucleus was better preserved than at the periphery of the cytoplasm. The mitochondria became swollen, and their internal membranes lost their parallel structure, underwent fragmentation, and finally disappeared almost completely. The matrix was loosened and became invisible. At the same time or even before, changes occur in the fine structure of the Nissl substance. The membrane systems of the endoplasmic reticulum became swollen. The R N P granules became greatly rarefied or formed lumps. The result of total necrosis is a dissociation of the neuropile. The surface membrane appeared "soaked" and showed signs of disintegration. I.v.L.

N64-14593
MORPHOLOGICAL ASPECTS OF WATER AND ION SHIFTS IN THE CNS

E. de Robertis *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 137-149 refs (See N64-14580 06-16) Available from Blackwell: 70s

The morphological aspects of water and ion shifts in the central nervous system are reviewed. Experiments on the frog brain are being observed microscopically, in which shifts of water and the ionic fluxes are being simultaneously studied. Preliminary observations confirm that in this brain the water retention by ouabaine treatment is mainly in glial processes. The swelling induced by an isomolar replacement of NaCl by KCl also results in an increase in size of the glia. All indications suggest that astroglia are cells with a high Na^+ content and are cells in which water shifts and ion fluxes follow a pattern similar to that in the extracellular space of other tissues. I.v.L.

N64-14594 Philipps Universität, Marburg (W. Germany)
CNS TISSUE AND CELLULAR PATHOLOGY IN HYPOXAEMIC STATES
H. Jacob *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 153–163 refs (See N64-14580 06-16) Available from Blackwell: 70s

There are some differences in vulnerability to hypoxaemia among intracellular structures and between the cell body and its peripheral processes. Such intracellular vulnerability apparently exists in both nerve cells and glia. In "acute cell disease" (Nissl) and in "severe cell disease" (Nissl), there is a total cellular necrobiosis involving all subdivisions of the cells. The same is true of the "amoeboid change" and clasmatodendrosis of the glia sometimes accompanying these neuronal changes. In ischaemic nerve cell changes, the damage is essentially limited to the nucleus and cell body. Status spongiosus may be considered as an example of selective damage to intercellular glial and neuronal processes (selective processes necrobiosis). In selective nucleo-perikaryon necrobiosis and selective nuclear necrobiosis, there is a loss of affinity for anilin-dyes and increased affinity for eosin and luxol-fast blue. The structural changes that begin intravitally under conditions of oxygen deficiency continue in the dying organism for some time. This is of importance because of techniques now employed to prolong life. I.v.L.

N64-14595
PATTERNS OF CNS VULNERABILITY IN CO, CYANIDE, AND OTHER POISONING
Stephen Kornyey *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 165–176 refs (See N64-14580 06-16) Available from Blackwell: 70s

A survey of the field of intoxications reveals that there are pictures, which may be called "histological syndromes," that present themselves in conditions produced by a great variety of causative noxae. Therefore, in pathogenesis, a mechanism must be postulated that can become activated by different etiological factors. An identical pathomechanism is the basis of the identity of the histological process. An anoxic-vasal type of pathogenesis can be clearly defined as is proved by the essential identity of histological findings in cases of pure anoxic conditions and intoxications. To this domain belong both conditions of impaired oxygen supply and those of impaired supply of the oxidizable substrate, and finally those conditions with a sudden onset of histotoxic anoxia. Histological processes with different structures and localizations develop when oxidative processes are inhibited at certain stages of the oxidative process. I.v.L.

N64-14596 National Inst. of Mental Health, Bethesda, Md.
COMMENTS ON THE SELECTIVE VULNERABILITY OF THE HIPPOCAMPUS
Paul D. MacLean *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 177–188 refs (See N64-14580 06-16) Available from Blackwell: 70s
(NIH Grant B-2275)

Results of experiments on the selective vulnerability of the hippocampus are reviewed. It is indicated that: (1) The 3-acetylpyridine destroyed, in mice, the neurons in the same areas of the hippocampus (CA3 and CA4) that were stained by dithizone, a chelating agent that gives a reddish color when combined with zinc. (2) The 3-acetylpyridine commonly affected hippocampal areas CA3 and CA4 in the squirrel monkey but there was more consistent and severe damage to the lateral geniculate bodies and the inferior olive. The results of these experiments point to the disturbing factor of species differences in the study of the selective vulnerability of the nervous system. I.v.L.

N64-14597 Langley Porter Neuropsychiatric Inst., San Francisco, Calif.
PATTERN OF CNS VULNERABILITY IN NEONATAL HYPOXAEMIA
N. Malamud *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 211–225 refs (See N64-14580 06-16) Available from Blackwell: 70s
(NIH Grant B-377)

The pattern and the mode of distribution of lesions in chronic cases of perinatal trauma, convulsive disorders of infancy, and kernicterus were investigated. The results of the investigation tend to support the view that these disorders are distinct pathoanatomical entities. Moreover, the pattern and topography of the lesions are sufficiently characteristic in each instance to permit speculation as to its pathogenesis. In perinatal trauma the principal changes are of a circulatory nature and appear to be related predominantly to disturbed venous circulation. The lesions observed in convulsive disorders could best be defined as a hypoxaemic encephalopathy and those in kernicterus as possibly a bilirubin encephalopathy. Their occasional coexistence does not detract from their specificity. It is suggested that the concept neonatal hypoxaemia is perhaps too general to characterize accurately the pathogenesis of the disorders in question I.v.L.

N64-14598 Illinois U., Chicago
INFLUENCE OF HYPOXIA IN VARIOUS DISEASES
O. T. Bailey *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 227–241 refs (See N64-14580 06-16) Available from Blackwell: 70s

Hypoxia plays a part in the distribution and character of lesions resulting from narrowing of cerebral arteries without occlusion in arteriosclerosis and arteriolosclerosis. When the lesions are not infarctive and tissue continuity is not destroyed, histological changes of interest in the evolution of hypoxic damage are encountered. Another problem involves the lesions in the field of distribution of occluded arteries in certain patients with the clinical syndrome of juvenile hemiplegia. The findings in two such patients are discussed in this report. There is some indication that hypoxia is concerned with the progression and spread of cerebral injury. The importance of hypoxia in the maintenance and advancement of lesions, not in themselves progressive, is also illustrated by the changes at the periphery of healing infarcts secondary to thrombosis of the superior sagittal sinus and cerebral veins, with long survival. In some instances, laminar necrosis in the adjacent cerebral cortex indicates that the deterioration of such patients is related to spreading hypoxia beyond the infarctions themselves. I.v.L.

N64-14599 Burden Neurological Inst., Bristol (Gt. Brit.)
PATTERN OF SYMMETRICAL BRAIN DAMAGE
R. M. Norman *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 243–249 refs (See N64-14580 06-16) Available from Blackwell: 70s

The pattern of the symmetrical brain damage at birth, due to hypoxic and ischaemic factors, includes the following: (1) There is a patchy disappearance of the small cells accompanied by mild fibrous gliosis in the areas of striatal marbling. The sites of predilection are the ventrolateral part of the head of the caudate nucleus and the anterior putamen. (2) The most severe neuronal losses, in the thalamus, are in the lateral nuclei. (3) There is some variation in the involvement of the globus pallidus (4) The subthalamic nuclei are also not always involved (5) The anygdaloid nuclei showed patchy nerve-cell loss and gliosis bilaterally in four cases, unilaterally in one case (6) All sectors of the pyramidal cell band, in the cornu Ammonis, may show minor damage but invariably the maximal cell losses were in the resistant sector h2. (7) The cerebellar vermis showed lobular atrophy of the more deeply placed folia in four cases, the superior vermis being involved in three of these, the anteroventral part in the other case. (8) The precentral and postcentral gyri were symmetrically atrophied in all cases studied. These central gyral changes were by far the most impressive of the lesions seen in the cerebral cortex. I.v.L.

N64-14600 National Inst. of Neurological Diseases and Blindness, Bethesda, Md.

SELECTIVE VULNERABILITY OF THE CENTRAL NERVOUS SYSTEM OF RHESUS MONKEYS TO ASPHYXIA DURING BIRTH

W. F. Windle *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 251–255 (See N64-14580 06-16) Available from Blackwell: 70s

This report discusses the histopathology of monkeys that were asphyxiated in their foetal membranes at Caesatean section prior to establishment of respiration—animals that were resuscitated subsequently by intratracheal administration of oxygen. Three histopathological phases are considered: (1) the structural changes in the brains of the animals partially asphyxiated although not to the point of asphyxial apnoea; (2) the structural changes in the nervous system that were visible during the 10 days after asphyxiation and resuscitation; and (3) the residual effects in the nervous system 10 months or more after asphyxiation. Also, the effects of asphyxiation in newborn and young monkeys asphyxiated with nitrogen are discussed. I.v.L.

N64-14601 Max-Planck-Institut für Hirnpathologie, Munich (W. Germany)

TOPISTIC LESIONS

W. Scholz *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 257–272 refs (See N64-14580 06-16) Available from Blackwell: 70s

(Contract AF 61(052)-341)

The phenomenon of laminar lesions in the cerebellar cortex and of the selective effect of hypoxaemia on the architectural fields of Ammon's horn, of the globus pallidus, and of other cerebral nuclei is discussed. I.v.L.

N64-14602 Naval Radiological Defense Lab., San Francisco, Calif.

PARAMETERS CONTROLLING OXYGEN UPTAKE OF THE INTACT RAT LIVER – RESPIRATORY RATE AND THE DEFINITION OF HEPATIC HYPOXIA

R. W. Brauer, G. F. Leong, R. J. Holloway, and J. S. Krebs *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 273-294 refs (See N64-14580 06-16) Available from Blackwell: 70s

The principal tool in this study was the isolated rat liver, profused through the portal vein at physiological blood pressures. The first measurements were designed to establish a baseline, and to determine the effect on hepatic oxygen uptake of varying the perfusion rate. At perfusion rates above 1.2 ml/g/min, the oxygen uptake rate of the rat liver is flow independent. As perfusion rates are lowered beyond this point, O_2 uptake decreases to successively lower levels. It appears that at 37.5° C the specific rate of O_2 consumption by the tissue is such that only cells in immediate contact with flowing blood participate in O_2 extraction. The lowering of the perfusion rate leads to marked reduction in oxygen uptake. Thus, it is possible to define the degree of hepatic hypoxia in terms of the ratio of the observed or predicted O_2 uptake rates under any given conditions to the basic O_2 uptake rate for the same tissue when supplied with fully oxygenated whole blood. Also, it is indicated that the isolated liver does not, in general, incur a measurable oxygen debt, as a result of prolonged exposure to levels of hypoxia at which its respiration is reduced to one-half to one-third of its basic value. I.v.L.

N64-14603 Illinois U., Chicago

THE EFFECT OF HYPOXAEMIA ON THE METABOLIC PATTERN OF THE PERFUSED BRAIN OF CATS

A. Geiger, G. Gombos, and S. Otzuki *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 295–304 refs (See N64-14580 06-16) Available from Blackwell: 70s

(NIH Grant B-413)

The changes in the metabolic pattern of the brain, when the oxygen tension in the blood is reduced, are reviewed. The relative rates are given at which exogenous glucose and endogenous metabolites, such as lipids, proteins, other carbohydrates, and nucleic acids contribute to the respiratory CO_2 and to the intermediary metabolites of the glycolytic and tricarboxylic cycles in the brain. It is indicated that some qualitative changes occur in the metabolic pattern of the brain during hypoxia, consisting mainly in the contribution of endogenous metabolites to the citric acid cycle, in addition to the quantitative changes in glucose utilization as manifested by the increase in rates of pyruvic acid and lactic acid formation. I.v.L.

N64-14604 Ludwig-Maximilians Universitat, Munich (W. Germany)

COMMENTS ON LIVER-BRAIN CORRELATIONS IN SYSTEMIC HYPOXAEMIA

F. Erbslöh *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 305–316 (See N64-14580 06-16) Available from Blackwell: 70s

Liver–brain correlations in systemic hypoxaemia are reviewed. It is indicated that deficient glucose utilization of the brain, in man, plays a role in the insufficient oxygen consumption in the liver. Furthermore, in view of the remarkable sensitivity of the liver to hypoxaemia, it may well be possible that, under conditions of generalized hypoxia, the metabolic changes in the liver contribute to those in the brain. I.v.L.

N64-14605 Naval Medical Research Lab., Groton, Conn.

CYTOCHEMICAL STUDIES IN CEREBRAL HYPOXIA

N. H. Becker *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 317–325 refs (See N64-14580 06-16) Available from Blackwell: 70s

Cytochemical studies were conducted on a rat-brain lesion. Results indicate that the pattern of the alterations of the intracellular organelles (the lysomes, mitochondria, and Golgi apparatus) is similar in both autolysis and anoxic necrobiosis. The alterations consist at first of swelling of the lysomes and mitochondria and the fragmentation of the Golgi apparatus, followed by ultimate dissolution of these structures. The lysomal changes occur early relative to those of the mitochondria and the Golgi apparatus. I.v.L.

N64-14606 Indiana U., Bloomington

HISTOCHEMICAL AND METABOLIC CHANGES IN BRAIN TISSUE AFTER HYPOXAEMIA

W. Zeman *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 327–348 refs (See N64-14580 06-16) Available from Blackwell: 70s

(NIH Grant B-2960-C1)

Histochemical determinations of certain oxidative and hydrolytic enzymes were performed on brain tissue of rats and monkeys with hypoxaemia. In addition, the uptake of ^3H-leucine and ^3H-thymidine in these tissues was studied by autoradiography. It was found that histochemical changes preceding the development of ischaemic nerve-cell necrosis consist of a swelling of the mitochondria. Moreover, protein turnover appears to be depressed. At the time of infarction, all oxidative enzymes are inactivated, whereas acid hydrolases remain in the same state as in the healthy control tissue. During the reactive phase of ischaemic nerve-cell necrosis, hydrolases are greatly enhanced in activity within mesenchymal cells, whereas oxidative enzymes are activated in proliferating astrocytes. These changes correlate with an increased ratio of thymidine-labeled nuclei of these cell species. I.v.L.

N64-14607 Government Hospital Tel-Hashomer (Israel)
STUDY OF THE EFFECTS OF HYPEROXIA ON THE CENTRAL NERVOUS SYSTEM
M. Wolman *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 349-356 refs (See N64-14580 06-16) Available from Blackwell: 70s

Experiments were conducted on rats to test the idea that lipid peroxides play an important role in hyperoxia. Results indicate that in acute oxygen poisoning, unsaturated lipids are peroxidized and that this can cause disorganization of tissue and cell membranes. However, no direct evidence of damage to membranes was obtained, and therefore the possibility of the formation of toxic lipid remains open. In tissue slices and homogenates in which random diffusion replaces the orderly diffusion from the blood stream, it appears that changes in some tissue membranes (i.e., vascular walls) are of no great importance for normal metabolism. In such preparations, the late effect of oxygen on cellular enzymes is probably the mechanism through which cellular metabolism is inhibited. I.v.L.

N64-14608
COMMENTS ON THE ENZYME HISTOCHEMISTRY OF THE NERVOUS SYSTEM
A. G. E. Pearse *In* CIOMS Selective Vulnerability of the Brain in Hypoxaemia 1963 p 357-365 (See N64-14580 06-16) Available from Blackwell: 70s

Comments on the enzyme histochemistry of the nervous system include the following: (1) Indoxyl techniques can be used for cholinesterases, esterases, and for some types of cathepsin. Normally these techniques can be used without selective inhibitors or activators, primarily as sensitive morphological indicators of the changing distribution of cells. With the use of inhibitors, they can be used for specific cholinesterase studies in place of the more commonly employed thiocholine techniques. (2) Some 12 oxidoreductases and 15 dehydrogenases can be demonstrated. Activity of mitochondrial α-glycerophosphate dehydrogenase is particularly high in Ammon's horn. The activity is not in the cell bodies, however, but apparently in processes that are all traveling in the same direction. Glucose-6-phosphate dehydrogenase has been shown to be an important enzyme in brain metabolism. In the spinal cord, the enzyme's highest activity is in the posterior columns. I.v.L.

N64-14613 Joint Publications Research Service, Washington, D.C.
CYBERNETICS AND CONTROL THEORY
V. I. Levenshteyn and M. V. Rybashov 14 Mar. 1963 14 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR, v. 147 no. 6, 1962 p 1300-1305
(JPRS-18127; OTS-63-21323) OTS: $0.50

CONTENTS:

1. ON THE INVERSION OF FINITE AUTOMATA V. I. Levenshteyn p 1300-1303 refs
2. SYNTHESIS OF A CLASS OF COMPUTERS M. V. Rybashov p 1304-1305 refs

N64-14655* National Aeronautics and Space Administration, Washington, D.C.
MANNED SPACE FLIGHT TEAM
Oct. 1963 15 p
(NASA EP-11) GPO: $0.15

Resumes of the following members of the manned spaceflight team are presented: (1) Neil A. Armstrong; (2) Frank Borman; (3) M. Scott Carpenter; (4) Charles Conrad, Jr.; (5) L. Gordon Cooper, Jr.; (6) John H. Glenn, Jr.; (7) Virgil I. Grissom; (8) James A. Lovell, Jr.; (9) James A. McDivitt; (10) Walter M. Schirra, Jr.; (11) Elliot M. See, Jr.; (12) Alan B. Shepard, Jr.; (13) Donald K. Slayton; (14) Thomas P. Stafford; (15) Edward H. White; and (16) John W. Young. Also, a list of the 14 newest astronauts is presented, and the training program for the flight personnel of the Manned Space Center is discussed. I.v.L.

N64-14675 Emmanuel Coll., Boston, Mass. Research Language Center
THE WAVE FILTERING PROCESS OF THE TRACHEAL OUTER WALL
Riko Toshitaka Sugimoto, Shin-ichiro Hashimoto, and Satoshi Takahira Bedford, Mass., AFCRL Mar. 1963 9 p refs Transl. into ENGLISH from Nippon Onkyo Gakkaishi (Tokyo), 1962 (Contract AF 19(604)-8505)
(E-T-J-63-6; AD-428507)

The vocal sound wave and the vibrational wave of the tracheal outer wall were simultaneously recorded by a two-channel magnetic recorder. The speaker was an adult male, and the five Japanese vowels were used. A data translator was used for sampling of these signals. R.T.K.

N64-14689 Stanford Research Inst., Menlo Park, Calif.
TACTUAL PERCEPTION OF VISUAL INFORMATION
James C. Bliss, Brian King, Kenneth Kotovsky, and Hewitt D. Crane Wright-Patterson AFB, Ohio, AF Avionics Lab., Dec. 1963 83 p refs
(Contract AF 33(657)-8824)
(ASD-TDR-63-732; AD-421511)

Psychophysical experiments aimed at determining parameters needed in the design of a tactile display containing about one hundred stimulators are reported. Also discussed are the design, construction, and performance of special equipment to control the tactile stimulators by means of programing a small digital computer. The phenomenon of apparent location was obtained with air-jet stimulation of the skin. Apparent motion was found to serve as a useful cue in temporal discriminations. Frequencies of stimulation less than 20 cps produced a pulsating sensation, whereas frequencies above 20 cps felt more like a "tone." The equipment to act as an interface between a CDC 160-A computer and an array of tactile stimulators was designed and constructed. Independent computer program routines were written to set up and perform a wide variety of experiments. R.T.K.

N64-14695 Radiation Applications, Inc., Long Island City, N.Y.
THE FEASIBILITY OF USING MEMBRANES FOR URINE PURIFICATION Technical Documentary Report, Jan. 1962-Jun. 1963
Eric A. Meier and Richard Everett, Jr. Wright-Patterson AFB, Ohio, Biomed. Lab., Nov. 1963 38 p refs
(Contract AF 33(657)-9347)
(AMRL-TDR-63-113; AD-427413) OTS: $1.00

The feasibility of using synthetic membranes in an ultrafiltration process for recovering potable water from urine was demonstrated with urine specimens which had been enzymatically treated and acidified with citric acid. Specially cast cellulose acetate membranes were used in an experimental ultrafiltration system to reclaim waters which met the United States Public Health Service specifications on chloride ion and total dissolved solids. The product water was obtained at initial flux rates of approximately 10 to 20 l/ft^2 of filtration surface per day at operating pressures of approximately 2000 psi. A proposed design of an ultrafiltration unit is included along with a comprehensive discussion of the engineering considerations deemed significant. Author

N64-14696 Chicago Medical School, Ill.
A STUDY OF THE EFFECTS OF EXTERNALLY APPLIED SINUSOIDAL FORCES ON THE EYE Technical Documentary Report, 1 Mar. 1961-15 Mar. 1963
John L. Nickerson, Anna Paradijeff, and H. S. Feinhandler Wright-Patterson AFB, Ohio, Biophys. Lab., Nov. 1963 18 p refs
(Contract AF 33(616)-7926)
(AMRL-TDR-63-120, AD-427391) OTS: $0.50

This research presents the results of investigations on the effects of externally applied sinusoidal vibrations on the eye tissues of a dog. The results are from the findings of gross autopsy, ophthalmological examination, and histological studies. Also reported are determinations of the natural resonance frequency of the eye. The possibility that deformation in the shape of the eye occurs at resonance has been explored. The methods by which these various determinations were made are described. Author

N64-14731 Atomic Energy of Canada Ltd., Chalk River, Ontario

LATENT IMAGE FADING IN DUPONT TYPE 555 PERSONNEL MONITORING FILM AT CHALK RIVER

G. B. Knight and C. R. Hoffmann Sep. 1963 9 p refs
(AECL-1872; CRRD-1172) Available from Sci. Doc. Distribution Office, Chalk River, Ontario: $0.20

DuPont type 555 films enclosed in the new AECL Photobadge were irradiated and stored at temperatures and relative humidities ranging from 35° to 85° F and 35% to 75%, respectively for 1- and 2-week periods. It was concluded that the effect of latent image fading was small compared with the errors normally encountered in relating film optical density to exposure. Author

N64-14740 Pittsburgh U., Pa. School of Medicine

MICROSPECTROPHOTOMETRY

J. J. Wolken and G. K. Strother Repr. from Appl. Optics, v. 2, no. 9, Sep. 1963 p 899-907 refs
(NASA Grant NsG-230-62)

Manual and recording microspectrophotometers have been constructed with cadmium selenide (CdSe) photoconductive cells and are in use as a spectroscopic tool in the study of the pigment chemistry of photoreceptors in living cells. The basic design and operation of these microspectrophotometers for obtaining absorption spectra are described. The absorption spectrum from the ultraviolet, visible, and near infrared can be obtained in a single sweep for specimen areas as small as 2 μ^2. Examples of absorption spectra of the chloroplast of plant cells, the retinal rods of the visual cells of the eye, and the red blood cell are given. The applications of microspectrophotometry to a variety of biological, biochemical, and chemical problems are indicated. Author

N64-14741 California U., Berkeley Space Sciences Lab.

EVIDENCE FOR LIFE ON MARS

D. G. Rea Repr. from Nature (London), v. 200, no. 4902, 12 Oct. 1963 p 114-116 refs
(NASA Grant NsG-101-61)

Observations are presented to illustrate the point that the evidence in support of the chance for the existence of life on Mars has been distorted and that a reexamination is required. The observational arguments for the existence of Martian life are: the various colors, including green, exhibited by the dark areas; the seasonal changes in the visual albedo and the polarization of the dark areas; the ability of the dark areas to regenerate after an extensive dust storm; and the presence of 2700 to 3000 cm^{-1} absorption bands, attributed to organic molecules. Aspects of Mars are given that defy the existence of life, and include the severity of the Martian climate. C.L.W.

N64-14750 Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

DATA PROCUREMENT AND PROCESSING FOR THE FISSION PRODUCT INHALATION PROGRAM USING AN AUTOMATIC READ OUT COUNTING SYSTEM Technical Progress Report

R. M. Goodrich and R. G. Thomas Dec. 1963 27 p ref
(Contract AT(29-2)-1013)
(LF-13) OTS: $0.50

An automatic readout counting system is in use which allows the radioactivity information from the scaling system to be transmitted directly to punched tape and/or typewriter. Additional sample information, such as tissue identification and weight, counting time, experiment number, etc., is preset with thumb-wheel switches into a data input box. Readout of the data input box just precedes scaler readout, the signal for which is given by the end of preset counting time. The punched tape is converted to cards which are stored until completion of an experiment. At this time the information is used in a program to compute the necessary parameters for final distribution and excretion analysis. When desired, the computer plots the radioactivity data from any given series of tissue or whole body determinations and yields the constants of the least squares equations. Integration of the function may also be performed for dosage determination. Author

N64-14778 Naval School of Aviation Medicine, Pensacola, Fla.

THE WOLFF-PARKINSON-WHITE SYNDROME AS AN AVIATION RISK

Raphael F. Smith 28 May 1963 15 p refs
(Rept. 15; AD-428966) OTS: $1.60

The prevalence of the W-P-W anomaly, the prevalence of tachycardia in the W-P-W group, and the incidence of tachycardia during the period of observation have been calculated from data obtained from surveys conducted on four groups of normal people. The mortality rate and the morbidity associated with the W-P-W syndrome are discussed. From observations on these groups of subjects and from similar observations reported in the medical literature the conclusion is reached that asymptomatic aviators and aviation candidates with the W-P-W anomaly could be allowed to continue in an unrestricted flying status, but those with paroxysmal tachycardia should be permanently disqualified for duty involving the actual control of aircraft. Author

N64-14779 Frost Engineering Development Corp., Denver, Colo.

HUMAN BODY DYNAMICS UNDER SHORT-TERM ACCELERATION

Peter R. Payne and Earnest L. Stech 26 Jun. 1962 67 p refs
(Tech. Rept. 115-2; AD-429027) OTS: $6.60

A dynamic mathematical model of the human body is presented that permits assessment of the loads imposed on the body during any type of acceleration time history. This model also permits, for the first time, an adequate definition of human tolerance to acceleration, and allows the prediction of the gross motion of the human body when subjected to accelerations. I.v.L.

N64-14810 Mississippi State U., State College

PHYSICAL, CHEMICAL AND MICROBIOLOGICAL EVALUATION OF ELECTRO-CHEMICAL DEGRADATION OF HUMAN WASTES Informal Progress Report No. 6, 1 Oct.-31 Dec. 1963

[1964] 25 p refs
(Contract AF 41(609)-1633)
(AD-429062) OTS: $2.60

Six metals were employed as electrodes to determine their utility in the breakdown of DO during electrolysis. Gold, indium, and vanadium were unsatisfactory. Iridium, palladium, and rhodium destroyed the DO during electrolysis but at a much slower rate than platinum. When these metals were employed as the cathodes with platinum as the anode, no improvement was noted in the time required for decolorization of the DO, but anode weight losses were considerably smaller. Studies of the growth rate of Chlorella 71105 in EDO and in Knop's medium were conducted. EDO yielded only half as much growth as the Knop's medium in a 96-hour period. Urine enriched EDO produced results equal to the Knop's medium. Growth studies were conducted utilizing EDO resulting from the use of cobalt, gold, indium, iridium, nickel, palladium, rhodium, vanadium, and zirconium. Author

N64-14832 University Coll., Galway (Ireland)
STUDY OF THE PROPERTIES AND STRUCTURE OF PURIFIED MAMMALIAN ADENOSINE DEAMINASE ISOLATED FROM CALF INTESTINE Quarterly Technical Status Report No. 7, 1 Jul.-30 Sep. 1963
Thomás G. Brady et al Oct. 1963 5 p
(Contract DA-91-591-EUC-2901)
(AD-429070)

Experimental procedures included the purification of adenosine deaminase from calf mucosa and cat lung, the attempted separation of the isozymes of adenosine deaminase by starch block electrophoresis, and the investigation of some tissue for their isozyme content. Thirteen animals have been examined to date. While considerably more organs will have to be investigated in both the cat and calf before definite conclusions can be reached, it does appear that the cat has considerably more uniformity of isozyme content than the calf. J.E.T.

N64-14866 National Aeronautics and Space Administration, Washington, D.C.
NASA PROGRESS IN LIFE SCIENCES
Hugh L. Dryden [1964] 20 p Presented at the 5th Annual Lectures in Aerospace Med., Brooks AFB, Tex., 3 Feb. 1964
(NASA TM X-51344) OTS: $1.60 ph, $0.80 mf

One of the major accomplishments of Project Mercury was in the area of biomedicine. Bioinstrumentation measured respiration by means of a thermistor (rectal temperature) and EKG, using a two-lead electrocardiograph. With Glenn's flight came additional improvements, such as the addition of blood pressure to the reactions to be measured. From this flight, it was learned that disorientation is not a problem of consequence. Also, during the course of the Mercury Project flight series, it became apparent that a very important index of astronaut performance and well-being was astronaut voice communication. This, coupled with the astronaut's subjective physiological observations, served as a validation of the physiological training that had been given. A trend analysis of Mercury data seems virtually to exclude the presence of acute ill effects due to short-duration weightlessness, but it also seems to establish that the effects of weightlessness upon man are very probably a function of time duration. I.v.L.

N64-14880 California U., Livermore. Lawrence Radiation Lab.
HAZARDS CONTROL Quarterly Report No. 14, Jul.-Sep. 1963
[1963] 76 p refs
(UCRL-7571) OTS: $1.75

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4. MAXIMUM BURIAL DEPTH OF AIRBORNE PARTICLES COLLECTED ON MEMBRANE FILTERS C. L. Lindeken and W. A. Phillips p 19-23 refs
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9. A REMOTELY CONTROLLED RADIATION CALIBRATION FACILITY A. Forsman, R. Taylor, and E. Beard p 38-42
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13. DETERMINATION OF THE VAPOR PRESSURE OF MERCURY G. O. Nelson and P. E. Barry p 53-56 refs
14. DECONTAMINATION FOLLOWING A NUCLEAR EXCURSION J. B. Huff and R. L. Kathren p 57-65 refs
15. WEATHERING AND LIGHT-TRAFFIC EFFECTS ON SIDEWALK TEST PATCHES J. R. Gaskill and C. R. Veith p 66-69

N64-14898 Texas Woman's U., Denton Nelda Childers Stark Lab. for Human Nutrition Research
FUNDAMENTAL INVESTIGATION OF LOSSES OF SKELETAL MINERAL IN YOUNG ADULT HUMAN MALES AND COLLATERALLY IN YOUNG ADULT MALE PIGTAIL MONKEYS (MACACUS NEMESTRIMA) THROUGH IMMOBILIZATION FOR VARYING PERIODS OF TIME, COUPLED WITH A STUDY OF METHODS OF PREVENTING OR REDUCING MINERAL LOSS Semiannual Report [1 Apr.-30 Sep. 1963]
Pauline Beery Mack et al 30 Sep. 1963 50 p
(NASA Grant NsG-440)
(NASA CR-55313) OTS: $4.60 ph, $1.70 mf

Two bed rest studies were conducted. Measurements of radiographic bone densitometry and analyses of calcium and phosphorus in the urine were made. The first of the two studies has shown that bed rest of as short a time as 3 days was followed by a loss in bone mass in the oscalcis in all human subjects. After a 10-day interim period, a second 3-day bed rest period, in which controlled isometric exercise was given produced a bone mass status in the central section of the oscalcis that was significantly increased. In an initial primate study, bone mass in numerous parts of the body, as measured from radiographs, was significantly higher following a period in which vigorous exercise was taken under direction. Balance studies accompanied the radiographic measurements. E.W.

N64-14924 Hanford Atomic Products Operation, Richland, Wash.
EVALUATION OF RADIOLOGICAL CONDITIONS IN THE VICINITY OF HANFORD, JULY-SEPTEMBER, 1963
R. F. Foster 15 Nov. 1963 32 p refs
(Contract AT(45-1)-1350)
(HW-79652) OTS: $1.00

Comprehensive surveillance of the occurrence of radioactive materials in air, water, and foodstuffs was continued in the vicinity of the Hanford plant. Natural background radiation, with some contribution from worldwide fallout, continued to be the primary source of environmental exposure. The largest contribution of radioactive material continued to be the highly dilute low-level waste in the reactor cooling water discharged to the Columbia River. Exposure from the various sources, summed in a manner that tends to maximize the total dose to an individual, were estimated to be about 10% of the Federal Radiation Council (FRC) guide for the total body, 30% of the FRC guide for a child's thyroid, and about 30% of the National Committee on Radiation Protection and Measurements (NCRP) maximum permissible rate of intake for bone-seeking radionuclides. Author

N64-14943 Martin Co., Baltimore, Md.
A MODEL OF HUMAN MAINTENANCE BEHAVIOR, I. DEVELOPMENT OF THE PROBLEM AND EVIDENCE FOR A MODEL
Hilton A. Grodsky, Girard W. Levy, and Robert D. Sorkin [1962] 24 p refs
(Eng. Rept. 11133)

This paper is concerned with the important facets of human maintenance behavior in space travel and the existence of evidence to suggest a model for human maintenance behavior.

The need to develop a theoretical model of human maintenance behavior, to be utilized in the training of personnel and in the design of equipment so as to realistically achieve the financial benefits of a reduced payload weight, is indicated. This model utilizes elements of signal detection theory and game theory. An example of a simple maintenance situation is given indicating some of the complex problems in its development and the derived benefits. C.L.W.

N64-14944 Joint Publications Research Service, Washington, D.C.
CYBERNETICS AND THE NERVOUS SYSTEM
G. Caclaianu (Rumanian Acad. of Sci.) 14 Feb. 1964 18 p refs Transl. into ENGLISH from Studii Cercetari Neurol. (Bucharest), v. 8, no. 3, 1963 p 325–335
(JPRS-23234; OTS-64-21562) OTS: $0.50

The relationship of cybernetics to science and technology, neurology, pathology, mathematics, logic, and philosophy is discussed. R.T.K.

N64-14952 Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.
INFLIGHT LOSS OF CONSCIOUSNESS, A CASE REPORT
Pei Chin Tang and J. Robert Dille Sep. 1963 15 p refs
(CARI-63-21)

A case of in-flight vertigo and loss of consciousness in a private pilot, flying alone, is presented. The differential diagnosis and the significance of the findings of 5 to 7 per second theta waves in the resting EEG and high voltage slow waves during caloric irrigation of the right ear are discussed. Author

N64-14966 Washington, U., Seattle
ANALOG COMPUTER SIMULATION OF TEMPERATURE REGULATION IN MAN Technical Documentary Report, Oct. 1960-Dec. 1962
Arthur C. Brown Wright-Patterson AFB, Ohio, Biomed. Lab., Dec. 1963 114 p refs
(Contract AF 33(616)-7342)
(AMRL-TDR-63-116; AD-428144) OTS: $2.50

The mathematical equations for temperature distribution were derived from the physical principles describing heat flow, first in the form of integral equations and the corresponding vector differential equations, and then in the form of difference differential equations appropriate for electronic simulation. From these equations, a model of the body was constructed involving four concentric thermal elements. The equations describing the behavior of the thermal elements were simulated electronically. Feedback loops representing the analog of control of metabolism and vasomotor state were introduced into the model, simulating the human temperature regulation system. Solutions were generated by the computer under the specific condition of cold water immersion for varying clothing insulation and environmental (water) temperature. The computer predictions were found to be in relatively good agreement with preliminary experimental work. Author

N64-14971 Jewish Hospital of Brooklyn, N.Y.
EXPLORATION OF THE VAPOR PHASE ULTRAVIOLET SPECTRA OF THE HORMONES FROM THE ADRENAL AND RELATED SUBSTANCES
Samuel Natelson and John Bonas Holloman AFB, N. Mex., 6571st Aeromed. Res. Lab., Dec. 1963 91 p refs
(Contract AF 29(600)-3337)
(ARL-TDR-63-29; AD-402417)

The absorption spectra for certain steroid and catechol derivatives in the range from 185 to 300μ in the vapor state are compared to the absorption spectra of these compounds observed in solvents. It is pointed out that better resolution and higher sensitivity are observed in the vapor state. Elevated temperatures are used to vaporize these compounds, and a practical cuvette and heating means are described for this purpose. At elevated temperatures certain bands visible at low temperatures are wiped out in the range of approximately 230μ. However other bands of high degree of absorptivity appear at from 185 to 210μ. The spectra of derivatives of desoxy corticosterone, cortisone, estradiol, estrone, veratrole, and vanillin are explored in this study. Author

N64-14997 Sandia Lab., Albuquerque, N. Mex.
VISUAL AIDS FOR MANUFACTURING PERSONNEL
Joseph Crompton Feb. 1964 17 p
(SC-4959(M)) OTS: $0.50

This report presents the simplified techniques used at Sandia Corporation in developing visual aids for weapon rebuild operations. However, these simplified techniques also have broader applications and can be used wherever complicated relationships must be translated into shop language. Author

IAA ENTRIES

A64-10090
PLASTICITY IN HUMAN SENSORIMOTOR CONTROL.
Richard Held (Massachusetts Institute of Technology, Psychology Section, Cambridge, Mass.) and Sanford J. Freedman (Tufts University, Institute for Psychological Research, Medford, Mass.).
Science, vol. 142, Oct. 25, 1963, p. 455-462. 26 refs.
NSF-Rockefeller Foundation -supported research; Institute of Mental Health Grant Nos. M-3657 and M-7642; and Grant Nos. AF-AFOSR-53-63, AF-AFOSR-354-63, and NSG-496.

Discussion of the ordered information entailed in the motor-sensory feedback loop as a factor responsible for the stable functioning of the plastic systems of coordination. Presented are results of experiments on vision and hearing, which show that the introduction of disorder into the motor-sensory loop changes the state of these systems and makes performance imprecise. It is concluded that an astronaut exposed to a space environment may lose ability to perform certain tasks which require precise sensorimotor control.

A64-10092
RADIATION DAMAGE TO ARTEMIA CYSTS: EFFECTS OF WATER VAPOR.
Wallace C. Snipes and Walter Gordy (Duke University, Dept. of Physics, Durham, N. C.).
Science, vol. 142, Oct. 25, 1963, p. 503, 504. 13 refs.
Army-supported research and Contract No. AF-AFOSR-62-327.

Experimental investigation of effects of moisture on the irradiation of living biological systems. It is found that water vapor altered the form and greatly increased the rate of decay of the electron-spin resonance pattern of long-lived free radicals obtained upon gamma irradiation of Artemia salina cysts (brine shrimp eggs). These results, combined with data on radiation survival, indicate that the water vapor protects the cysts from radiation damage, or heals the damage. They also indicate that water protects the cysts from the effect of oxygen by neutralizing the radiation-induced free radicals before they can interact with oxygen to produce irreversible damage.

A64-10093
COUNTERACTING EFFECTS OF PHYSICAL EXERCISES PERFORMED DURING PROLONGED PERCEPTUAL DEPRIVATION.
John P. Zubek (Manitoba, University, Dept. of Psychology, Winnipeg, Canada).
Science, vol. 142, Oct. 25, 1963, p. 504-506. 14 refs.

Experimental investigation to determine whether the introduction of physical exercises during prolonged perceptual deprivation could minimize or even eliminate behavioral and physiological impairments. Subjects who were required to perform physical exercises during a week's exposure to unpatterned light and white noise showed fewer impairments on 15 behavioral measures than did subjects who were not required to exercise during the same period in an isolation chamber. Fewer hallucinatory phenomena and fewer disturbances of the electroencephalogram were observed. On the basis of these results it is suggested that the degree of motor activity permitted during isolation is perhaps one of the most important variables operating in sensory and perceptual deprivation experiments.

A64-10101
THE ECOLOGICAL PROFILE OF MARS: BIOASTRONAUTICAL ASPECT.
Hubertus Strughold (USAF, Aerospace Medical Div., Brooks AFB, Tex.).
IN: EXPLORATION OF MARS; Proceedings of the American Astronautical Society Symposium on the Exploration of Mars, Denver, Colo., June 6, 7, 1963. (Advances in the Astronautical Sciences, Vol. 15.)
Edited by George W. Morgenthaler.
North Hollywood, Western Periodicals Co., 1963, p. 30-44. 36 refs.

Review of the environmental and operational background information necessary for the success of a Mars manned planetary flight. The factors discussed include the Martian gravitational, magnetic, radiational, atmospheric, hydrospheric, lithospheric, and biotic environments.

A64-10112
HUMAN REQUIREMENTS FOR THE MARS MISSION.
Eugene B. Konecci (NASA, Office of Advanced Research and Technology, Biotechnology and Human Research, Washington, D.C.) and A. James Shiner (NASA, Office of Advanced Research and Technology, Manned Systems Integration, Washington, D.C.).
IN: EXPLORATION OF MARS; Proceedings of the American Astronautical Society Symposium on the Exploration of Mars, Denver, Colo., June 6, 7, 1963. (Advances in the Astronautical Sciences, Vol. 15.)
Edited by George W. Morgenthaler.
North Hollywood, Western Periodicals Co., 1963, p. 277-286.

This review, for a Mars mission highlights the requirements and need to do human research and development for adequate life support and protective systems for man's survival, to determine man-machine relationships adequately, and to integrate them properly into advanced aerospace systems. It is paramount that the physical and human requirements be compatible if we are to realize an optimum system with the highest reliability and least weight.

A64-10113
FULLY REGENERATIVE LIFE SUPPORT SYSTEMS FOR MARS MISSIONS.
Robert D. Gafford (Martin Marietta Corp., Martin Co., Life Sciences Laboratory, Denver, Colo.).
IN: EXPLORATION OF MARS; Proceedings of the American Astronautical Society Symposium on the Exploration of Mars, Denver, Colo., June 6, 7, 1963. (Advances in the Astronautical Sciences, Vol. 15.)
Edited by George W. Morgenthaler.
North Hollywood, Western Periodicals Co., 1963, p. 287-307. 10 refs.

Discussion of a manned Mars mission that may be planned for the early 1970's. The Mars spaceship will contain a crew of five men and will require a period of 420 days (including 40 days' stay at Mars) to accomplish the round trip from Earth orbit to Mars orbit and return. Stored quantities of food, oxygen, nitrogen, and CO_2 adsorbent, including reserves, will weigh between 11,000 and 16,000 lb, depending upon the amount of food and oxygen regenerated on board. Estimates of total system weight will depend upon the development of functional prototype hardware.

A64-10114
PSYCHOLOGICAL ASPECTS OF EXTENDED MANNED SPACE FLIGHT.
Julien M. Christensen (USAF, Aerospace Medical Div., Aerospace Medical Research Laboratories, Behavioral Science Laboratory, Human Engineering Div., Wright-Patterson AFB, Ohio).
IN: EXPLORATION OF MARS; Proceedings of the American Astronautical Society Symposium on the Exploration of Mars, Denver, Colo., June 6, 7, 1963. (Advances in the Astronautical Sciences, Vol. 15.)
Edited by George W. Morgenthaler.
North Hollywood, Western Periodicals Co., 1963, p. 308-346. 56 refs.

Sampling of some of the relevant information available in psychology is offered, and problems that will require further attention before predictions in the behavioral area for the Mars trip can be made with confidence are identified. A two-fold thesis is developed. First, psychology has legitimate and important contributions to make to the Mars trip. Second, the advantages, however, are mutual - i.e., it is confidently predicted that participation in this venture will force psychologists to reexamine their traditional principles and theoretical positions, and will stimulate an attack on the basic issues of human behavior with refreshing insights gained from new points of vantage.

A64-10115
SOME METABOLIC ASPECTS OF EXTENDED SPACE FLIGHT.
Donald R. Young (NASA, Ames Research Center, Moffett Field, Calif.).
IN: EXPLORATION OF MARS; Proceedings of the American Astronautical Society Symposium on the Exploration of Mars, Denver, Colo., June 6, 7, 1963. (Advances in the Astronautical Sciences, Vol. 15.)
Edited by George W. Morgenthaler.
North Hollywood, Western Periodicals Co., 1963, p. 347-369. 56 refs.

Review of some of the anticipated metabolic consequences and physiologic effects of space flight. The factors which have been considered are as follows: (1) effect of immobilization and confinement, (2) cabin atmospheric requirements, (3) selection of an adequate diet for maintenance of fitness and for protection against radiation damage, and (4) the effect of metabolic periodicities on performance. These are discussed from the point of view of extended missions for which there will be no capability for re-supply or crew rotation. Several methods for maintaining optimal health and operational efficiency have been examined. It is concluded that a systematic program of exercise and the selection of special diets are required in order to avoid hazardous complications and to maintain man in a state of well-being.

A64-10126
EVIDENCE OF THE EXISTENCE OF LIFE ON MARS.
William M. Sinton (Lowell Observatory, Flagstaff, Ariz.).
IN: EXPLORATION OF MARS; Proceedings of the American Astronautical Society Symposium on the Exploration of Mars, Denver, Colo., June 6, 7, 1963. (Advances in the Astronautical Sciences, Vol. 15.)
Edited by George W. Morgenthaler.
North Hollywood, Western Periodicals Co., 1963, p. 543-551.

Discussion of the observational evidence that bears on the supposed existence of vegetation in the dark regions of the planet Mars. Perhaps the oldest evidence which is sometimes cited is that the dark areas are green. In truth, these areas may not be green. The oldest valid evidence is the marked seasonal intensity variation of the dark regions. Another line of evidence follows from the failure of the dark areas to be covered up as a result of the dust storms. Recently, it has been found that the polarization properties of the dark regions vary regularly with the season, and from this variation it is concluded that the microscopic character of the dark material varies. Recently, too, it was learned that the characteristic infrared absorptions of organic matter are present in the dark regions, which observation considerably strengthens the hypothesis of vegetation. From temperature observations, it is concluded that plants are likely to be shaped like cactus.

A64-10128
BIOLOGICAL EXPLORATION OF MARS.
Carl Sagan (Harvard University, and Smithsonian Astrophysical Observatory, Cambridge, Mass.).
IN: EXPLORATION OF MARS; Proceedings of the American Astronautical Society Symposium on the Exploration of Mars, Denver, Colo., June 6, 7, 1963. (Advances in the Astronautical Sciences, Vol. 15.)
Edited by George W. Morgenthaler.
North Hollywood, Western Periodicals Co., 1963, p. 571-581.
17 refs.

Discussion of the evidence of indigenous biology on Mars. The present evidence strongly suggests, but does not conclusively prove, that life exists on Mars. Only the landing of a biologist on Mars can provide the desired sophistication in detection and detailed characterization of Martian life forms. In preparation, a program of orbiters and unmanned landers is indicated. An orbiter has the intrinsic advantage that it provides information concerning large areas and long intervals of time, permitting observations of seasonal and secular changes in Martian surface features. Intercomparison of Martian and terrestrial organisms, both on the biochemical and on the morphological levels, can provide a general perspective which is currently lacking in biology, because all the life forms known to date have probably evolved from a single instance of the origin of life.

A64-10147
STUDIES WITH A SIMULATED MARTIAN ENVIRONMENT.
Thomas L. Roberts (USAF, Systems Command, Aerospace Medical Div., Astrobiology Branch, Brooks AFB, Tex.).
Journal of the Astronautical Sciences, vol. 10, Fall 1963, p. 65-74.
56 refs.

Presentation of hypothetical models of the planet Mars, constructed on the basis of observations and indirect experiments. The models are used to investigate problems pertaining to atmospheric and surface features in determining whether Mars offers a hospitable environment for terrestrial life. Experiments with these models indicate that bacteria are able to survive and multiply in a simulated Martian environment, and thus the view is encouraged that life exists on Mars.

A64-10151
SPACECRAFT AND LIFE SYSTEMS.
Philip K. Eckman (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.) and William M. Helvey (Republic Aviation Corp., Farmingdale, N.Y.).
Astronautics and Aerospace Engineering, vol. 1, Nov. 1963, p. 20-28.

Review of the state-of-the-art of spacecraft and satellite programs, emphasizing recent developments in life-support systems. The 1962-63 spacecraft flights are briefly reviewed; these include the manned Mercury flights, and the major accomplishments of the Telstar, Relay, Syncom, and Orbiting Solar Observatory flights. Major systems are outlined for the Gemini, Apollo, Surveyor, and Nimbus programs. Subsystems are tabulated. The major features of the life-support systems for these are described, as well as methods of simulating zero-g conditions, and techniques for monitoring physiological data.

A64-10215
CHEMICAL EVOLUTION.
Melvin Calvin (California, University, Dept. of Chemistry, Berkeley, Calif.).
IN: INTERSTELLAR COMMUNICATION.
Edited by A. G. W. Cameron.
New York and Amsterdam, W. A. Benjamin, Inc., 1963, p. 33-81.
65 refs.

Discussion of chemical evolution and of the development of concepts on the origin of life on Earth. Considered are the primitive atmosphere, evolution of catalysts, molecular crystallization, the formation of a cell, and precursor conditions for chemical evolution. Also treated are the possibility of life on other planets, life elsewhere in the solar system, in other galactic systems, and man's place in the universe.

A64-10216
OCCURRENCE OF LIFE IN THE UNIVERSE.
Su-Shu Huang (NASA, Goddard Space Flight Center, Greenbelt, Md.).
(American Scientist, vol. 47, 1959, p. 397.)
IN: INTERSTELLAR COMMUNICATION.
Edited by A. G. W. Cameron.
New York and Amsterdam, W. A. Benjamin, Inc., 1963, p. 82-88.

Discussion of the requirements for the occurrence of life in the universe, from the present knowledge of the stars and their evolution. Considered are time scales of biological and stellar evolution, and the habitable zone of a star. It is stated that faint dwarf stars in our galaxy and, perhaps, in other galaxies, may possess planets with living beings. Our Sun does support life abundantly on at least one of its planets. The stars in the solar neighborhood which are binary and multiple systems have a damaging effect on the development of life on their planets.

A64-10217
THE PROBLEM OF LIFE IN THE UNIVERSE AND THE MODE OF STAR FORMATION.
Su-Shu Huang (NASA, Goddard Space Flight Center, Greenbelt, Md.).
(Astronomical Society of the Pacific, Meeting, San Francisco, Calif., June 1959.)
IN: INTERSTELLAR COMMUNICATION.
Edited by A. G. W. Cameron.
New York and Amsterdam, W. A. Benjamin, Inc., 1963, p. 89-92.

Presentation of general conclusions concerning the occurrence of life in the universe. It is stated that the prediction is warranted that, out of 42 known stars (including the Sun) within 5 parsecs from us, only three stars have a good chance for supporting advanced living beings on their planets, if such planets exist. The problem of the occurrence of life in the universe reduces to the problem of discovering whether simple main sequence F, G, and K stars possess planets. Three arguments are presented for believing that the formation of planets around stars is a common phenomenon. It is predicted that nearly all single stars of the main sequence below F5 and, perhaps, above K5, have a fair chance of supporting life on their planets; therefore life should be a common phenomenon in the universe.

A64-10218

LIFE-SUPPORTING REGIONS IN THE VICINITY OF BINARY SYSTEMS.

Su-Shu Huang (NASA, Goddard Space Flight Center, Greenbelt, Md.).

(Astronomical Society of the Pacific, Publications, vol. 72, 1960, p. 106.)
IN: INTERSTELLAR COMMUNICATION.
Edited by A. G. W. Cameron.
New York and Amsterdam, W. A. Benjamin, Inc., 1963, p. 93-101.

Quantitative study of the statement that, if a life-supporting planet exists in a binary system, it must be an interior planet in the case of a distant binary, and an exterior planet in the case of a close binary. Considered are the habitable zone of a binary system, the dynamical stability of the orbit of a third body in a binary system, and the life-supporting ability of a binary system in terms of the separation between the components. It is stated that many binaries have as good a chance to support life as do single stars. However, it is emphasized that this may be true only for distant binaries having nearly circular orbits. The situation is not so favorable if the binary has a highly eccentric orbit.

A64-10234

LIFE IN THE GALAXY.

R. N. Bracewell (Stanford University, Radio Astronomy Institute, Stanford, Calif.).

IN: INTERSTELLAR COMMUNICATION.
Edited by A. G. W. Cameron.
New York and Amsterdam, W. A. Benjamin, Inc., 1963, p. 232-242.

Speculation on the existence of intelligent life in regions of space far beyond the confines of our solar system, and on establishing contact with it. It is stated that conditions suitable for intelligent life are believed to be widespread in our galaxy. It is proposed that messenger probes be launched to the thousand surrounding stars. One might be in our system now, in which case we should be very careful not to overlook unexplained radio signals that may be received.

A64-10248

THE IDEAL RELATIONSHIP BETWEEN INSPIRED OXYGEN CONCENTRATION AND CABIN ALTITUDE.

J. Ernsting (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).

Aerospace Medicine, vol. 34, Nov. 1963, p. 991-997. 14 refs.

Review of the factors which determine the physiologically desirable relationship between the concentration of oxygen in the inspired gas and the absolute pressure within a pressure or sealed cabin. It is seen that the maximum allowable concentration of oxygen is influenced principally by the direct toxic effects of oxygen upon the respiratory tract, and by the need to reduce the possibility of gross pulmonary atelectasis in the presence of blockage of the airways induced by exposure to accelerative forces. The incidence of decompression sickness is the main factor that limits the maximum cabin altitude, and it can also influence the composition of the gas breathed in the intact cabin if depressurization of the cabin or the use of a full pressure suit has to be considered.

A64-10249

RORSCHACH INDICATIONS OF EMOTIONAL INSTABILITY AND SUSCEPTIBILITY TO MOTION SICKNESS.

Allen E. McMichael and Ashton Graybiel (U.S. Navy, School of Aviation Medicine, Pensacola, Fla.).

(Aerospace Medical Association, Annual Meeting, Los Angeles, Calif., Apr. 30, 1963.)
Aerospace Medicine, vol. 34, Nov. 1963, p. 997-1000. 12 refs.
NASA Order No. R-47.

Experimental investigation to test the hypothesis that individuals who are particularly anxious, or dependent, or labile, or rigid would be particularly susceptible to motion sickness, because of their sensitivity to their own feelings about themselves and their world. In the experiment nine volunteer normal subjects were administered a battery of psychological tests, of which one was the Rorschach test, prior to their exposure to four experimental conditions: aerial acrobatics, going to sea in a power boat, experiencing zero G, and the slow rotation room. Five composite dimensions of personality were correlated to each of the four criteria. These dimensions were: anxiety, dependency, drive, lability, and rigidity. A total score for all dimensions was similarly correlated. Rigidity was significantly correlated, at or beyond the 0.05 level of confidence, with susceptibility to motion sickness in aerial acrobatics, going to sea in a power boat, and in the slow rotation room. Lability was significantly correlated, beyond the 0.01 level of confidence, to susceptibility to motion sickness in a weightless environment.

A64-10250

THERAPY OF ACUTE UDMH INTOXICATION.

Kenneth C. Back, Mildred K. Pinkerton, and Anthony A. Thomas (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

Aerospace Medicine, vol. 34, Nov. 1963, p. 1001-1004. 10 refs.

Investigation of both symptomatic and antidotal treatment of acute intoxication by UDMH (missile fuel, 1,1-dimethylhydrazine), emphasizing the effect of two Vitamin B_6 congeners, pyridoxine and pyridoxamine. Symptomatic treatment consisting of a combination of sedatives, anticonvulsants, cardiac glycosides, potent vasoconstrictors, artificial respiration, and plasma expanders failed to protect animals from lethal doses of UDMH. Vitamin B_6 analog therapy is seen to constitute the first successful approach to specific treatment which prevents convulsions and death in all species tested. The ED_{50}'s (effective doses) of pyridoxine hydrochloride and pyridoxamine dihydrochloride were determined in mice, rats, dogs, and monkeys. The only manifestation which was not abolished by this therapy in dogs and monkeys was vomiting. The data presented are the basis for a suggested emergency treatment of severely exposed personnel, consisting of the injection of 25 mg/kg pyridoxine hydrochloride.

A64-10251

EFFECTS OF RED LIGHTING ON ACCOMMODATION IN AIRCREW PERSONNEL.

Stanley Diamond (Pan American World Airways, Overseas Div., San Francisco, Calif.).

(Aerospace Medical Association, Annual Meeting, Los Angeles, Calif., Apr. 29, 1963.)
Aerospace Medicine, vol. 34, Nov. 1963, p. 1005-1007.

Investigation of accommodative amplitudes in aircrew personnel under light- and dark-adapted conditions. A consistent and significant loss of available accommodation under red light is found, which could constitute a source of ocular fatigue, and which could be aided by additional plus lenses for near work. This effect is thought to result from the spectral hyperopia derived from the physiological chromatic aberration of the eye in the photopic state, and is enhanced by the influence of inhibitory or negative accommodation induced by dark adaptation and dim illumination.

A64-10252

SYMPATHOADRENAL RESPONSE TO WATER IMMERSION.

Michael McCally and Duane E. Graveline (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Biomedical Laboratory, Biophysics Branch, Psychophysiological Stress Sect., Wright-Patterson AFB, Ohio).

Aerospace Medicine, vol. 34, Nov. 1963, p. 1007-1011. 14 refs.

Experimental investigation to ascertain the role of the sympathetic nervous system in the impairment of orthostatic tolerance following immersion in water. The urinary catecholamine response of 16 subjects to 6 hr of complete immersion in water is studied and related to subsequent orthostatic tolerance on the tilt table. Probable mechanisms of the reduced noradrenaline excretion during immersion are discussed.

A64-10253

INFLUENCE OF SELECTED VIBRATIONS UPON SPEECH. III - RANGE OF 6 cps TO 20 cps FOR SEMI-SUPINE TALKERS.

Charles W. Nixon and Henry C. Sommer (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Laboratories, Biomedical Laboratory, Biodynamics and Bionics Div., Biological Acoustics Branch, Wright-Patterson AFB, Ohio).

Aerospace Medicine, vol. 34, Nov. 1963, p. 1012-1017.

Investigation to determine the effects on word intelligibility of exposure to low-frequency sinusoidal vibrations within the range of 6 cps to 20 cps, in the X, Y, and Z modes, when the talker is in the semisupine position. The study is part of an investigation of the capability for continuous speech communication from a space vehicle during powered flight and re-entry. The effects upon vibrated speech of ambient noise and level of acceleration are also

examined. Word intelligibility is found to be differentially influenced by mode of vibration, frequency of vibration, ambient noise level, and acceleration level. Intelligibility data are considered as a criterion for predicting efficiency of speech communication.

A64-10254
OCULAR HYPEROXIA.
Cecil C. Beehler, Norris L. Newton, James F. Culver (USAF, Systems Command, Aerospace Medical Div., Clinical Sciences Div., Dept. of Experimental Surgery and Ophthalmology, Brooks AFB, Tex.), and Thomas Tredici (Armed Forces Institute of Pathology, Washington, D.C.).
Aerospace Medicine, vol. 34, Nov. 1963, p. 1017-1020.

Experimental investigation to determine the effect of high-oxygen environments on the visual system of mature animals. It is found that exposure to 680 and 760 mm Hg of oxygen, for no longer than 48 hr, can result in profound eye damage. Clinically, the animals develop retinal detachment, conjunctivitis, iritis, and hypotony. Histologic studies revealed subretinal fluid and degeneration of the rod and cone layer, as well as ciliary cysts.

A64-10255
CONTINUOUS FUNCTIONAL TESTING OF OXYGEN BREATHING EQUIPMENT.
J. Ryan Neville (USAF, Systems Command, Aerospace Medical Div., Physiology Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 34, Nov. 1963, p. 1020-1024.

Description of the application of a gas-phase oxygen transducer to the continuous functional testing of an aviator's oxygen-breathing equipment by direct observation of oxygen concentration changes in the dead space of the mask and in the inlet tubing. Test procedures are described for regulators and oxygen masks, which detect faulty and ill-fitting equipment that might otherwise be unnoticed.

A64-10256
AN ELECTRICAL IMPEDANCE PLETHYSMOGRAPH.
G. G. Lucchina (U.S. Navy, Life Sciences Dept., Point Mugu, Calif.) and C. G. Phipps (Vermont, University, Dept. of Physiology and Biophysics, Burlington, Vt.).
Aerospace Medicine, vol. 34, Nov. 1963, p. 1025-1031.

Description of an electrical impedance plethysmograph, emphasizing its application to weapon systems evaluation and to space flights. The physiological, operational, and electronic systems considerations in the design and construction of the instrument are considered. Schematic and block diagrams of the instrumentation are presented and discussed, and sample traces are presented, along with suggestions for applications to obtain blood-pressure and flow data.

A64-10257
VESTIBULAR RESPONSES TO OSCILLATION ABOUT THE YAW AXIS.
Robert L. Cramber, Patrick J. Dowd, and Donald B. Helms (USAF, Systems Command, Aerospace Medical Div., Ear, Nose, and Throat Dept., Vestibular Laboratory, Brooks AFB, Tex.).
Aerospace Medicine, vol. 34, Nov. 1963, p. 1031-1034.

Experimental investigation to determine the validity of the cupular analog for amplitude distortion in response to harmonic acceleration and for the effects of repeated prolonged exposure. Four cats were exposed repeatedly to harmonic stimulation of the horizontal semicircular canals. This treatment affected both the dynamic characteristics and the amplitudes of the responses to a test series of vestibular stimuli. All four animals showed a lawful relationship in the phase angles between the harmonically varying acceleratory stimuli and the preconditioned responses which they elicited. It is believed that the vestibulo-ocular reflex and other vestibular reflexes can be modified by appropriate physiological conditioning so that responses to nonphysiological acceleratory stimuli will become adaptive or at least not nonadaptive. However, caution is urged in the prescribing of conditioning regimens, lest the subject is inadvertently rendered more susceptible rather than more resistant to spatial disorientation.

A64-10258
THE GENERAL AND COMPARATIVE BIOLOGY OF EXPERIMENTAL ATMOSPHERES AND OTHER STRESS CONDITIONS.
S. M. Siegel, L. Halpern, G. Davis, and C. Giumarro (Union Carbide Corp., Union Carbide Research Institute, Tarrytown, N.Y.).
Aerospace Medicine, vol. 34, Nov. 1963, p. 1034-1037. 22 refs.

Experimental investigation of the toxic effects of elevated oxygen levels on cells of plants, invertebrates, and humans. Sixteen plant and animal forms including seed plants, mosses, protozoa, insects and human cells were exposed to O_2 at 1.0 atm pressure. Germination, growth, defoliation, and survival were examined relative to their respective air control. Germination and growth were markedly inhibited; leaves were induced to fall; protozoa and HeLa cells were killed. Insects were also killed, but underwent loss of coordination prior to death. The sensitive plant, Mimosa, lost its typical touch sensitivity after a brief contact and eventually its leaves. HeLa cells grown under 35-50% O_2 developed granularity of cytoplasms and nuclear malformation, but most strikingly showed an increase in globular lipid (Sudan III stain). The number of globules per cell increased as cell viability declined. The toxicities of several peroxides toward plant and animal test objects were also compared in recognition of the probable role of peroxides in O_2-damage.

A64-10259
RAPID DECOMPRESSION HAZARDS AFTER PROLONGED EXPOSURE TO 50 PER CENT OXYGEN - 50 PER CENT NITROGEN ATMOSPHERE.
Morris J. Damato, Francis M. Highly, Edwin Hendler, and Edward L. Michel (Naval Air Engineering Center, Air Crew Equipment Laboratory, Philadelphia, Pa.; NASA, Houston, Tex.).
Aerospace Medicine, vol. 34, Nov. 1963, p. 1037-1040.

Experimental investigation of the rapid decompression hazard following exposure to a proposed space capsule atmosphere in order to: (1) establish the required time of preoxygenation for protection against a rapid decompression from sea level to 35,000 ft; and (2) to establish the required time for equilibration during partial denitrogenation at a simulated altitude of 18,000 ft in a 50% oxygen-50% nitrogen atmosphere for protection against rapid decompression. Based on the results of this investigation, the following are concluded: in rapid decompression followed by prolonged exposure to altitudes of 35,000 ft, the following procedures preceding the decompression have been found to minimize the incidence of bends: (1) breathing 100% oxygen for at least 3 hr at sea level; (2) breathing a 50% oxygen-50% nitrogen gas mixture for about 18 hr or more at an altitude equivalent of 18,000 ft; and (3) breathing 100% oxygen for 2 hr at sea level followed by breathing a 50% oxygen-50% nitrogen gas mixture for 12 hr at an altitude equivalent of 18,000 ft. During repeated exposures, recurrence of bends in the same area is very likely. The manifestation of bends may be delayed for more than 2 hr following decompression. Characteristic sensations of bends may be either localized in one area or may radiate eventually to involve more than one area simultaneously.

A64-10260
RELATIVE MOTION OF ELEMENTS IN INSTRUMENT DISPLAYS.
W. G. Matheny, D. J. Dougherty, and J. M. Willis (Bell Aerospace Corp., Bell Helicopter Co., Fort Worth, Tex.).
(Aerospace Medical Association, Meeting, Atlantic City, N.J., Apr. 9, 1962.)
Aerospace Medicine, vol. 34, Nov. 1963, p. 1041-1046.
Contract No. Nonr 1670(00).

Experimental investigation of the effect of the motion imparted to the operator by vehicular motion on the evaluation of the outside-in vs the inside-out display of the information by which the vehicle operator nulls the errors about the longitudinal-lateral axis of the aircraft. The results of the experiments suggest that motion is a relevant variable and that the degree to which it duplicates the angular motion of the vehicle being simulated is most important. Lack of the motion cues may lead to erroneous conclusions as to the suitability of displays for systems in which motion cues are present. Motion simulation systems, which exhibit transient accelerations or unrealistic phase differences between motion and visual stimuli, may provide cues to response which are inappropriate to the task of the operator.

A64-10261
SHORT TERM PSYCHOTHERAPY OF THE AVIATOR.
Roy E. Ehrlich and Philip B. Phillips (U.S. Navy, School of Aviation Medicine, Naval Aviation Medical Center-54, Pensacola, Fla.).

Aerospace Medicine, vol. 34, Nov. 1963, p. 1046, 1047.

Brief review of case histories, to demonstrate the fact that a significant number of aviators can be treated for psychogenic problems and returned to useful flight status, particularly those with good motivation, strong defenses, and somatization of their conflicts. It is seen that, in a reasonably short period of time, a workable insight can be developed by the pilot, especially if reinforced by authoritarian support and encouragements.

A64-10262

CASE REPORT NUMBER 14.

Jan H. Tillisch and Earl T. Carter (Mayo Clinic and Mayo Foundation, Rochester, Minn.).

Aerospace Medicine, vol. 34, Nov. 1963, p. 1048-1050.

Brief discussion of the case history of a commercial pilot with rheumatoid synovitis of the right knee, in order to illustrate some considerations involved in treating and diagnosing pilots with rheumatoid arthritis and related disorders. A synovectomy was performed, and, after a convalescence of about two months, the pilot returned to flying duties, maintaining a basic program of physiotherapy, salicylate medication, and adequate rest.

A64-10263

THE PATHOLOGY OF EJECTION FAILURE.

Richard M. Chubb, W. Harley Davidson, and Walter D. Gable (Armed Forces Institute of Pathology, Aerospace Pathology Branch, Washington, D.C.).

Aerospace Medicine, vol. 34, Nov. 1963, p. 1050-1054.

Review of 273 cases of ejection failure in order to determine what injuries occurred in the failures, and, insofar as possible, what produced them. The fatal injury patterns in the ejection failures are tabulated, and toxicologic studies of the victims are discussed.

A64-10264

THE AEROMEDICAL PROBLEM OF GLAUCOMA.

James F. Culver and William B. Clark (USAF, Systems Command, Aerospace Medical Div., Clinical Sciences Div., Dept. of Experimental Surgery and Ophthalmology, Brooks AFB, Tex.).

(Aerospace Medical Association, Annual Meeting, Los Angeles, Calif., Apr. 30, 1963.)

Aerospace Medicine, vol. 34, Nov. 1963, p. 1055-1058.

Brief consideration of the advisability of adding tonometry to the physical examination for flying personnel, in order to detect occurrences of glaucoma. Screening techniques are delineated, and criteria for referral to specialists are outlined. Administrative handling is briefly considered for patients whose eyes are termed preglaucomatous and for patients who are clearly glaucomatous and are receiving therapy.

A64-10265

THE COMMON COLD - A CONTINUING AEROMEDICAL PROBLEM.

John W. Funk (USAF, Systems Command, Aerospace Medical Div., Brooks AFB, Tex.).

(Aerospace Medical Association, Annual Meeting, Los Angeles, Calif., Apr. 30, 1963.)

Aerospace Medicine, vol. 34, Nov. 1963, p. 1058-1061. 26 refs.

Brief discussion of problems associated with the common cold, its incidence in pilots, and its importance as a cause of their loss of effectiveness. The clinical syndrome is described, and the underlying pathophysiologic mechanism is postulated. Treatment is discussed, along with some aeromedical therapeutic management techniques.

A64-10566

SUBJECTIVE EVALUATION OF DELAY AND ECHO SUPPRESSORS IN TELEPHONE COMMUNICATIONS.

R. R. Riesz (Union College, Dept. of Physics, Barbourville, Ky.) and E. T. Klemmer (Bell Telephone Laboratories, Inc., Murray Hill, N.J.).

Bell System Technical Journal, vol. 42, Nov. 1963, p. 2919-2941.

The effect of transmission delay upon the quality of a telephone circuit is investigated using naturally occurring telephone conversations. Round-trip delays of 600 and 1,200 msec go almost unnoticed at first when no echo sources or echo suppressors are present in the circuit. After exposure to pure delays of up to 2,400 msec, considerable dissatisfaction, indicated by rejection of the circuit, develops with the 600- and 1,200 msec delays. When echo sources and echo suppressors are added to the circuit, some dissatisfaction develops immediately for round-trip delays of 600 and 1,200 msec. No adaptation to the effects of delay occurs; in fact dissatisfaction increases with experience under certain conditions.

A64-10624

UTILIZING THE VISUAL ENVIRONMENT IN SPACE.

Aaron Hyman (USAF, Systems Command, Aerospace Medical Div., Behavioral Sciences Laboratory, Wright-Patterson AFB, Ohio).

Human Factors, vol. 5, June 1963, p. 175-186.

Analysis of: (1) methods for estimating distance in space on the basis of visual information; and (2) factors affecting the illuminance and luminance of celestial and orbital bodies in space. Two procedures for distance estimation are considered. In one, formulae relating angular subtense to target distance are derived for spherical and disk objects. A design for a simple reticle to be used in distance estimation is described. In the other procedures, the utilization of illuminance from spherical and disk-shaped satellites for the purpose of relating it to object distance is examined. Elementary formulas are developed to show a satellite's appearance in space for the simple case where the illuminance is provided by a celestial body equivalent to a point source.

A64-10625

VISUAL EXPERIENCES OF THE ASTRONAUTS AND COSMONAUTS.

Donald L. Zink (USAF, Systems Command, Aerospace Medical Div., Behavioral Science Laboratory, Wright-Patterson AFB, Ohio).

Human Factors, vol. 5, June 1963, p. 187-201. 22 refs.

Summary of the major visual experiences reported by the pilots of the American and Soviet spacecraft that have been orbited to date. The provisions for external vision on the various spacecraft are briefly described. The effects, on sight, of vibration and acceleration during launch and re-entry are discussed, and the appearance of the Earth and its distinguishable features, and of the sky, including the stars and Moon, are reviewed. These findings are discussed for their implications for man's visual requirements in future space flights.

A64-10626

VISUAL SEARCH IN THE SPACE ENVIRONMENT.

Walter F. Grether (USAF, Systems Command, Aerospace Medical Div., Behavioral Sciences Laboratory, Wright-Patterson AFB, Ohio).

Human Factors, vol. 5, June 1963, p. 203-209. 10 refs.

Description of a method for computing the probability of an astronaut's sighting of another vehicle in a coplanar orbit for purposes of rendezvous. The conditions affecting the search and sighting capabilities of the astronaut are reviewed. It is suggested that only two classes of space targets are likely to be seen: celestial bodies at great distance, and objects in approximately coplanar orbits. Threshold data for foveal vision are presented which can be used to make predictions of the maximum distances at which space rendezvous targets should be visible. An example is presented of an application of the method to a search situation approximating rendezvous with a target comparable to the Gemini vehicle.

A64-10627

VIGILANCE: A REVIEW AND RE-EVALUATION.

Harry J. Jerison and Ronald M. Pickett (Antioch College, Behavior Research Laboratory, Yellow Springs, Ohio).

Human Factors, vol. 5, June 1963, p. 211-238. 75 refs.

Contract No. AF 33(657)-7362; Grant AF-AFOSR-150-63.

Development of a theoretical model of vigilance as a human factor, which is based on the decision-theory approach to the observing response phase of the vigilance task. Vigilance literature is critically reviewed. Examples of recommendations for manned space systems, based on the model, are constructed. These include the use of storage signals to increase the signal probability (increase signals-per-unit-time by using a longer unit of time), and to make more reasonable demands on man's observing behavior. It is suggested that monitoring jobs should be made analogous to jobs of quality control specialists, who check the adequacy of system performance, instead of to those of a look-out scanning a region for danger signals.

A64-10628

VISION AND UNUSUAL GRAVITATIONAL FORCES. Appendix - BODY ACCELERATION - COMPARATIVE TABLE OF EQUIVALENTS.

William J. White and Richard A. Monty (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.).

Human Factors, vol. 5, June 1963, p. 239-263. 115 refs.

Critical review of investigations of the effects upon human vision of unusual gravitation forces encountered during space flight, emphasizing the effects of increased g-force and of zero g. Qualitative and quantitative data are summarized, including application of the threshold methods of psychophysics to the performance of flying tasks such as dial reading. Briefly reviewed are the operational experiences of American astronauts. Techniques for ameliorating the undesirable effects of acceleration and zero gravity are summarized.

A64-10629
VISUAL SPACE PERCEPTION AS INFLUENCED BY UNUSUAL VESTIBULAR STIMULATION.
Brant Clark (San Jose State College, Dept. of Psychology, San Jose, Calif.).
Human Factors, vol. 5, June 1963, p. 265-274. 57 refs.

Consideration of the role of the influence of vestibular stimulation on visual space perception, in the confusions regarding sensory information experienced during aircraft and space flight. The transducer mechanisms of the vestibular receptors are briefly described, and the visual effects associated with unusual stimulation by angular acceleration are delineated. A discussion of the effects associated with unusual stimulation by linear acceleration includes consideration of visual perception of the vertical and horizontal with normal gravitational force, the effects of increased g, and the oculo-agravic illusion caused by subgravity effects.

A64-10630
THE VISUAL SUB-SYSTEM CONCEPT AND SPACECRAFT ILLUMINATION.
Albert H. Urmer and Edward R. Jones (McDonnell Aircraft Corp., Engineering Psychology Dept., St. Louis, Mo.).
Human Factors, vol. 5, June 1963, p. 275-283. 19 refs.

Consideration of general crew station and illumination requirements for a spacecraft, based on a systems' engineering approach that is designated the "visual sub-system concept." It is shown that these requirements are affected by factors such as vibration, acceleration, dark adaptation, visual acuity, and unique environmental conditions. Design parameters are suggested for optimizing crew station illumination.

A64-10631
SPACE CABIN ATMOSPHERE TRACE CONTAMINANTS AND THEIR POSSIBLE INFLUENCE ON VISUAL PARAMETERS.
John M. Lagerwerff (Marquardt Corp., Bioastronautics Dept., Van Nuys, Calif.).
Human Factors, vol. 4, June 1963, p. 285-293. 67 refs.

Discussion of the effects of the classical components of a space cabin atmosphere on the visual function. Emphasized is the effect of ozone, because under the influence of solar and cosmic radiations, ozone may be formed from liquid and gaseous oxygen supplies on board the spacecraft. Based on the observed physiological effects of small doses of positive and negative free air ions, it is hypothesized that, in the ionized state, some gaseous and volatile human metabolic waste products may have entirely different properties than they have in the ordinary state, and may affect vision.

A64-10632
VISUAL SURVEILLANCE AND RECONNAISSANCE FROM SPACE VEHICLES.
Marshall A. Narva and Frederick A. Muckler (Martin Marietta Corp., Martin Co., Baltimore, Md.).
Human Factors, vol. 5, June 1963, p. 295-315. 54 refs.

Review of problems to be encountered in the utilization of manned space vehicles for surveillance and reconnaissance and of the variables that will influence the performance of the operator in such operations. Analyses of the theoretical capabilities of direct, unaided vision and of man-periscopic vision are presented. Variables discussed are those of the vehicle, the object (such as size, shape, and background characteristics), the display, and the operator.

A64-10634
VISUAL CAPABILITIES OF PERFORMING RENDEZVOUS IN SPACE.
James M. Vanderplas (Washington University, St. Louis, Mo.).
Human Factors, vol. 5, June 1963, p. 323-328. 23 refs.

Review of the critical visual capabilities connected with detection, discrimination, recognition, identification, and judgment in relation to the acquisition, homing, and docking phases of space rendezvous. The inadequacies of existing sources of data, especially in interaction effects, and the need for the presentation of data in a form permitting specific predictions, are discussed.

A64-10789
HYPERLIPIDAEMIA: A CAUSE OF DECREASED OXYGEN SATURATION.
G. Douglas Talbott (American Medical Research Foundation, Dayton, Ohio) and Regina Frayser (Indiana University, Medical School, Dept. of Medicine, Indianapolis, Ind.).
Nature, vol. 200, Nov. 16, 1963, p. 684.
Contract No. AF-33(616)-8378; FAA Grant No. 2198; NIH Grant No. H 4080.

Review of an experiment in which a decrease in arterial oxygen saturation was caused by the induction of hyperlipidaemia in humans, by the intravenous infusion of fat emulsion. It was found that the oxygen saturation fell from an average of 96.1% in the 11 subjects, to an average of 91.9%. These results are briefly discussed.

A64-10876
DETECTING EXTRATERRESTRIAL LIFE.
Warren G. Meinschein (Esso Research and Engineering Co., Linden, N.J.).
Industrial Research, vol. 5, Sept. 1963, p. 20-24.

Discussion of current methods for the detection of remnants of extinct life in meteorites, with particular reference to the investigation of carbon compounds in chondrites. Noted is the inadequacy of the available analytical instruments to precisely characterize and identify the carbon compounds contained in fractions in some meteorites, and which have to be extracted by various solvents. Compared are (1) the infrared spectra of crude oil, benzene extractable fractions of recent marine and ancient sediments, and the Orgueil meteorite, and (2) the infrared spectra of silica gel chromatographic fractions of the Orgueil meteorite benzene extracts. The general scientific aspects of meteorite investigations are outlined, and the present scientific controversy over the carboneous materials of meteoritic origin is described.

A64-10959
IDENTIFICATION OF ELEMENTARY AUDITORY DISPLAYS: EFFECT OF UNBALANCED PROBABILITIES OF OCCURRENCE.
Irwin Pollack and James Boynton (USAF, Systems Command, Electronic Systems Div., Decision Sciences Laboratory, Hanscom Field, Bedford, Mass.).
(USAF ESD-TDR-63-352, 1963.)
Acoustical Society of America, Journal, vol. 35, Nov. 1963, p. 1831, 1832.

Investigation of sound levels identified by listeners from a series in which one sound level occurred twice as often as each of six other sound levels. Unbiased measures of identification performance indicated that highest identification performance is achieved for the most frequently presented category, and that lowest identification performance is achieved for categories adjacent to the most frequent category.

A64-11282
A SAMPLED DATA MODEL FOR EYE TRACKING MOVEMENTS.
Laurence R. Young (Massachusetts Institute of Technology, Dept. of Aeronautics and Astronautics, Cambridge, Mass.).
(International Federation of Automatic Control, Congress, Basel, Switzerland, Aug. 21-Sept. 4, 1963.)
IN: JOINT AUTOMATIC CONTROL CONFERENCE, 4th, UNIVERSITY OF MINNESOTA, MINNEAPOLIS, MINN., JUNE 19-21, 1963, PREPRINTS OF TECHNICAL PAPERS.
Conference sponsored by the American Institute of Chemical Engineers.
New York, American Institute of Chemical Engineers, 1963, p. 606, 607. Abridged.

Brief description of a model for studying the human eye-movement control system. In the sampled data model, the error angle between the desired angle of gaze and the actual eye position is detected at the retina. This error is sampled by an impulse modulator at sampling intervals T, where T is the average refractory period for saccadic movements. A block diagram of the model is linearized to obtain a pair of equations which describe all the observed transient responses in which the saccadic dead zone is exceeded.

A64-11340
SPACE TRAINING PAST AND FUTURE.
Robert S. Buchanan and William G. Schweikhard.
IN: TESTING OF MANNED FLIGHT SYSTEMS CONFERENCE, EDWARDS AFB, CALIF., DECEMBER 4-6, 1963, PROCEEDINGS. Conference sponsored by the American Institute of Aeronautics and Astronautics, Air Force Flight Test Center, and NASA, Flight Research Center.
New York, American Institute of Aeronautics and Astronautics, 1963, p. 73-76.

Brief consideration of present and proposed selection and training programs for pilots of space vehicles. The selection and training are outlined for the Mercury and Gemini programs, and for the X-15 and X-20 aircraft. Russian cosmonaut training is briefly considered, and Aerospace Research Pilot School training is described. Suggestions are made for the selection of astronauts for future programs.

A64-11341
PILOT TRAINING FOR THE X-20 HYPERSONIC RESEARCH AIRCRAFT.
Russell L. Rogers (USAF, Flight Test Center, Edwards AFB, Calif.).
IN: TESTING OF MANNED FLIGHT SYSTEMS CONFERENCE, EDWARDS AFB, CALIF., DECEMBER 4-6, 1963, PROCEEDINGS. Conference sponsored by the American Institute of Aeronautics and Astronautics, Air Force Flight Test Center, and NASA, Flight Research Center.
New York, American Institute of Aeronautics and Astronautics, 1963, p. 77-81.

Review of the various phases of the pilot training for the X-20 aircraft. The six-degrees-of-freedom static simulator used is described briefly, and its role in vehicle design and in pilot training is delineated. The type training which will be received in the flights of the X-15 research vehicle is outlined. Considered is the ground training given to the pilots so that they can better understand and evaluate the vehicle and its subsystems by learning the distinctive theories which are applied to the X-20 design; and so that they will be familiar with all significant support areas in order to perform the integrated aircrew-groundcrew tasks.

A64-11351
NEW TYPES OF CHROMOSOME REARRANGEMENTS IN TRADESCANTIA PALUDOSA MICROSPORES UNDER THE EFFECT OF CERTAIN FACTORS ASSOCIATED WITH SPACE FLIGHT [NOVYE TIPY PERESTROEK KHROMOSOM, VOZNIKAIUSHCHIE V MIKROSPORAKH TRADESCANTIA PALUDOSA POD DEISTVIEM FAKTOROV KOSMICHESKOGO POLETA NA KORABLIAKH SPUTNIKAKH].
N. L. Delone, P. R. Popovich, V. V. Antipov, and V. G. Vysotskii.
Akademiia Nauk SSSR, Doklady, vol. 152, Oct. 11, 1963, p. 1227-1230. 14 refs. In Russian.

Discussion of some new types of chromosome rearrangements in tradescantia paludosa microspores observed during the Vostok-4 (1962 Alpha Nu 1) experiment. The factors affecting the chromosome rearrangements do not include factors associated with the re-entry phase of the space flight. Presented are the qualitative and quantitative data on chromosome rearrangements obtained from an analysis of the metaphases, anaphases, telophases, and prophases. Presented is a schematic representation of the observed chromosome, chromatide, and spheric fragments. The observed chromosome rearrangements are seen to be caused by the dynamic factors of space flight. Therefore, a prolonged space flight should not contribute to an increase in the kinetic effect, provided that the flight trajectory will not pass through regions of high-intensity ionizing radiation.

A64-11388
LIFE IN THE UNIVERSE.
A. E. Slater.
Spaceflight, vol. 5, Nov. 1963, p. 198-201.

Brief discussion of factors associated with the existence of life elsewhere in the universe. Considered are the fundamental characteristics of living processes, which involve energy transfers; the origin and development of life; the activities of DNA and RNA molecules; and possible evidence of extraterrestrial life - e.g., changes of color on the Martian surface.

A64-11410
THE MAN AND TECHNOLOGY IN THE NUCLEAR AND SPACE AGE; Proceedings of the International Congress, Milan, Italy, Apr. 18-21, 1962.
Congress sponsored by Associazione Internazionale Uomo nello Spazio, Associazione Scienze Astronautiche, Institution of Nuclear Engineers, International Society for Capillary and Blood Research, and Arbeitsgemeinschaft beratender Ingenieure für den Luftschutz.
Rome, Associazione Internazionale Uomo nello Spazio, 1963. 807 p. $15.

Collection, in book form, of papers presented with the participation of 212 scientists from 24 different countries. The papers cover the subjects of astronautics, nuclear energy, space biology, and hematology. The papers are individually abstracted and indexed in this issue.

A64-11415
POSSIBILITIES FOR LIFE IN THE UNIVERSE.
J. Kleczek (High Altitude Observatory, Boulder, Colo.; Astronomical Institute Ondrejov, Czechoslovakia).
IN: THE MAN AND TECHNOLOGY IN THE NUCLEAR AND SPACE AGE; Proceedings of the International Congress, Milan, Italy, Apr. 18-21, 1962.
Rome, Associazione Internazionale Uomo nello Spazio, 1963, p. 135-138.

Brief consideration of the necessary conditions for the existence of life and of the possibility that these conditions are to be found in the universe. The interconnection of the evolution of stars and life is briefly discussed. Two criteria for life are noted to be the presence of such elements as carbon and oxygen; and sufficient amount of energy to form complex molecules of organic compounds and to sustain reactions in a living organism.

A64-11426
RECENT PROGRESS AND FUTURE PROBLEMS IN SPACE BIOMEDICINE.
Don Flickinger (USAF, Washington, D.C.).
IN: THE MAN AND TECHNOLOGY IN THE NUCLEAR AND SPACE AGE; Proceedings of the International Congress, Milan, Italy, Apr. 18-21, 1962.
Rome, Associazione Internazionale Uomo nello Spazio, 1963, p. 441-451.

General discussion of the present state-of-the-art of aerospace medical research. Definitions are presented for such terms as space biosciences, space biomedicine, and space biotechnology. The critical biomedical problems of space flight are briefly discussed, and the biomedical results obtained from space activities are reviewed, including those of the American and Soviet astronauts. A list is presented of biomedical requirements, both scientific and technological, which are critical to future programs.

A64-11427
BASIC REQUIREMENTS FOR THE PSYCHO-PHYSICAL SELECTION OF ASTRONAUTS [LINEAMENTI DI UNA SELEZIONE PSICOFISICA DEL COSMONAUTA].
T. Lomonaco (Ispettorato di Sanità Aeronautica, Rome, Italy).
IN: THE MAN AND TECHNOLOGY IN THE NUCLEAR AND SPACE AGE; Proceedings of the International Congress, Milan, Italy, Apr. 18-21, 1962.
Rome, Associazione Internazionale Uomo nello Spazio, 1963, p. 453-468. In Italian.

The criteria recommended for the psycho-physical selection of astronauts are as follows: (1) the astronaut must be free from all diseases or anatomic or functional imperfections that may incapacitate him from performing his mission; (2) he must be equipped with a neuro-psychic structure that will enable him to withstand the psycho-physical loads imposed by his space mission; and (3) he must have such aptitudes that will absolutely qualify him to perform the duties considered essential to the success of his mission and to his safety.

A64-11428
THE USE OF AN INERT GAS IN AN ARTIFICIAL ENVIRONMENT [DE L'UTILITE D'UN GAZ INERTE DANS UNE ATMOSPHERE ARTIFICIELLE].
M.-V. Strumza.

IN: THE MAN AND TECHNOLOGY IN THE NUCLEAR AND SPACE AGE; Proceedings of the International Congress, Milan, Italy, Apr. 18-21, 1962.
Rome, Associazione Internazionale Uomo nello Spazio, 1963, p. 487-492. 18 refs. In French.

Consideration of the type of atmosphere necessary to sustain man in space flight. It is seen that a homogeneous atmosphere of pure oxygen at a pressure between 380 and 160 mm Hg has the advantage of simplicity. However, for an interplanetary voyage or for an observation satellite rotating around the Earth for a long period of time, such an atmosphere would cause pulmonary disturbances. It is seen that the injection of a quantity of an inert gas into the oxygen atmosphere would prevent this condition. Helium is found to be preferable to nitrogen for this purpose. A technique is described for regenerating oxygen.

A64-11429

THE PERCEPTION OF MOTION, EQUILIBRIUM AND ORIENTATION UNDER CONDITIONS OF ZERO GRAVITY [LA PERCEZIONE DEL MOTO, L'EQUILIBRIO E L'ORIENTAMENTO IN CONDIZIONI DI GRAVITAZIONE NULLA].
R. Margaria and T. Gualtierotti.
IN: THE MAN AND TECHNOLOGY IN THE NUCLEAR AND SPACE AGE; Proceedings of the International Congress, Milan, Italy, Apr. 18-21, 1962.
Rome, Associazione Internazionale Uomo nello Spazio, 1963, p. 493-504. 27 refs. In Italian.

Brief description of the present knowledge and numerous gaps of the physiology of the organs of the perception of motion, equilibrium, and orientation in space, under conditions of weightlessness. The few tests performed on man and animals during the early stages of the space conquest point to the great fundamental necessity for well-planned and well-directed research in this field.

A64-11430

CONTRIBUTIONS AND STIMULATION BY AEROSPACE MEDICINE TO OTHER BRANCHES OF MEDICINE [BEITRÄGE UND ÄNREGUNGEN DER RAUMFAHRTMEDIZIN FÜR ANDERE GEBIETE DER MEDIZIN].
H. von Diringshofen.
IN: THE MAN AND TECHNOLOGY IN THE NUCLEAR AND SPACE AGE; Proceedings of the International Congress, Milan, Italy, Apr. 18-21, 1962.
Rome, Associazione Internazionale Uomo nello Spazio, 1963, p. 505-511. In German.

Brief consideration of the interrelations between aerospace medical research and the various branches of medicine in general. It is emphasized that the physiological and psychological investigations of aerospace medicine go beyond a narrow applicability to the aerospace sciences. This is illustrated by consideration of investigations of the effects of acceleration, weightlessness, radiations, and sensorial deprivations. Stresses encountered in space flight are related to clinical medicine, as are the problems of hygiene and nutrition.

A64-11431

RECENT CONSIDERATIONS AND EXPERIMENTS IN THE FIELD OF DECOMPRESSION SICKNESS.
R. Ruff (Deutsche Versuchsanstalt für Luft- und Raumfahrt e.V., Institut für Flugmedizin, Bad Godesberg, Germany).
IN: THE MAN AND TECHNOLOGY IN THE NUCLEAR AND SPACE AGE; Proceedings of the International Congress, Milan, Italy, Apr. 18-21, 1962.
Rome, Associazione Internazionale Uomo nello Spazio, 1963, p. 513-518.

Brief discussion of the causes of decompression sickness. The general physical principles of the absorption and expansion of a gas bubble are delineated. Experiments are reviewed which show that, in the lungs of an animal, excessive pressure which is less than the maximum respiratory pressure experienced in life can cause escape of air from the lungs into the vessels. These air embolisms, as small as they are, explain the fact that even during slow drops in pressure, gas bubbles can be formed in the blood and tissues, because the gas nuclei necessary for the formation of bubbles would be present at all times.

A64-11432

MAJOR BIOLOGICAL PROBLEMS IN THE ENVIRONMENT OF A SPACE VEHICLE, WITH SPECIAL REGARD TO AIR REGENERATION [I PRINCIPALI PROBLEMI BIOLOGICI DELL'AMBIENTE DI UN VEICOLO SPAZIALE, CON PARTICOLARE RIGUARDO ALLA RIGENERAZIONE DELL'ARIA].
A. Scano.
IN: THE MAN AND TECHNOLOGY IN THE NUCLEAR AND SPACE AGE; Proceedings of the International Congress, Milan, Italy, Apr. 18-21, 1962.
Rome, Associazione Internazionale Uomo nello Spazio, 1963, p. 519-533. 37 refs. In Italian, with summaries in English and French.

Summary of the available knowledge of major biological problems in the confined environment of a space vehicle. A critical analysis is made of the O_2 supply systems, CO_2 depuration, elimination of water vapor and other gaseous or volatile substances produced by man, the elimination and partial or total recovery of excreta, the problem of maintaining the pressure and composition of the air or mixture provided for respiration, and temperature maintenance. Considered is the closed-circuit system for regenerating respiratory gases, the latter being classified and discussed on the basis of available experimental findings; also discussed are their feasibility, as well as the problems of safety and absolute and relative performance in terms of time. It is concluded that O_2 supplies and chemical or physical absorption of CO_2 and other polluting substances are still to be preferred for space travels of a few days' duration, whereas, for longer-lasting space journeys (lasting weeks or even months) preference should go to closed-circuit systems of O_2 chemical and physico-chemical recuperation from expired CO_2 and waste water. Closed-circuit systems of biological regeneration, which would permit the simultaneous solution of a number of problems, are not yet sufficiently proven and stand in need of further study.

A64-11434

INVESTIGATIONS OF THE BEHAVIOR AND PERSONALITY OF CONFINED SUBJECTS [RICERCHE SUL COMPORTAMENTO E SULLA PERSONALITA IN SOGGETTI SOTTOPOSTI A CONFINAMENTO].
M. Strollo.
IN: THE MAN AND TECHNOLOGY IN THE NUCLEAR AND SPACE AGE; Proceedings of the International Congress, Milan, Italy, Apr. 18-21, 1962.
Rome, Associazione Internazionale Uomo nello Spazio, 1963, p. 577-591. In Italian, with summaries in English and French.

Investigation of the degree of individual tolerance to confinement, in a situation limiting both freedom of movement and normal work activity for a maximum period of 6 hours. It is stated that, by and large, the findings so far obtained evidence the interaction between tolerance to confinement and some dominant personality traits. Particular weight, in this respect, has been given to those aspects relevant to the "instinctive-emotional" and "practical-volitional" sphere -i.e., aspects which are not strictly related to the "mental-cultural" background. These data could be profitably relied upon in a preliminary evaluation of those prerequisites which are basically important for the selection of spacemen: this fact would prove the remarkable practical value of the "confinement" test as an additional tool by which to determine the candidate's fitness.

A64-11435

THE EFFECTS OF SUBGRAVITY AND THE METHODS FOR REPRODUCING IT ON THE GROUND AND IN FLIGHT [GLI EFFETTI DELLA SUBGRAVITA E I METODI PER RIPRODURLA A TERRA E IN VOLO].
G. Meineri.
IN: THE MAN AND TECHNOLOGY IN THE NUCLEAR AND SPACE AGE; Proceedings of the International Congress, Milan, Italy, Apr. 18-21, 1962.
Rome, Associazione Internazionale Uomo nello Spazio, 1963, p. 593-609. 34 refs. In Italian, with summaries in English and French.
[For abstract see Accession no. A63-21441 20-16]

A64-11437

ON SPACE HAEMATOLOGY [AUS DER WELTRAUMHAEMATOLOGIE].
A. Hittmair (Innsbruck, Universität, Medizinische Klinik, Innsbruck, Austria).
IN: THE MAN AND TECHNOLOGY IN THE NUCLEAR AND SPACE AGE; Proceedings of the International Congress, Milan, Italy, Apr. 18-21, 1962.
Rome, Associazione Internazionale Uomo nello Spazio, 1963, p. 633-637. In German.

General discussion of the effects of radiation encountered during space flight on the blood tissue. The discussion is in terms of the effects of radiation following the nuclear explosions in Hiroshima and Nagasaki. Considered are the occurrences of anemia and the changes in the general blood count of those who survived the bombings.

A64-11438
THE HAEMATOLOGIC EFFECT OF X-RAYS [HAEMATOLOGISCHE EINWIRKUNG VON RÖNTGENSTRAHLEN].
E. F. Scheller.
IN: THE MAN AND TECHNOLOGY IN THE NUCLEAR AND SPACE AGE; Proceedings of the International Congress, Milan, Italy, Apr. 18-21, 1962.
Rome, Associazione Internazionale Uomo nello Spazio, 1963, p. 651-664. In German.

Presentation of a new method for investigating the effects of X-rays on the cytoplasm of blood cells, using an ultramicroscope. In the method, stained blood smears are irradiated with increasing X-ray dosages, and successive photographs are taken. As an example of the application of the method, cells were studied which were irradiated in an energy range of 50 to 500 r. The effect of increased dosage on the cells is found to be dependent on the duration of exposure. Above 400 r direct damage to the microcellular particles of the blood cell cytoplasm is found. Experiments with hamsters demonstrate that a dosage of 500 r is lethal. Application of this method to studying the effects of radiation on astronauts is briefly discussed.

A64-11439
GENERAL STUDY OF PHARMACOLOGICAL RESEARCH [ETUDE GENERALE SUR LA RECHERCHE EN PHARMACOLOGIE].
H. Laborit (Marine Nationale, Centre d'Etudes et de Recherches Bio-Physiologiques, Laboratoire d'Entonologie, Paris, France).
IN: THE MAN AND TECHNOLOGY IN THE NUCLEAR AND SPACE AGE; Proceedings of the International Congress, Milan, Italy, Apr. 18-21, 1962.
Rome, Associazione Internazionale Uomo nello Spazio, 1963, p. 665-677. In French.

General discussion of the nature of pharmacological investigations and their applications to aerospace medical development. The nature of the Krebs cycle producing ATP in the body is briefly analyzed, and methods of changing or controlling the metabolic activities in man are discussed. The nature of psychopharmacology is delineated. The possibility of inducing artificial hibernation in man is briefly considered, and the application during space flight is discussed.

A64-11441
THE TENSION DISORDER KNOWN AS "ESSENTIAL HYPERTENSION."
Edmund Jacobson.
IN: THE MAN AND TECHNOLOGY IN THE NUCLEAR AND SPACE AGE; Proceedings of the International Congress, Milan, Italy, Apr. 18-21, 1962.
Rome, Associazione Internazionale Uomo nello Spazio, 1963, p. 685-692.

Brief consideration of the autogenous responses of pilots in the etiology of essential hypertension and of the influence of educative techniques in overcoming hypertensive response. An instrument, the integrating neurovoltmeter, is described briefly, by which tension states are measured in microvolts and plotted against time in minutes. Typical case studies and recordings using the instrument are presented and briefly analyzed.

A64-11442
THE PSYCHOLOGICAL PROBLEMS OF MANNED SPACEFLIGHT [DIE PSYCHOLOGISCHEN PROBLEME DER BEMANNTEN RAUMFAHRT].
Karl Durst.
IN: THE MAN AND TECHNOLOGY IN THE NUCLEAR AND SPACE AGE; Proceedings of the International Congress, Milan, Italy, Apr. 18-21, 1962.
Rome, Associazione Internazionale Uomo nello Spazio, 1963, p. 703-707. In German.

Brief discussion of the psychological experiences to be suffered during space flight, and of the possible ways of avoiding detrimental effects. Emphasized are problems associated with the isolation of an astronaut, or, if in a crew, of cooperation between the members. The type of training required to insure optimum crew functioning is discussed.

A64-11453
NEW CONCEPTS IN MONITORING OF ASTRONAUT BRAIN FUNCTION.
Roger M. Morrell (Jackson Memorial Hospital, Miami, Fla.).
(American Astronautical Society, Paper AAS 62-11.)
IN: ADVANCES IN THE ASTRONAUTICAL SCIENCES. VOL. XI. Edited by Horace Jacobs.
(American Astronautical Society, Annual Meeting, 8th, Washington, D. C., Jan. 16-18, 1962, Proceedings.)
North Hollywood, Calif., Western Periodicals Co., 1963, p. 221-225. 35 refs. Abridged.

Presentation of new findings in experimental and clinical neurophysiology, psychology, and instrumentation as they might bear on techniques in monitoring of astronaut brain function. It is concluded that some form of representation and analysis of electrical activity of the brain is necessary but that monitoring of certain psychophysiological or behavior variables will also be useful. Methods are sought which allow prediction of significant changes in brain function, rather than waiting for them to occur.

A64-11454
THE EFFECTS OF MAN ON THE WEIGHT OF A MANNED SPACE VEHICLE.
Herbert C. Sanders (Boeing Co., Aero-Space Div., Seattle, Wash.).
IN: ADVANCES IN THE ASTRONAUTICAL SCIENCES. VOL. XI. Edited by Horace Jacobs.
(American Astronautical Society, Annual Meeting, 8th, Washington, D. C., Jan. 16-18, 1962, Proceedings.)
North Hollywood, Calif., Western Periodicals Co., 1963, p. 227-270. 17 refs.

Discussion of some of the problems associated with the weight which must be added to a spacecraft to accommodate man. The required design considerations of a manned space vehicle are reviewed emphasizing those areas significantly affecting vehicle weight. A number of subsystems within the manned space vehicle needed to sustain the crew are discussed together with their weights. A weight comparison is made between two vehicles, manned and unmanned, which perform similar missions in space. Weight statements and configuration drawings are presented for both vehicles. Because the weight of the manned vehicle is approximately three times greater than the unmanned, it is necessary to design vehicle subsystems requiring a minimum crew and to provide - e.g., by simulation - a means for the crew to live in the smallest possible space without inhibiting performance efficiency.

A64-11456
PRACTICALITY AND THE SELECTION OF A SPACE CABIN ENVIRONMENT.
Donald L. Foster and Malcolm D. Ross (General Motors Corp., Defense Research Laboratories, Biological Sciences and Systems Dept., Warren, Mich.).
IN: ADVANCES IN THE ASTRONAUTICAL SCIENCES. VOL. XI. Edited by Horace Jacobs.
(American Astronautical Society, Annual Meeting, 8th, Washington, D. C., Jan. 16-18, 1962, Proceedings.)
North Hollywood, Calif., Western Periodicals Co., 1963, p. 299-333. 34 refs.

Critical examination of requirements for a life support system in a space environment. It is proposed that, insofar as possible, a normal sea-level environment be utilized for the early manned space operations. The practicality of modifying this natural environment for reasons of engineering expediency, or because of potential hazards associated with loss of system integrity, is questioned. It is suggested that the advantages of a sea-level environment are far more important than inadequate resolution of problems arising from anticipatory situations.

A64-11457
A CURRENT SURVEY OF SPACE RADIATION HAZARDS TO ASTRONAUTS.
Richard Madey (Republic Aviation Corp., Farmingdale, N.Y.).
IN: ADVANCES IN THE ASTRONAUTICAL SCIENCES. VOL. XI. Edited by Horace Jacobs.

(American Astronautical Society, Annual Meeting, 8th, Washington, D. C., Jan. 16-18, 1962, Proceedings.)
North Hollywood, Calif., Western Periodicals Co., 1963, p. 334-366. 79 refs.

Review of the composition, location, intensity, angular and energy distributions, temporal variations, and interrelationships of energetic particles in space. The description of the radiation environment emphasizes the background necessary to estimate and to protect man against the natural radiation hazards in space. Estimates of natural radiation hazards to manned space travel are given on the basis of the best measurements currently available. The uncertainty arising from extrapolation of spectral data is avoided by restriction of the calculations of the absorbed dose rates to the observed energy regions. Similarly, a restriction of calculations of the absorbed dose arising from solar flare protons to observed time intervals avoids the uncertainty resulting from extrapolation of the observed time dependence to unknown regions.

A64-11507
AGE DIFFERENCES IN CHOICE REACTION TIME AND CARDIOVASCULAR STATUS AMONG PILOTS.
Jacek Szafran (Lovelace Foundation, Dept. of Experimental Psychology, Albuquerque, N. M.).
Nature, vol. 200, Nov. 30, 1963, p. 904-906. 18 refs.
Grant No. RG-7646.

Review of investigations of pilot sensory-motor performance in relation to age, using commercial, military, and test pilots, ranging in age from the twenties to the sixties. The aim of the investigation is to gauge "spare channel capacity" by the introduction of subsidiary tasks and measurement of their effects on performance of the main task. A preliminary conclusion of the study is that, in a sample of individuals representing the profession of piloting aircraft, age differences in the rate of gain of information are less impressive than might be expected from other data in the field of gerontology.

A64-11726
MEDICAL SELECTION AND PSYCHO-PHYSIOLOGICAL TRAINING OF SPACE PILOTS [SELEZIONE MEDICA ED ADDESTRAMENTO PSICO-FISIOLOGICO PER PILOTI SPAZIALI].
Tomaso Lomonaco.
Missili, vol. 5, June 1963, p. 137-148. In Italian, with summary in English.

Discussion of the basic principles governing the selection and psycho-physiological conditioning of spacemen, in order to enable them to withstand the physiological conditions they will encounter during flight, which are at the borderline of human endurance. Medical selection and psycho-physiological training are the cornerstones, lacking which, man's conquest of space is impossible. Briefly surveyed are the psycho-physiological and physio-pathological findings in cosmonauts during recent orbital flights.

A64-11728
NEW PHYSIOLOGICAL AND PSYCHOLOGICAL PROBLEMS OF TRANSPORT AIRCRAFT CREWS [PROBLEME FIZIOLOGICE ŞI PSIHOLOGICE NOI ALE ECHIPAJELOR DIN AVIAŢIA DE TRANSPORT].
Matei I. Oroveanu.
Revista Transporturilor, vol. 10, Jan. 1963, p. 25-32. 12 refs. In Rumanian.

Brief review of the factors bearing on the selection and behavior in service of flying personnel assigned to supersonic and hypersonic transport aircraft.

A64-11731
PERCEPTIVE HEARING LOSS IN AIRMEN - ACOUSTIC TRAUMA IN FLYING AND AERONAUTICAL INDUSTRY PERSONNEL [HIPOACUSIAS PERCEPTIVAS DEL AVIADOR - EL TRAUMA ACUSTICO DEL PERSONAL VOLANTE Y DE LAS INDUSTRIAS AERONAUTICAS].
Pedro Gomez Cabezas.
Revista de Aeronáutica y Astronáutica, vol. 23, Oct. 1963, p. 843-850. In Spanish.

Discussion of perceptive deafness caused by aeronautical noise trauma. Considered are the characteristics of aeronautical noise, its mode of action and effects, the histopathology of the injuries caused by noise, and the noise trauma in aeronautical industry and among flying personnel. The results of a survey of 958 case histories of deafness observed in pilots, mechanics, and radiomen are presented. The necessity of creating a protective system for the retirement of personnel afflicted with aeronautical deafness is pointed out.

A64-11761
LINEAR PROGRAMMING FOR LIFE SUPPORT OPTIMIZATION.
Neil W. O'Rourke (General Dynamics Corp., General Dynamics/Astronautics, Space Station Program, San Diego, Calif.).
AIAA Journal, vol. 1, Dec. 1963, p. 2852, 2853.

Application of linear programming to optimize the air, water, and thermal control for a one man-day life-support system based on the storage of supplies and wastes. Two approaches to solving the linear programming methods are considered - namely, a graphical procedure, and one involving the use of "tableaux." It is assumed that water vapor is condensed and re-used and that the daily water requirement is reduced accordingly.

A64-11918
NUCLEAR SPACE PROJECTS FACE UP TO SAFETY PROBLEMS.
Harold L. Davis.
Nucleonics, vol. 21, Dec. 1963, p. 41-45. 12 refs.

Discussion of the problem of overcoming the potential hazards connected with launching nuclear powered systems into space. A realistic appraisal of the hazards establishes needs for engineered safeguards that will require design ingenuity and will complicate further the nuclear systems being readied for launch. It is stated that a separate review of safety considerations must be made fresh for each new device which is planned to be put into space, with intra-agency participation of all relevant disciplines including physicists, aerodynamicists, aeronautical engineers, metallurgists, electronic engineers, meteorologists, oceanographers, and biomedics.

A64-12142
DISQUALIFYING OCULAR DEFECTS IN AIR FORCE RECRUITS.
James L. Curtis (USAF, Systems Command, Aerospace Medical Div., Lackland AFB, Tex.).
Military Medicine, vol. 128, Dec. 1963, p. 1196-1198.

Brief discussion of the types of ocular defects which disqualified Air Force recruits during the 18 month period from January 1, 1961 through June 30, 1962. Observations of the conditions and guidelines for their earlier identification are discussed for heterotropia, cataracts, amblyopia, aphakia, severe myopia, chorioretinitis, nystagmus with amblyopia, macular degeneration, retinal detachment, and unilateral blindness.

A64-12379
MAXIMUM RANGE OF PHYSIOLOGICAL TOLERANCE UNDER SOME CONDITIONS OF MODERN AND SPACE FLIGHT [GLI ESTREMI LIMITI DI TOLLERANZA FISIOLOGICA IN ALCUNE CONDIZIONI DEL VOLO MODERNO E DEL VOLO SPAZIALE].
T. Lomonaco (Ispettorato di Sanitá Aeronautica, Rome, Italy). (Centro di Studi e Ricerche di Medicina Aeronautica, Conference, Mar. 23, 1963.)
Rivista di Medicina Aeronautica e Spaziale, vol. 26, July-Sept. 1963, p. 383-403. In Italian.

Review of the physiological stresses encountered in high-performance aircraft and space vehicles. The importance of establishing the range of physiological tolerance is emphasized. Anoxia and related conditions (acapnia, overbreathing, pressure breathing, hypercapnia), low barometric pressure, wide temperature changes, accelerative and decelerative forces, and weightlessness are considered, together with their symptoms and range of tolerance. Aeromedical investigations for the purpose of studying and improving the physiological tolerance to the stresses considered are outlined.

A64-12380
VESTIBULAR FUNCTION AND FLIGHT BEHAVIOR OF THE PILOT TRAINEE [LA FUNZIONE VESTIBOLARE ED IL COMPORTAMENTO IN VOLO DELL' ALLIEVO PILOTA].
P. Castagliuolo and C. Koch (Istituto Medico-Legale per l'Aeronautica Militare "G. Gradenigo," Naples, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 26, July-Sept. 1963, p. 454-463. In Italian.

Presentation of results of a comparison of vestibular test responses, particularly the electronystamographic ones, with pilot cadet behavior during his early flight training. The investigation, made on 940 subjects, shows a close relationship between vestibular test results and behavior in the various stages of flying.

A64-12381
SOME ASPECTS OF HEARING PROTECTION AGAINST NOISE IN AIR FORCE MAINTENANCE PERSONNEL [SU ALCUNI ASPETTI DELLA PROTEZIONE ACUSTICA DEL PERSONALE SPECIALISTA DELL'AERONAUTICA CONTRO I RUMORI].
R. Caporale (Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 26, July-Sept. 1963, p. 464-477. 13 refs. In Italian.

Description of a method for the determination of the sound pressure level by means of technical data on noise source and sound transmission properties in piston and jet aircraft. The phonometric technique of sound pressure level measurement by means of a phonometer and sound analyzer is described, and the importance of environmental factors in performing phonometry is emphasized. Presented are data obtained in sound pressure level measurement, as well as data on the sound spectrum of an F-104 aircraft. Devices for individual noise protection are reviewed, together with some methods for appraising the protective performance of ear muffs, ear plugs, and of noise-protection helmets.

A64-12417
HUMAN INFORMATION PROCESSING.
Murray Eden (Massachusetts Institute of Technology, Dept. of Electrical Engineering and Research Laboratory of Electronics, Cambridge, Mass.).
IN: REPORT ON PROGRESS IN INFORMATION THEORY IN THE U.S.A. - 1960-1963.
Edited by L. A. Zadeh.
IEEE Transactions on Information Theory, vol. IT-9, Oct. 1963, p. 253-256.
Army-Navy-NIH-supported research; Grant No. MH-0473-7-03; NSF Grant No. G-16526.

Survey of psychological and neurophysiological research relevant to the study of human behavior as an information transfer process. Considered are the transmission properties of nervous tissue, the relation between "simple" stimuli to a sense organ and the nervous electrical activity which follows, statistical analyses of neural events, direct explorations of the nervous system using microprobes, effects of interrupting sensory information inputs, language as a human information-handling system, theories of syntactic analysis, and pattern recognition.

A64-12899
PILOT CONTROL OF THE X-20/TITAN III BOOST PROFILE.
James W. Wood (USAF, Systems Command, Flight Test Center, Manned Spacecraft Section, Edwards AFB, Calif.).
IN: SOCIETY OF EXPERIMENTAL TEST PILOTS, SEVENTH ANNUAL SYMPOSIUM, BEVERLY HILLS, CALIF., SEPT. 27, 28, 1963, PROCEEDINGS.
Society of Experimental Test Pilots, 1963, p. 165-175.

Study of the feasibility of pilot control of the X-20/Titan III booster. The equipment and procedure used in the simulation tests are described. Figures show the pilot in the booster loop (PIBOL), simulation description, PIBOL boost constraints, boost primary control regions, present X-20 cockpit, burnout display guidance systems studied, a comparison between the pilots and the automatic system for Stage 0 guidance, and the final configuration for the PIBOL guidance and control integration. As a result of the simulation, a recommendation has been made that pilot control of the boost phase be incorporated with the manned X-20/Titan III missions as a backup capability with a further objective of proving this concept during the X-20/Titan III program by programming flights using pilot control from liftoff.

A64-12928
THE DEPENDENCE OF THE PHOTOPUPIL RESPONSE ON FLASH DURATION AND INTENSITY.
Mathew Alpern, Donald W. McCready, Jr., and Lloyd Barr (Michigan, University, Depts. of Ophthalmology and Physiology, Ann Arbor, Mich.).
Journal of General Physiology, vol. 47, Nov. 1963, p. 265-278. 22 refs.
U.S. Public Health Service Grant No. B 1578; NSF Grant No. 10045.

The changes in pupil size were recorded by infrared pupillographic methods in response to light flashes of different durations and intensities for a 13 degree 34 minute centrally fixated circular field. For such stimuli, the threshold intensities for (rod) vision and for the pupil response were found to be about the same. The response amplitudes were related to the logarithm of the flash energy, the reciprocity law remaining valid up to about one-half second. The curve relating flash energy and pupil response was clearly divisible into two parts commensurate with the duplex character of the human retina. A similar dichotomy appears in curves relating response amplitude to response latency. Since the pupil response is determined by total flash energy, intense long flashes produce larger pupil responses than shorter (and perceptually brighter) ones of the same intensity.

A64-12932
MAN AGAINST SPACE.
David Kerslake (RAF Institute of Aviation Medicine, Farnborough, Hants., England).
Discovery, vol. 24, Oct. 1963, p. 30-35.

Various problems which man must solve if space exploration is to be successful are discussed. Psychological problems (e.g., isolation), weightlessness, artificial gravity, and radiation are included. The provision of an acceptable environment to be carried and used by man in otherwise hostile circumstances is also discussed briefly.

A64-12933
TRANSFER OF TRAINING FROM A SIMULATED TO A REAL CONTROL SITUATION.
M. Hammerton (Medical Research Council, Applied Psychology Research Unit, Cambridge, England).
Journal of Experimental Psychology, vol. 66, Nov. 1963, p. 450-453.

This reports an examination of transfer of training when tasks differed only in display appearance; angular control/display relationships were identical. An experimental group of 11 unskilled subjects were trained on a cathode-ray tube to control the movements of a trolley moving along a miniature railway; a control group of 12 subjects practiced on the real trolley ab initio. Initial transfer was poor (-17% by one measure), the performance decrement being pronounced ($p < .1\%$). Saving, however, was considerable (> 70%). Conclusions are: (a) motor response is not immediately transferred, despite identical dynamics and display kinematics; (b) recovery of skill is very rapid; and (c) these findings may be attributed to stimulus compounding.

A64-12934
EFFECT OF INTERPOLATED MONOCULAR AND BINOCULAR VISUAL PURSUIT REACTION TIME ACTIVITY ON REMINISCENCE IN PURSUIT ROTOR PERFORMANCE.
M. Humphries and J. McIntyre (Alberta, University, Calgary, Alberta, Canada).
Perceptual and Motor Skills, vol. 17, Oct. 1963, p. 333, 334.

Using different types of simple serial reaction time tasks interpolated between two sessions of massed practice on the pursuit rotor, an attempt was made to determine whether temporary work decrement could be attributed to fatigue in the peripheral mechanisms of vision. The results suggest that, if there is a locus of temporary work decrement, it is not in the visual system.

A64-12935
AN ATTEMPT TO FIND A LOCUS OF TEMPORARY WORK DECREMENT IN PURSUIT ROTOR PERFORMANCE.
M. Humphries and J. McIntyre (Alberta, University, Calgary, Alberta, Canada).

Perceptual and Motor Skills, vol. 17, Oct. 1963, p. 397, 398.

Three groups were engaged in one of three types of activity interpolated between two sessions of massed practice on the pursuit rotor. The interpolated tasks were visual pursuit reaction time, blindfolded rotary arm movement, and rest. The interpolated tasks were selected to determine whether the recovery from temporary work decrement could be blocked by continued visual or motor activity. Since all groups recovered equally from work decrement, it was concluded that the locus cannot be in the peripheral motor or visual systems.

A64-12936

PAIN SENSITIVITY AS A MEASURE OF PERCEPTUAL DEPRIVATION TOLERANCE.

John P. Zubek (Manitoba, University, Winnipeg, Manitoba, Canada).

Perceptual and Motor Skills, vol. 17, Oct. 1963, p. 641, 642.

The pain sensitivity of 24 subjects who successfully endured a week of perceptual deprivation was not significantly different from that of 12 subjects who terminated isolation after only a few days. Findings are discussed in terms of prior evidence.

A64-12937

EFFECTS OF HIGH ENVIRONMENTAL TEMPERATURE ON SWEATING AND SKIN RESISTANCE.

R. C. Wilcott (Western Reserve University, Cleveland, Ohio).

Journal of Comparative and Physiological Psychology, vol. 56, Aug. 1963, p. 778-782.

National Institute of Mental Health Research Grant No. MY4848.

Contrary to observations of Kuno and Neuman, results of this study show that, while a rise in environmental temperature has greater effects on chest sweating and resistance basal levels than at the palm, effects at the palm are of considerable magnitude. Both areas show thermoregulatory sweating. Because of the complex anatomical structures in the hand, cooling of the hand by thermoregulatory sweating would be expected to be nearly as important as cooling of other body areas. In addition, contrary to Kuno's results, stimuli administered prior to elevation of room temperature evoked increased sweating and reduced skin resistance at both palm and chest, indicating that with some subjects arousal sweating can occur in both areas at normal room temperature.

A64-12938

STEROID AND CATECHOLAMINE STUDIES ON PILOTS DURING PROLONGED EXPERIMENTS IN A SPACE CABIN SIMULATOR.

F. Ulvedal, W. R. Smith, and B. E. Welch (USAF, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Dept. of Bioastronautics, Brooks AFB, Tex.).

Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1257-1263. 13 refs.

Urinary excretion of 17-hydroxycorticosteroids, corticosterone-like hormones, and catecholamines (epinephrine and norepinephrine) has been investigated on pilots during prolonged experiments in a two-man space cabin simulator. The experimental profiles were: (1) two 17-day experiments at ground level; (2) two 14-day experiments at 27,000 ft; and (3) four experiments at 33,500 ft lasting 17 days. In the latter two groups the atmosphere was essentially 100% O_2. The hormone parameters indicate that conditions imposed by the experimental procedures were no more stressful to the subjects than undergoing extensive medical examinations, as observed from pre- and postexperimental values. The only significant trend was the continuous linear increase in the excretion of corticosterone-like hormones. There were borderline indications that the excretion of 17-hydroxycorticosteroids and norepinephrine were altitude dependent. Extraordinary occurrences in the simulator were correlated with increased catecholamine and steroid excretion. The correlation coefficients and the analyses of variance for the four hormone parameters were calculated and discussed.

A64-12939

CONTINUOUS AND QUANTAL THEORIES OF SENSORY DISCRIMINATION.

C. J. Duncan and P. M. Sheppard (Liverpool, University, Dept. of Zoology and Dept. of Genetics, Liverpool, England).

Royal Society (London), Proceedings, Series B, vol. 158, Oct. 22, 1963, p. 343-363. 15 refs.

The following two major and opposing theories of sensory discrimination are investigated: (1) that the systems responsible are sensitive to changes in the magnitude of the stimulus, however small, but that there is interference with the signal because of noise in the system; and (2) that sensation is stepwise or quantal in character, because changes in the stimulus below a certain magnitude are not detected. Using experimental and mathematical models it was (a) confirmed that in a "noisy" situation very small changes in the stimulus are appreciated on a statistical basis; and (b) demonstrated that, as predicted theoretically, the appearance of quanta can be introduced into the experimental results by the use of techniques which permit information loss. It was further shown that, in earlier work purporting to demonstrate the existence of sensory quanta, the technique of experiment has always been such as to introduce the information loss necessary to create artificial quanta. It is concluded that there is, at present, no evidence for the existence of a genuine sensory quantum. The relevance of these findings to evolutionary theory is discussed briefly.

A64-12941

ANALYSIS OF FORCE AND ACCELERATION DATA FROM HUMAN IMPACT EXPERIMENTS.

Edmuns B. Weis, Jr., Neville P. Clarke (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio), and Paul J. Martin (Technology, Inc., Dayton, Ohio).

IN: Annual Conference on Engineering in Medicine and Biology, 16th, Baltimore, Md., Nov. 18-20, 1963, Proceedings, Volume 5. Meeting sponsored by the Institute of Electrical and Electronics Engineers, and Instrument Society of America.
New York, Institute of Electrical and Electronics Engineers, 1963, p. 80, 81. Abridged.

This is a study of the human response to acceleration for the purpose of providing design criteria for aerospace operations. The mechanical driving point impedance of the body has been measured in 42 tests conducted on a free-fall facility. Results show that it is desirable to protect the human from the high-frequency component of the acceleration environment and from the 7-8 cps components.

A64-12942

TECHNICS OF REGIONAL RHEOGRAPHY FOR MONITORING THE CIRCULATION IN THE BRAIN AND IN THE EYE.

Stanley A. Radvan-Ziemnowics (Georgetown University Medical Center, Neurological Research Laboratory, Washington, D.C.).

IN: Annual Conference on Engineering in Medicine and Biology, 16th, Baltimore, Md., Nov. 18-20, 1963, Proceedings, Volume 5. Meeting sponsored by the Institute of Electrical and Electronics Engineers, and Instrument Society of America.
New York, Institute of Electrical and Electronics Engineers, 1963, p. 96, 97. Abridged.
NASA-supported research.

The so-called regional rheoencephalography and rheoophthalmography is described and proposed in order to localize more precisely the cerebral and/or ocular circulatory disturbances. These new methods are useful for studying the dynamics of cerebral and ocular blood supply and can be helpful in the diagnosis and prognosis especially in more limited circulatory disturbances.

A64-12944

AFTEREFFECT OF SLEEP DEPRIVATION.

Robert T. Wilkinson (Medical Research Council, Applied Psychology Research Unit, Cambridge, England).

Journal of Experimental Psychology, vol. 66, Nov. 1963, p. 439-442. 16 refs.

Twenty-four enlisted men stayed awake one night, slept normally the next, and on the following day carried out either a 1-hr vigilance task (Experiment I, 12 subjects) or a 30-min test of serial reaction (Experiment II, 12 subjects). In each case performance fell below control levels (normal sleep on both nights). Subjects were their own controls in a balanced design. This "aftereffect" of sleep deprivation was greatest in the morning and, unlike the direct effect

of sleep deprivation, was apparent at the start of the test and increased little with time. This suggests disturbed diurnal rhythm as the cause rather than failure to make up for lost sleep.

A64-12973
UNUSUAL ENVIRONMENTS AND HUMAN BEHAVIOR - PHYSIOLOGICAL AND PSYCHOLOGICAL PROBLEMS OF MAN IN SPACE.
Edited by Neal M. Burns (Minneapolis-Honeywell Regulator Co., Aeronautical Div., Space and Armaments Systems, Minneapolis, Minn.), Randall M. Chambers (U. S. Naval Air Development Center, Aviation Medical Acceleration Laboratory, Johnsville, Pa.), and Edwin Hendler (U. S. Naval Air Equipment Center, Air Crew Equipment Laboratory, Philadelphia, Pa.).
New York, Macmillan Co., Free Press of Glencoe, 1963. 438 p. $9.95.

Discussion of the biological problems of man in space and the research and ideas associated with the environmental stresses of space flight. There are twelve chapters: the first six are concerned with the general problem of the response of the human organism to unusual environmental conditions; the second six chapters deal with specific problem areas. The aim is to provide a useful review, as well as a clear introduction to the techniques of the biological and behavioral sciences. Examined are the physiological measures and indices of stress; a mathematical model of stress is developed. Treated in some detail are problems with a long research history, such as isolation and confinement, marine submergence, acceleration, and temperature, with emphasis on the effects of environmental stress upon performance. Included are four problems of major interest: weightlessness, high-altitude experience, vibration, and radiation. The continuity of current research with earlier investigation is emphasized throughout. Discussed are the future trends of manned space-flight programs, the advances to be expected, and the new problems that may arise. Experiments and observations are suggested for a complete synthesis of research. The chapters are individually abstracted and indexed in this issue.

A64-12974
THE PHYSIOLOGICAL EFFECTS OF UNUSUAL ENVIRONMENTS.
Richard W. Lawton (General Electric Co., Space Technology Center Valley Forge, Pa.).
IN: UNUSUAL ENVIRONMENTS AND HUMAN BEHAVIOR - PHYSIOLOGICAL AND PSYCHOLOGICAL PROBLEMS OF MAN IN SPACE.
Edited by Neal M. Burns, Randall M. Chambers, and Edwin Hendler
New York, Macmillan Co., Free Press of Glencoe, 1963, p. 3-31. 34 refs.

Study of the effect of stress states upon the regulatory activity of the human organism. Analyzed are the nature and the effects of the cardiovascular, thermal, visual, and respiratory stresses.

A64-12975
PSYCHOLOGICAL AND PSYCHOPHYSIOLOGICAL INDICES OF STRESS.
George E. Ruff (Pennsylvania, University, School of Medicine, Philadelphia, Pa.).
IN: UNUSUAL ENVIRONMENTS AND HUMAN BEHAVIOR - PHYSIOLOGICAL AND PSYCHOLOGICAL PROBLEMS OF MAN IN SPACE.
Edited by Neal M. Burns, Randall M. Chambers, and Edwin Hendler.
New York, Macmillan Co., Free Press of Glencoe, 1963, p. 33-59. 76 refs.

Development of a stress model according to which the aspects of behavior in unusual environments are treated in terms of the effects of changes in energy inputs, information inputs, and the meaning of information inputs. Each of these three parameters is discussed. The model permits treatment of a state of stress either by inputs to a system or by outputs from a system. Examined are the psychological measures that, in the case of input definitions, are used to determine the relationship of the physical stressor to the performance of a particular task. Specifically examined are perceptual, motor, perceptual-motor, and cognitive tests, and tests of emotional response. Also examined are the psychophysiological measures of the activity of the sympathetic nervous system, the pituitary-adrenal function, and the activity of the cerebral cortex.

A64-12976
COMPUTER SIMULATION OF MAN-MACHINE SYSTEMS.
Arthur I. Siegel and J. J. Wolf (Applied Psychological Services, Wayne, Pa.).
IN: UNUSUAL ENVIRONMENTS AND HUMAN BEHAVIOR - PHYSIOLOGICAL AND PSYCHOLOGICAL PROBLEMS OF MAN IN SPACE.
Edited by Neal M. Burns, Randall M. Chambers, and Edwin Hendler.
New York, Macmillan Co., Free Press of Glencoe, 1963, p. 61-86.
Contract No. Nonr 2279(00).

Development of a model in which the human operator in a man-machine system can be simulated to include such factors as operator stress and urgency conditions, and the point beyond which the human operator would be expected to break down. The purpose of the model is to provide quantitative answers to the following questions: (1) Given a specific machine design, can an average two-man team be expected to complete successfully all actions required for task performance within the time limits given for each operator? (2) How does task or system success probability change for slower or faster teams and longer or shorter periods of allotted time? (3) What is the magnitude of the relative stress placed on each operator during performance, and in which portions of the task are the operators overloaded or underloaded? (4) What is the frequency distribution of each operator's failures as a function of various relative stress tolerances and team member speeds? Based on a combination of techniques rather than transfer functions and probability theory, the model also yields required interpretive data such as peak and terminal stress levels and the subtask on which they occur, the identification of noncritical subtasks skipped by an operator because of his high stress, and the identification of waiting or idle times.

A64-12977
PSYCHOLOGICAL PROBLEMS OF PROLONGED MARINE SUBMERGENCE.
Benjamin B. Weybrew (U. S. Naval Medical Research Laboratory, New London, Conn.).
IN: UNUSUAL ENVIRONMENTS AND HUMAN BEHAVIOR - PHYSIOLOGICAL AND PSYCHOLOGICAL PROBLEMS OF MAN IN SPACE.
Edited by Neal M. Burns, Randall M. Chambers, and Edwin Hendler.
New York, Macmillan Co., Free Press of Glencoe, 1963, p. 87-125. 91 refs.

Discussion of problems of submarine psychology, concerning the selection and training of personnel, the effects of a spatially restricted environment, the effects of living in a circumscribed psychosocial situation, and the noxious effects of continuously breathing a completely self-contained regenerated atmosphere. Identified and outlined are the important areas of submarine psychology which have emerged since the introduction of atomic submarines. A theoretical model is developed from which hypotheses are derived for use as guide lines for research in the field of applied psychology. Specific attention is given to the following: the concept of stress as it applies to the closed ecology of the submarine; the physical, sensory, perceptual, social, and human engineering aspects of the submarine environment; behavioral changes during prolonged submergence; and assessment of the adjustment potentiality of personnel for extended submerged duty. Trends in future research in submarine psychology are noted.

A64-12978
PSYCHOPHYSIOLOGY OF HIGH-ALTITUDE EXPERIENCE.
David G. Simons, Don E. Flinn, and Bryce Hartman (USAF, School of Aerospace Medicine, Brooks AFB, Tex.).
IN: UNUSUAL ENVIRONMENTS AND HUMAN BEHAVIOR - PHYSIOLOGICAL AND PSYCHOLOGICAL PROBLEMS OF MAN IN SPACE.
Edited by Neal M. Burns, Randall M. Chambers, and Edwin Hendler.
New York, Macmillan Co., Free Press of Glencoe, 1963, p. 127-164. 30 refs.

Discussion of high-altitude stress as experienced by astronauts in real or simulated flight conditions. High-altitude stress experience is divided into three categories: (1) acute psychophysiological stress, which may occur in response to anticipated or real hazards of flight, (2) acute fatigue stress, occurring in 24-48-hr missions that require constant vigilance and task performance, and (3) task commitment stress, characteristic of the experience of an individual committed to a prolonged, highly prescribed activity regime in a restricted environment. These three factors are discussed in connection with psychophysiological concepts. Directions for future research are proposed.

A64-12979
ISOLATION AND SENSORY DEPRIVATION.
Neal M. Burns (Minneapolis-Honeywell Regulator Co., Aeronautical Div., Space and Armaments Systems, Minneapolis, Minn.) and Douglas Kimura (United Aircraft Corp., Corporate Systems Center, Farmington, Conn.).
IN: UNUSUAL ENVIRONMENTS AND HUMAN BEHAVIOR - PHYSIOLOGICAL AND PSYCHOLOGICAL PROBLEMS OF MAN IN SPACE.
Edited by Neal M. Burns, Randall M. Chambers, and Edwin Hendler. New York, Macmillan Co., Free Press of Glencoe, 1963, p. 167-192. 94 refs.

Review of the available data obtained from confinement and isolation studies. Animal experimentation, studies on humans, and personal reports on the effects of confinement, isolation, and extreme hazard are discussed.

A64-12980
OPERATOR PERFORMANCE IN ACCELERATION ENVIRONMENTS.
Randall M. Chambers (U. S. Naval Air Development Center, Aviation Medical Acceleration Laboratory, Johnsville, Pa.).
IN: UNUSUAL ENVIRONMENTS AND HUMAN BEHAVIOR - PHYSIOLOGICAL AND PSYCHOLOGICAL PROBLEMS OF MAN IN SPACE.
Edited by Neal M. Burns, Randall M. Chambers, and Edwin Hendler. New York, Macmillan Co., Free Press of Glencoe, 1963, p. 193-319, 237 refs.

Discussion of the effect of acceleration stress upon human behavior and physiology. Examined are the basic types of acceleration environments; the physiological tolerance to acceleration stress, including some maximum acceleration exposures endured by human subjects; and the different ways in which acceleration affects human performance, with particular reference to sensation and perception (such as vision; the vestibular, kinesthetic, and proprioceptive senses; hearing; time perception; and acceleration-induced disorientation and illusions). Studied are the effects of acceleration on simple and complex psychomotor performance, mental abilities, personality, emotional behavior, and motivation. Discussed are acceleration training procedures and the study of psychological, psychomotor, cognitive, and emotional problems by means of simulation techniques.

A64-12981
TEMPERATURE EFFECTS ON OPERATOR PERFORMANCE.
Edwin Hendler (U. S. Naval Air Equipment Center, Air Crew Equipment Laboratory, Philadelphia, Pa.).
IN: UNUSUAL ENVIRONMENTS AND HUMAN BEHAVIOR - PHYSIOLOGICAL AND PSYCHOLOGICAL PROBLEMS OF MAN IN SPACE.
Edited by Neal M. Burns, Randall M. Chambers, and Edwin Hendler. New York, Macmillan Co., Free Press of Glencoe, 1963, p. 321-352. 60 refs.

Review of the physical concepts of temperature, temperature regulation in man, and the effects of temperature upon human performance. The physical and physiological factors of temperature regulation are examined, and their individual effects upon the performance of an operator are demonstrated by several examples.

A64-12982
WEIGHTLESSNESS.
J. P. Loftus, Jr. and Lois R. Hammer (USAF, Systems Command, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio).
IN: UNUSUAL ENVIRONMENTS AND HUMAN BEHAVIOR - PHYSIOLOGICAL AND PSYCHOLOGICAL PROBLEMS OF MAN IN SPACE.
Edited by Neal M. Burns, Randall M. Chambers, and Edwin Hendler. New York, Macmillan Co., Free Press of Glencoe, 1963, p. 353-377. 51 refs.

Discussion of the nature of weightlessness and the conditions associated with it. The experimental devices and simulation techniques currently employed are evaluated in terms of their practicality and the limits they place upon extrapolations from data obtained through their use. Available data are reviewed and discussed with respect to orientation, psychomotor performance, and physiological function.

A64-12983
VIBRATION.
Aaron B. Nadel (General Electric Corp., TEMPO, Santa Barbara, Calif.).
IN: UNUSUAL ENVIRONMENTS AND HUMAN BEHAVIOR - PHYSIOLOGICAL AND PSYCHOLOGICAL PROBLEMS OF MAN IN SPACE.
Edited by Neal M. Burns, Randall M. Chambers, and Edwin Hendler. New York, Macmillan Co., Free Press of Glencoe, 1963, p. 379-394. 25 refs.

Discussion of the effects of vibratory forces upon biological systems, with particular reference to the human organism. Examined are the vibratory forces transmitted by the vehicle in which the man is contained, and those that may impinge upon the human body (or parts of it) via air transmission, producing resonant responses in specific parts of the body. Descriptions are given of animal and human studies designed to establish human tolerance limits to mechanical vibration.

A64-12984
THE EFFECTS OF RADIATION ON INTEGRATED BEHAVIOR.
Paul R. Tobias (Aerospace Corp., Los Angeles, Calif.).
IN: UNUSUAL ENVIRONMENTS AND HUMAN BEHAVIOR - PHYSIOLOGICAL AND PSYCHOLOGICAL PROBLEMS OF MAN IN SPACE.
Edited by Neal M. Burns, Randall M. Chambers, and Edwin Hendler. New York, Macmillan Co., Free Press of Glencoe, 1963, p. 395-417. 32 refs.

Review of recent results of radiation research, with reference to the effects of low-level radiation upon integrated human behavior. Examined are problems involved in the measurement of various types of radiation, problems concerning the radiation environment of man in space, and the primary biological effects of radiation. A discussion is given of the effects of radiation on performance, and of the specific effects of sublethal and very small doses of radiation upon the organ systems and behavior.

A64-12985
THE DECADE AHEAD.
Neal M. Burns (Minneapolis-Honeywell Regulator Co., Aeronautical Div., Space and Armaments Systems, Minneapolis, Minn.), Randall M. Chambers (U. S. Naval Air Development Center, Aviation Medical Acceleration Laboratory, Johnsville, Pa.), and Edwin Hendler (U. S. Naval Air Equipment Center, Air Crew Equipment Laboratory, Philadelphia, Pa.).
IN: UNUSUAL ENVIRONMENTS AND HUMAN BEHAVIOR - PHYSIOLOGICAL AND PSYCHOLOGICAL PROBLEMS OF MAN IN SPACE.
Edited by Neal M. Burns, Randall M. Chambers, and Edwin Hendler. New York, Macmillan Co., Free Press of Glencoe, 1963, p. 419-426.

Discussion of the directions space research should take during the next decade, in the light of our current level of understanding of the problems to be encountered. Examined are the approaches, based on simulation and computers, to the problem of establishing tolerance criteria, and developing engineering methods to provide normal functioning of the human operator in extreme environments. Some aspects of the methodological problem are reviewed. Also discussed are approaches to the planning of missions, and the need for basic scientific research is indicated.

A64-12986
BIOASTRONAUTIC RESEARCH IN THE AIR FORCE.
William C. Marett (USAF, Office of the Surgeon General, Washington, D.C.).
(American Medical Association, Annual Meeting, 11th, Chicago, Ill., June 24-28, 1962.)
Archives of Environmental Health, vol. 7, Oct. 1963, p. 448-452.

The word "bioastronautics" is defined, and the team concept implied in this research is discussed. Recent organizational consolidation of USAF research facilities is explained, and the numbers and kinds of people involved and the amount of money invested in Air Force bioastronautic research are enumerated. The broad categories of life science research are listed and the principal research facilities described. Finally, examples of specific areas of research being performed at several of these facilities are discussed.

A64-12987
EFFECTS OF MILD CARBON MONOXIDE INTOXICATION.
John H. Schulte (Department of the Navy, Bureau of Medicine and Surgery, Washington, D. C.).
Archives of Environmental Health, vol. 7, Nov. 1963, p. 524-530. 26 refs.

The effects of exposures for varying lengths of time to an atmosphere containing 100 parts per million of carbon monoxide were measured in a group of 49 healthy men between 25 and 55 years of age. This exposure produced levels of carboxyhemoglobin in the blood of the subjects ranging from 0 to 20. 4%. Impairment of function due to exposure to carbon monoxide occurred earliest in the higher centers of the central nervous system in that area (or areas) of the brain which controls some of the cognitive and psychomotor abilities. Impairment is detectable at levels of carboxyhemoglobin below 5%, and the degree of impairment increases with increasing concentration of the carboxyhemoglobin in the blood.

A64-12988
RESPIRATORY REGULATION IN MAN DURING ACCLIMATIZATION TO HIGH ALTITUDE.
C. C. Michel (Oxford, University, Laboratory of Physiology, Oxford, England) and J. S. Milledge (Christian Medical College, Vellore, Madras, India).
Journal of Physiology, vol. 168, Oct. 1963, p. 631-643. 34 refs.

Respiratory response to combinations of hypoxia and hypercapnia was studied in four healthy male subjects at sea level and during and after acclimatization at 19,000 ft. Responses were compared by using the equation of Lloyd et al. which relates pulmonary ventilation to the alveolar pO_2 and alveolar pCO_2. It was found that the parameters related to hypoxia were affected little by several months at high altitude, while the parameters of the hypercapnic response were conspicuously changed.

A64-12989
A STUDY OF PHOTOSTRESS AND FLASH BLINDNESS.
Sanford L. Severin, Norris L. Newton, and James F. Culver (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
American Journal of Ophthalmology, vol. 56, Oct. 1963, p. 589-595

Results are reported of a study designed to evaluate the problem of flash blindness. Fifteen subjects were exposed to light flashes ranging over three levels of corneal illuminance; 86, 080 lux, 150, 640 lux, and 242, 100 lux, using two different pupil conditions and two testing luminances. Analysis of the results demonstrates that: (1) A linear plot describes the relationship between time required for recovery and flash intensity over the range tested. (2) There is a significant difference in recovery rate between subjects. This variation is demonstrated by an actual change in the slope of the recovery function. (3) Pupillary size has a significant effect upon the time required for recovery from dazzle. The operational significance of these observations is implied.

A64-12990
A STUDY OF VARIOUS INDICES OF ADRENOCORTICAL ACTIVITY DURING 23 DAYS AT HIGH ALTITUDE.
P. C. B. Mackinnon, M. E. Monk-Jones, and K. Fotherby (Royal Free Hospital School of Medicine, Depts. of Anatomy and Physics; Postgraduate Medical School, Dept. of Chemical Pathology, London, England).
Journal of Endocrinology, vol. 26, Aug. 1963, p. 555-566. 29 refs.

Measurements of urinary 17-hydroxycorticosteroids, 17-oxosteroids, pregnanediol, pregnanetriol, and circulating eosinophils were made at sea level and during a 23-day stay at high altitude. An attempt was also made to measure changes in emotional activity by means of the palmar sweat index (PSI). This index was assessed at intervals throughout the day at sea level and at high altitude, and in response to adrenocorticotropic hormone (ACTH) and a self-imposed stress. Within 24 hours of acute exposure to high altitude urinary 17-hydroxycorticosteroids increased while circulating eosinophils decreased; by the fifth day both were returning to sea-level values. The output of 17-oxosteroids was lower by the 5th day at high altitude and subsequently increased; pregnanediol and pregnanetriol levels remained unchanged. PSIs throughout the day became progressively lower as the length of stay at altitude increased. The response to ACTH at sea level and high altitude appeared to be similar but the response to a self-imposed stress was longer in duration at high altitude than at sea level.

A64-12991
VARIATIONS IN PULSE RATE AT A CYCLE ERGOMETER TEST ON SWEDISH AIR FORCE PILOTS.
Uno Lundberg and Sture Gramvall.
Meddelanden från Flyg- och Navalmedicinska Nämnden, vol. 12, no. 1, 1963, p. 4, 5.

Thirty-seven pilots of the Royal Swedish Air Force, ages ranging from 20 to 34 years, participated in a year's study of pulse variations during work and rest. The test consisted of registering the initial resting pulse rate, work pulse rate during the last two minutes of work of 3,000 kilogram-meters on a cycle ergometer, and the restitution pulse rate after five minutes of rest. Each man was tested once a week in the morning. The highest values were obtained after vacation in August and the lowest in early spring. The difference was significant at a $p < 0.01$ level of confidence. These results are explained in terms of the breakdown of the physical training program during the summer months.

A64-12992
ORTHOSTATIC REACTIONS - A STUDY OF THE BEHAVIOUR PATTERN OF RECRUITS AND PILOTS.
Uno Lundberg and Sture Gramvall.
Meddelanden från Flyg- och Navalmedicinska Nämnden, vol. 12, no. 1, 1963, p. 6-11.

Forty-two pilots and 113 recruits performed a total of 10 orthostatic tests each before and after breakfast, fasting, and three testing sessions with ingestion of glucose solution. Normal activity was maintained in the first four test sessions with flying substituted for normal activity in the last testing sessions. No marked differences could be shown between the pilot group and recruits with respect to pulse rate, blood pressure, or the frequency of orthostatic reactions. Ten recruits and three pilots were shown to have a confirmed orthostatic reaction. Twelve recruits and four pilots exibited a "marked pulse reaction" - i. e., a difference of 20-29 beats per minute between the rates before and after the orthostatic test. Some apparent differences between the groups may be explained as a result of more intensive physical training to which the pilots are subjected.

A64-12993
BACK INJURIES AFTER CATAPULT EJECTION [RYGGUNDERSÖKNING AV KATAPULTUTSKJUTNA].
Carl Hirsch and Alf Nachemson.
Meddelanden från Flyg- och Navalmedicinska Nämnden, vol. 12, no. 1, 1963, p. 1-4. In Swedish.

Back injuries were investigated in 55 pilots who had ejected from their aircraft during the period of 1957-60. Incidence, distribution, and level of the vertebral fractures are reported. X-ray findings also disclosed spondylolisthesis, vertebral osteochondritis, Schmorl's nodules, old vertebral fractures, disk degeneration, and hemangioma. Other injuries sustained were distorsio pedis, luxatio humeroscapularis, fractura femoris, fractura sacri, and fractura sterni.

A64-12994
THE INFLUENCE OF AGE ON PERFORMANCE AS SHOWN BY EXERCISE TESTS.
D. B. Dill (Indiana University, Dept. of Anatomy and Physiology, Bloomington, Ind.).
Pediatrics, vol. 32, Oct. 1963, p. 737-741. 18 refs.
Contract No. FA-2049.

Experiments of work performance in the United States and in other countries are reviewed. Various exercise tests used in such experiments are described and discussed, including the treadmill, bicycle ergometer, Harvard steptest, and the Balke tests. Reasons for preference in the use of certain tests over others in different cases are discussed. It is suggested that in a study of individuals varying widely in age and fitness, the Balke test is best for the following reasons: (1) the initial work rate can be the minimum speed of the horizontal treadmill for the young, the old, and the unfit; (2) the first minutes of work constitute a warm-up; (3) maximum performance can be assessed in a single experiment; and (4) blood pressure can be observed throughout the test (which is impossible in a subject running on the treadmill).

A64-12995
PHYSICAL PERFORMANCE IN RELATION TO BODY SIZE AND COMPOSITION.

Ulrich C. Luft, David Cardus, Thomas P. K. Lim, E. C. Anderson, and J. I. Howarth (Lovelace Foundation; Los Alamos Scientific Laboratories, Biological and Medical Research Group, Albuquerque, N. M.).
Annals of the New York Academy of Sciences, vol. 110, Sept. 26, 1963, p. 795-808.

Physical performance was determined on a homogeneous group of 65 men between 27 and 44 years of age with a simplified procedure for estimating aerobic capacity, in connection with the U. S. Space Program test pilot selection. Fat-free weight was derived by densitometry. Total body water, total potassium, total hemoglobin, and blood volume were measured as potential indices of metabolizing tissue involved in exercise. Statistical analysis of the data was performed using stepwise linear regression with ratio of variance tests to select factors most highly correlated with aerobic capacity. A regression equation for predicting aerobic capacity from the knowledge of fatfree weight and potassium is given. Deviations of measures from predicted values are attributed to individual differences in cardiovascular and respiratory competence under stress. Evidence is presented that the magnitude of maximal oxygen consumption relative to fat-free weight is associated with the potassium concentration in the latter. This probably reflects differences in the proportion of muscle present in the fat-free body.

A64-12996
ON JUDGING THE NOISE FROM AIRCRAFT IN FLIGHT.
D. W. Robinson, J. M. Bowsher, and W. C. Copeland (National Physical Laboratory, Applied Physics Div., Teddington, England).
Acustica, vol. 13, no. 5, 1963, p. 324-336. 12 refs.

Sixty subjects made judgments of the sounds of aircraft flying overhead, on three occasions. Two rating scales were used for outdoor judgments using criteria of "noisiness" and "intrusiveness." The second criterion was also used for indoor tests. Noise levels were expressed in decibels of measured sound level, dB(A), and of perceived noise level. The level just regarded as "noisy" outdoors was 93 dB(A). Comparison of the indoor and outdoor tests showed that subjects made roughly the same judgment on a given aircraft although the sound level indoors was reduced by the building structure. Psychological scales derived from the results suggest that "noisiness" and "intrusiveness," like "loudness," follow a power law of the intensity.

A64-13081
INVESTIGATION OF OBSERVER'S ERROR IN THE VISUAL READING OF SCALE-DIVISION FRACTIONS [ISSLEDOVANIE POGRESHNOSTI NABLIUDATELIA PRI OTSCHITYVANII NA GLAZ DOLEI DELENIIA SHKALY].
I. D. Fainerman.
Izmeritel'naia Tekhnika, Oct. 1963, p. 21-23. In Russian.

Experimental investigation of the systematic error in individual scale readings. Graphs are presented showing the error distribution for an individual observer in the reading of decimal scale divisions, in comparison to data obtained by other investigators. A graphical representation of the deviation of the readings from the actual values is also given.

A64-13301
APPARENT CHANGE OF REPETITIVE NOISE BURSTS.
Lois L. Elliott (USAF, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
(USAF, School of Aerospace Medicine, Res. Rep. 63-72, 1963.)
Acoustical Society of America, Journal, vol. 35, Dec. 1963, p. 1917-1923. 16 refs.

Description and analysis of observations that noise bursts presented at constant, slow-flutter rates (20-160 bursts/sec) through earphones appear to change in rate and in loudness. Three listening modes were employed - monotic; diotic, with noise bursts presented to both ears simultaneously in phase; and dichotic, with noise bursts led to alternate ears. Two intensity levels were investigated, 53 and 73 db, with flutter rates of 20, 30, 40, 50, 60, 80, 160, and 320 bursts/sec. The results are discussed in terms of neurophysiological evidence and the representation of interrupted noise in Licklider's triplex theory.

A64-13302
CENTRAL FACTOR IN PURE-TONE AUDITORY FATIGUE.
Joel S. Wernick and Jerry V. Tobias (Civil Aeromedical Research Institute, Oklahoma City, Okla.).
Acoustical Society of America, Journal, vol. 35, Dec. 1963, p. 1967-1971. 20 refs.

Review of studies designed to investigate the possibility that a listener's level of mental activity is an important factor in auditory fatigue. Subjects were presented with 40- or 90-db SL tone for 3 min under conditions of (1) a mental task or (2) reverie. Pre- and post-fatigue thresholds were measured with a switched (0.2 sec on, 0.2 sec off) tone. For low-level (40 db) fatigue, the frequency of the test tone was 4,000 cps, and for high-level (90 db) fatigue, 5,656 cps. Subjects consistently showed greater temporary threshold shifts and longer recovery times when the fatigue tone was presented in the mental-task condition. The results indicate that the degree of effect of a fatiguing tone is a function of the listener's degree of mental activity during stimulation.

A64-13306
ASYMMETRIC SYNTHESIS OF α-AMINO-ACIDS BY THE STRECKER SYNTHESIS.
Kaoru Harada (Florida State University, Institute for Space Biosciences and Dept. of Chemistry, Tallahassee, Fla.).
Nature, vol. 200, Dec. 21, 1963, p. 1201.
Grant No. NsG 173-62.

Brief description of the asymmetric synthesis of L-alanine. The general method of asymmetrically synthesizing α-amino acids in solution involves (1) the reaction of an aldehyde with hydrogen cyanide and D-(−)-α-methylbenzylamine in methanol, (2) the hydrolysis of the resulting amino nitrile to the N-(α-methylbenzyl) amino acid, and (3) catalytic hydrogenolysis to remove the methylbenzyl group. The production of 0.68 gram of pure N-(α-methylbenzyl) analine, and subsequent hydrogenolysis to 95% optically active L-analine, is outlined.

A64-13439
USE OF GAS CHROMATOGRAPHY FOR THE DETECTION OF LIFE ON MARS.
Vance I. Oyama (NASA, Ames Research Center, Exobiology Div., Life Detection Systems Branch, Moffett Field, Calif.).
Nature, vol. 200, Dec. 14, 1963, p. 1058, 1059.
Contract No. NAS-7-100.

Investigation which confirms, in part, the premise on which the technique of gas chromatography as applied to the identification of pyrolysis products of biological materials for life detection on Mars. This premise is based on the fact that terrestrial life is an aggregate of carbonaceous macromolecular structures as well as a lesser mass of monomeric organic substances. In the investigation, the simple technique of thermal degradation is applied to the analyses of chemical structure, using freshly isolated, but unidentified, micro-organisms grown in trypticase soy broth under aerobic conditions at 30°C.

A64-13449
FOOD IN FLIGHT.
Robert A. Nanz (NASA, Washington, D. C.).
Space World, vol. A-3, Jan. 1964, p. 12-14.

General discussion of the development of techniques for preparing and storing foods for future manned space flights. The experience with liquid and solid foods obtained during the Mercury flights of Glenn, Carpenter, and Cooper are reviewed. It is noted that major problems related to eating in space are the weight requirements and weightlessness, the former relating to the payload capable of being placed in space. Lightweight compact foods have been chosen to provide the necessary calories. To provide the astronaut with a variety of good tasting foods, freeze-dried meal components are being developed by removing the moisture from foods in the frozen state. Briefly considered are problems of container handling while eating in space.

A64-13477
RADIATION HAZARD IN SPACE FROM SOLAR PARTICLES.
Phyllis Freier and William R. Webber (Minnesota, University, School of Physics, Minneapolis, Minn.).
Science, vol. 142, Dec. 20, 1963, p. 1587-1592.

Consideration of the shielding necessary to protect an astronaut from solar radiation, especially that caused by a solar flare. Available techniques for detecting solar-flare particles and for calculating particle flux are delineated. Radiation doses from solar particles under various thicknesses of spherical shielding are tabulated and analyzed. The doses experienced on the surface of a man who is inside a spacecraft having a shielding of 1 gm/cm^2 are calculated.

A64-13509
THE FUNCTION OF THE SEMICIRCULAR CANALS DURING WEIGHTLESSNESS.
James A. Roman (USAF, Systems Command, Flight Test Center, Aerospace Research Pilot School, Edwards AFB, Calif.), Bruce H. Warren (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Bioastronautics Dept., Brooks AFB, Tex.), and Ashton Graybiel (U. S. Naval School of Aviation Medicine, Aviation Medical Center, Pensacola, Fla.).
Aerospace Medicine, vol. 34, Dec. 1963, p. 1085-1089. 13 refs.

Experimental investigation to estimate the sensitivity of the semicircular canals to stimulation during periods of weightlessness averaging 46 sec, by timing the duration of apparent rotation of a visual target (oculogyral illusion) and of the subject's perception of rotation after stimulation. Stimulation was accomplished by rolling the aircraft during periods of subgravity as well as during 1-g control maneuvers. Time-intensity relationships of the stimulus were obtained by means of specialized instrumentation incorporated into the experimental subject's crash helmet. For three subjects investigated, no significant difference between the sensitivity of the semicircular canals to stimulation at zero-g was noted as compared to sensitivity determined by similar means at 1-g.

A64-13510
BIODYNAMIC RESPONSE TO SUPERSONIC EJECTION.
Neville P. Clarke (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).
(Aerospace Medical Association, Annual Meeting, Los Angeles, Calif., Apr. 29-May 1, 1963.)
Aerospace Medicine, vol. 34, Dec. 1963, p. 1089-1094.

Presentation of the results of a B-58 escape capsule flight test consisting of eight ejections at subsonic and supersonic speeds. The subjects were black bears, whose mechanical response is similar to that of man. Discussed in some detail are tests made at an altitude of 45,000 ft., at a speed of M = 1.6, which represents the most unstable capsule flight encountered in the program. It presents a complex pattern of high-amplitude accelerations and is associated with a significant injury to the animal subject. The technique used to estimate the tolerability or nontolerability of the loads for man during operational use of the capsule was to regard the direction, magnitude, and rate of change of direction of the resultant acceleration as the major parameters of importance. The orthogonal acceleration-time histories have been used as much as possible in an attempt to relate these data to observations made under more controlled conditions of human response to acceleration.

A64-13511
PHOTOSTRESS AND FLASH BLINDNESS IN AEROSPACE OPERATIONS.
Sanford L. Severin, Albert V. Alder, Norris L. Newton, and James F. Culver (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
(Aerospace Medical Association, Annual Meeting, Los Angeles, Calif., Apr. 29-May 1, 1963.)
Aerospace Medicine, vol. 34, Dec. 1963, p. 1095-1098.

Experimental investigation of the parameters involved in flash blindness, in order to determine whether there is a consistent relationship between the recovery of visual discrimination and the intensity of the dazzling flash. In one study, 15 subjects were exposed to light flashes ranging over three levels of corneal illuminances: 86,080 lux, 150,640 lux, and 242,100 lux using two different pupil conditions. In a second study, 40 subjects were exposed to light flashes ranging over the same level of illuminances. Two recovery functions were evaluated: the period of time to recover contrast discrimination, and the time required to regain visual acuity at the same level of illuminance. It was found that a linear plot describes the relationship between time required for recovery and flash intensity over the range tested. Pupillary size has a significant effect upon the time required for recovery from dazzle.

A64-13512
PHYSIOLOGICAL FACTORS IN THE TRAINING OF AIRCREW IN THE USE OF R. A. F. PARTIAL PRESSURE SUITS.
P. R. Wagner and D. Beeton (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).
Aerospace Medicine, vol. 34, Dec. 1963, p. 1099-1102.

Discussion of the training of aircrews in the use of partial pressure suits, and of some of the physiological aspects of this training. Briefly discussed are the documentation and medical examination of the trainees, as well as the nature of the lectures, demonstrations, and ground level training which they receive. Each subject, following the successful completion of the ground level training, is exposed to a stimulated high altitude in a decompression chamber. The results of an analysis of the physiological recordings for 50 subjects are presented. The mean values of heart rate and mean arterial pressure have been plotted against time, and a band has been calculated from the variability of the standard group, so that the values from a different group can be compared with it.

A64-13513
CELLULAR OXYGEN CONSUMPTION AT LOW OXYGEN TENSIONS.
Robert J. Reyes and J. Ryan Neville (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 34, Dec. 1963, p. 1103-1106. 19 refs.

Presentation of the preliminary results of a base line study of the critical oxygen tension (C.O.T. - the lowest oxygen tension whicl is capable of maintaining maximum respiration) of Sacchyromyces cervisiae (yeast). In order to study certain aspects of the idea that the C.O.T. is a result of the partial oxidation of the cytochrome system rather than a limitation in the physical diffusion process, Neurospora crassa mutant strains are used which may lack a normal component in the cytochrome chain and/or have a decrease in the concentration of the enzyme. The C.O.T. of these cytochrome mutants is compared to the normal organism under identical physiological conditions. The results show that the C.O.T. of a yeast cellular suspension is not changed by either the number of cells in suspension (1 to 8 gm per cent) or a change in the buffer from a pH of 5 to 8. Two metabolic states for yeast are reported - exogenous and starved. It is seen that the evidence supports the idea that the C.O.T. of cells and tissues is related to the degree of oxidation or reduction of the cytochrome system.

A64-13514
HISTOPATHOLOGY OF EXPERIMENTAL DECOMPRESSION SICKNESS.
James R. Clay (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 34, Dec. 1963, p. 1107-1110. 19 refs.

Experimental investigation of decompression sickness in the dog. Dogs overcompressed to 75 psi gage pressure were decompressed to 10,000 or 15,000 ft simulated altitude. They developed pathologic changes similar to those seen in human decompression sickness. In addition, bone marrow emboli were produced in a fairly high percentage of the animals. Pulmonary fat embolization was massive in many instances and the intravascular fat remained after five days.

A64-13515
ADAPTATION OF SMALL GROUPS TO EXTREME ENVIRONMENTS.
E. K. Eric Gunderson and Paul D. Nelson (U. S. Navy, Medical Neuropsychiatric Research Unit, San Diego, Calif.).
(Aerospace Medical Association, Annual Meeting, Los Angeles, Calif., Apr. 29-May 1, 1963.)
Aerospace Medicine, vol. 34, Dec. 1963, p. 1111-1115.
U. S. Navy Research Task MROD 5.12-2004.

Review of three studies to measure the subjective emotional responses and individual performance of groups functioning in extremely isolated Antarctic stations. Under conditions of restricted stimulation and activity for prolonged periods, participants reported an increase in the incidence and severity of emotional and somatic symptoms. The best single measure of effective individual performance was a standard score derived from peer and supervisor choices on an item indicating whom they would prefer to be with if they returned to the Antarctic. Three behavior areas contributed unique variance to the composite criterion: emotional composure, social compatibility, and task motivation. Attitude measures revealed a general decline in work satisfaction, social relationships, and group accomplishment.

A64-13516
CHROMATID DELETIONS PRODUCED IN HUMAN CELL CULTURES BY 250 KV X-RAYS AT LIQUID NITROGEN TEMPERATURES.
Robert H. Fetner (Georgia Institute of Technology, Engineering Experimental Station, Atlanta, Ga.) and Allan A. Katzberg (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).

Aerospace Medicine, vol. 34, Dec. 1963, p. 1115-1118. 22 refs.

Experimental investigation of the frequency of interstitial chromatid deletions produced by 250 kv X-rays, in KB cell cultures at -190°C and 25°C, in order to determine if frozen cells would permit an independence of the time limitation in studying radiation-induced chromosome aberrations in rapidly proliferating cell lines. In unfrozen cells the optimum production of chromatid deletions was 12 hours after irradiation for doses up to 200 r. Between 200 and 400 r a mitotic inhibition was produced which resulted in the maximur number of chromatid deletions being observed 24 hours after irradiation. In the experimental group irradiated in liquid nitrogen, no mitotic inhibition was observed with doses to 2,000 r. The maximum production of chromatid deletions as a function of dose indicated a high positive correlation between these two variables. There were 1.3×10^{-5} interstitial deletions/chromosome/r in the frozen group. Cells irradiated in liquid nitrogen are 1/3 as sensitive to chromosome breakage as cells irradiated at room temperature.

A64-13517

GASEOUS ENVIRONMENT CONSIDERATIONS AND EVALUATION PROGRAMS LEADING TO SPACECRAFT ATMOSPHERE SELECTION.

Edward L. Michel, George B. Smith, Jr., and Richard S. Johnston (NASA, Manned Spacecraft Center, Houston, Tex.).

Aerospace Medicine, vol. 34, Dec. 1963, p. 1119-1121.

Brief discussion of the engineering and physiologic considerations involved in the selection and validations of the artificial gaseous atmosphere for forthcoming Gemini and Apollo missions. Briefly reviewed are investigations to determine the required time of pre-oxygenation at sea level to provide adequate protection against bends in the event of an early mission decompression, and to determine if protection against bends can be achieved following a decompression after equilibration to the subject 50% oxygen-50% nitrogen, 7-psia atmosphere. The implications of the results of the atmosphere validation program are discussed, including the relative merits of the 100% oxygen, 5-psia atmosphere and the two-gas atmospheres.

A64-13518

HUMAN RESPONSE TO SEVERAL IMPACT ACCELERATION ORIENTATIONS AND PATTERNS.

Edmund B. Weis, Jr., Neville P. Clarke, and James W. Brinkley (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

(Aerospace Medical Association, Annual Meeting, Los Angeles, Calif., Apr. 29-May 1, 1963.)
Aerospace Medicine, vol. 34, Dec. 1963, p. 1122-1129.

Experimental investigation of the human response to abrupt accelerations under controlled conditions. In the experiments, the subject, wearing the Mercury pressure suit helmet, was placed in a rigid vehicle in a sitting position, restrained with a nonextensible chest and pelvic harness, and exposed to six deceleration profiles in seven orientations. In the six acceleration profiles peak g ranged from 3 to 26 g units, impact velocity ranged from 5 to 28 ft/sec, and onset ranged from 200 to 2,000 g units/sec. The seven orientations contained forward, upward, right, and left components of acceleration, and were 45° apart. The acceleration of the center of gravity of the vehicle, the force exerted by the subject on the vehicle, and biomedical data were recorded. The results of the testing indicate a set of impact conditions that are tolerable. Preliminary results of a mathematical analysis are presented, and the trends indicate that it is desirable to attenuate high-frequency components of the acceleration pulse in impact protection.

A64-13519

ELECTRICAL ENERGY FROM BIOLOGICAL SYSTEMS.

J. J. Konikoff, L. W. Reynolds, and E. S. Harris (General Electric Co., Missile and Space Div., Space Sciences Laboratory, Philadelphia, Pa.).

(Aerospace Medical Association, Annual Meeting, Los Angeles, Calif., Apr. 29-May 1, 1963.)
Aerospace Medicine, vol. 34, Dec. 1963, p. 1129-1133.
Contract No. NASw 511.

Discussion of three mechanisms postulated to explicate the production of an emf by microorganisms, especially in reference to increasing this emf in a closed ecology for manned space flight. These hypotheses state that the organism during normal metabolism either: (1) acts in such a manner as to depolarize the electrode; (2) directly releases electrons which are collected on the electrode; or (3) produces fuel-cell-active material from a substrate which is in its normal state not active as a fuel. Experimental investigations which contribute to an understanding of the mechanisms involved are briefly summarized.

A64-13520

LIGHT AIRCRAFT NOISE PROBLEMS.

Robert L. Wick, Jr., Lester B. Roberts, and William F. Ashe (Ohio State University, Dept. of Preventive Medicine, Columbus, Ohio).

Aerospace Medicine, vol. 34, Dec. 1963, p. 1133-1137.

Investigation to determine the presence or the absence of a hearing hazard in general aviation aircraft of the light variety. Sound pressure level measurements and an octave band analysis were performed in actual aircraft using a Mine Safety Appliance Model B "Soundscope" and octave band analyzer. Data were collected with the long axis of a microphone pointed vertically and located at ear level midway between the pilot and co-pilot seats. The data, presented tabularly, are in good general agreement with those levels predictable by general formulas. A tentative damage-risk criterion for short term exposure to over-all noise level is developed and is shown graphically. The graph implies that the pilot has one exposure per day at the level of noise and for the duration shown.

A64-13521

OBSERVATIONS ON THE ELICITATION OF SECONDARY AND INVERTED PRIMARY NYSTAGMUS FROM THE CAT BY UNILATERAL CALORIC IRRIGATION.

William E. Collins (Federal Aviation Agency, Civil Aeromedical Research Institute, Oklahoma City, Okla.).

Aerospace Medicine, vol. 34, Dec. 1963, p. 1137-1142. 29 refs.

Experimental investigation which indicates that both secondary and inverted primary nystagmus may be elicited from cats with vestibular stimulation by repeated unilateral caloric irrigation. The reaction appeared after irrigation in light and in darkness, with stimuli temperatures of 23.5° and 53.5°C applied for 30 sec, and at 5.0°C applied for 15, 30, and 35 sec. However, not all cats demonstrate an inverse response. The inverse reaction most frequently obtained was the secondary nystagmus. Several possible explanations for the occurrence of the phenomena are briefly considered, including cooling and peripheral events, and central and peripheral factors.

A64-13522

A SELF-CONTAINED AIR SYSTEM AND PROTECTIVE SUIT.

James G. Billingsley and Norm Le Vora (Fitzsimons General Hospital, Pulmonary Function Clinic; Martin Marietta Corp., Denver, Colo.).

Aerospace Medicine, vol. 34, Dec. 1963, p. 1142-1146. 31 refs.

Experimental evaluation of subject response to a closed, self-contained air system designed to protect an individual from hazardous environmental vapors. Air supply was provided from a liquid oxygen-nitrogen source and mixed to some degree with suit air. A portion of the circulation was directed over the extremities for cooling. The suit utilized in the tests covered the entire body and was sealed with helmet, boots, and gloves to maintain a positive internal pressure of one-half inch of water. Body temperature, suit temperature, carbon dioxide levels, heart rates, and electrocardiographic tracings were monitored through several positions of rest and exercise. Workload included a walk of 2.5 mph and crawl at 0.8 mph on a level motor-driven treadmill. No untoward response was noted in any of the measured parameters, and subjects tolerated the isolation and challenge well. Carbon dioxide levels remained well within physiologically acceptable limits at rest and exercise.

A64-13523

ACCUMULATION OF STATIC ELECTRICITY ON ARCTIC CLOTHING.

James H. Veghte and Walter W. Millard (Arctic Aeromedical Laboratory, Fort Wainwright, Alaska).

Aerospace Medicine, vol. 34, Dec. 1963, p. 1146-1149.

Measurement of the electrostatic voltages and capacitance on active men wearing arctic clothing assemblies at temperatures ranging from +5° to -43°C. It is found that, although there is an increase of electrostatic charges on arctic clothing assemblies with a decrease in ambient temperature, the stored energy calculations indicate that there is no danger of igniting explosive gas-air mixtures by a discharge of the electrostatic charges under normal conditions. It is seen that a hazard may exist if a person rapidly removes his

outer jacket while working outside in a hazardous gas-air mixture. Also, a definite buildup of electrostatic charges above the critical threshold for igniting a concentrated gas-air mixture by an electrostatic discharge exists when a person working out of doors comes in and removes his parka or wool shirt without first properly grounding himself.

A64-13744
SPEECH DURATIONS OF ASTRONAUT AND GROUND COMMUNICATOR.
Joseph D. Matarazzo, Arthur N. Wiens, George Saslow (Oregon, University, Medical School, Portland, Ore.), Richard M. Dunham (Houston, University, Houston, Tex.), and Robert B. Voas (NASA, Manned Spacecraft Center, Houston, Tex.).
Science, vol. 143, Jan. 10, 1964, p. 148-150.
National Institute of Mental Health Grant No. M-1938.

Discussion of a relationship between the speech duration of a ground communicator and that of an astronaut, observed from both a correlation analysis for the first and second orbits, and the mean speaking times per orbit for three orbits. The findings are an interesting extension to a similar relation established in speech-time controlled tests made in nondirective employment interviews.

A64-13745
ARTIFICIAL FOOD PRODUCTS AND ASTRONAUTICS [SZTUCZNE ŚRODKI SPOŻYWCZE I ASTRONAUTYKA].
Astronautyka, vol. 6, May 1963, p. 21-24. 18 refs. In Polish.

Survey of recent developments in the field of photosynthesis, in the light of the energy balance and the demographic and economic aspects on the Earth. Specifically discussed is the problem of synthetic manufacture of food products, both for the population of our planet and for aerospace missions, by radio biological and chemical methods.

A64-13748
EFFECTS OF ACCELERATION FORCES ON TIMING BEHAVIOR IN THE WHITE RAT.
A. O. DeMarco and I. Geller (Wyeth Laboratories, Inc., Philadelphia, Pa.).
Aerospace Medicine, vol. 35, Jan. 1964, p. 30-32.

The present study was the first in a series in which an attempt is being made to protect an organism against the stresses of g-forces with appropriate pharmacologic agents. Specifically, it was concerned with the effects of centrifugation on timing behavior of the white rat. A direct relationship was shown between duration of centrifugation and degree of disruption of timing behavior; but as centrifugation sessions were continued, rats apparently developed tolerance to the g-forces.

A64-13749
PHYSIOLOGICAL STUDY OF AN EJECTION AT THE SPEED OF SOUND RESULTING IN SERIOUS INJURIES [ETUDE PHYSIOLOGIQUE D'UNE EJECTION SONIQUE AYANT ENTRAÎNE DES LESIONS GRAVES].
M. Bourret (Faculté de Médecine, Marseille, France), A. Salvagniac, F. Fabre, and J. Divine.
Revue de Médecine Aéronautique et Cosmonautique, vol. 2, Aug.-Sept. 1963, p. 424-429. 21 refs. In French.

A report is given of a double ejection from an aircraft traveling near the speed of sound at a probable altitude between 10,000 and 15,000 feet. Injuries to the pilot were closed dislocations of both knees and rupture of knee ligaments, fracture of the ulna, dislocation of the elbow, and extensive petechiae. The feet of the pilot were not in position on the foot-rest during ejection. The navigator suffered an open dislocation of one knee and rupture of knee ligaments, a double fracture of the femur, fracture of the humerus, and extensive petechiae. The leg injuries are attributed to the action of wind blast rather than to improper foot position during ejection. The fracture of the ulna is attributed to seat design, and the humeral fracture to wind blast.

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A64-13750
ACCELERATIONS AND ADRENALS [ACCELERATIONS ET SURRENALES].
R. Loubière, A. Pfister, G. Cheymol, and A. Rambourg.
Revue de Médecine Aéronautique et Cosmonautique, vol. 2, Aug.-Sept. 1963, p. 414-419. In French.

Cytological studies were made of the effects of acceleration at 15 g for 15-20 minutes on the adrenal glands of 40 rats. Rats dying during acceleration (40%) showed little cellular damage in the adrenal medulla, but the capillaries were markedly dilated, and some sympathetic cells contained degenerative vacuoles. The adrenal cortex showed extensive cellular damage, with large vacuoles present in many cells of the reticulum and fasciculus. Some cellular degeneration was also observed in the sympathetic ganglia. The adrenals of surviving rats sacrificed immediately after acceleration showed similar, but less severe, damage to those of rats killed by acceleration. Animals sacrificed after two weeks showed almost complete regression of adrenal lesions. It is suggested that death in succumbing rats was caused by adrenal damage resulting from stasis-produced anoxia occurring during adrenal hyperfunctioning under acceleration stress.

A64-13751
RESPIRATORY BEHAVIOR OF MAN BREATHING UNDER OVERPRESSURE [LE COMPORTEMENT VENTILATOIRE DE L'HOMME RESPIRANT EN SURPRESSION].
C. Jacquemin, P. Verène, and P. Richard (Centre d'Essais en Vol, Brétigny-sur-Orge, Seine-et-Oise, France).
Revue de Médecine Aéronautique et Cosmonautique, vol. 2, Aug.-Sept. 1963, p. 444-446. 19 refs. In French.

Experiments were conducted to investigate the generally accepted hypotheses that expiration is active and inspiration passive, and that the work of respiration is increased during positive-pressure breathing. Measurements of respiratory volume revealed that thoracopulmonary equilibrium during pressure breathing occurs at the end of expiration. Recording of the electromyographic activity of the respiratory muscles showed a persistence of activity during expiration. Oxygen consumption was not increased by pressure breathing. It is concluded that pressure breathing has no effect on the normal rhythm or work load of the respiratory muscles.

A64-13752
REFLECTIONS ON THE EXAMINATION OF THE CARDIOVASCULAR SYSTEM AT THE TIME OF THE INITIAL SELECTION OF FLIGHT PERSONNEL [REFLEXIONS SUR L'EXAMEN DU SYSTEME CARDIOVASCULAIRE LORS DE LA SELECTION INITIALE DU PERSONNEL NAVIGUANT].
Erwin A. Lauschner (Luftfahrtmedizinisches Institut, Fürstenfeldbruck, Germany).
Revue de Médecine Aéronautique et Cosmonautique, vol. 2, Aug.-Sept. 1963, p. 458-462. 16 refs. In French.

A comparative study was made of the cardiovascular examination methods used in the selection of flying personnel in six western

countries. The purposes of cardiovascular examination are: (1) elimination of candidates with cardiovascular disease or limiting anomaly; (2) evaluation of functional cardiovascular limitations; and (3) detection of a propensity towards premature cardiovascular aging. Tests to detect the presence of cardiovascular disease or anomaly are fairly uniform in the countries studied, and include measurements of blood pressure and pulse, the electrocardiogram, and chest radiography. Various tests of cardiovascular function are used, but their usefulness is limited because of the dependence of results on physical conditioning. Selection methods currently in use do not permit an estimate of the probability of early development of cardiovascular disease. It is concluded that the cardiovascular examination should include tests to evaluate the long-term cardiovascular prognosis of flight candidates.

A64-13753
ACTIVITY OF THE NERVOUS SYSTEM OF THE WHITE RAT DURING SHORT PERIODS OF WEIGHTLESSNESS [ACTIVITE DU SYSTEME NERVEUX DU RAT BLANC PENDANT DE COURTES PERIODES DE NON GRAVITE].
R. Grandpierre, R. Angiboust, R. Brice, B. Cailler, G. Chatelier, J. Ginet, R. Grognot, and F. Soret.
Revue de Médecine Aéronautique et Cosmonautique, vol. 2, Aug.-Sept. 1963, p. 400-405. In French.

Studies were made of the effects of short periods of weightlessness produced during airplane or rocket flight on the nervous system of rats. Telemetric measurements of the electrical activity of the central nervous system (cortex and reticulum) revealed no effect of weightlessness for periods as long as 1-1/2 minutes. The epileptic-type activity observed under normal resting conditions in some animals was suppressed during the acceleration period preceding weightlessness, but reappeared during the weightless period. Measurements of muscular tone in the neck suggested a decrease in proprioceptive activity during weightlessness.

A64-13754
CHANGES IN BRAIN GLYCOGEN CONCENTRATION IN RATS DURING HIGH ALTITUDE (12,470 FT) EXPOSURE.
Dorothy E. Woolley and Paola S. Timiras (California, University, Dept. of Physiology, Berkeley, Calif.).
Society for Experimental Biology and Medicine, Proceedings, vol. 114, Dec. 1963, p. 571-574. 17 refs.
USPHS-supported research.

Glycogen concentrations were significantly reduced in the forebrain, brain stem, and cerebellum of rats exposed for 3, 8, and 30 days to 12,500 feet altitude, as compared with control values. After 60 days at altitude, brain stem and cerebellum glycogen concentrations returned to normal, but forebrain glycogen was still significantly decreased. The changes in brain glycogen were not accompanied by changes in plasma glucose. Hematocrit values were already significantly increased after 3 days, and increased further after 8, 30, and 60 days of altitude exposure.

LC ENTRIES

A64-80001
KEROSENE PNEUMONITIS: AN EXPERIMENTAL STUDY WITH SMALL DOSES.
Paul Gross, James M. McNerney, and Mary Ann Babyak (Mellon Inst., Pittsburgh, Pa.)
American Review of Respiratory Diseases, vol. 88, Nov. 1963, p. 656–663. 12 refs.

When sublethal doses of kerosene types of hydrocarbons are injected intratracheally into rats, two different inflammatory processes are initiated simultaneously: an acute, exudative and a chronic, proliferative inflammation. The first, representing the reaction of the alveolar capillaries, reaches its acme within three days and subsides to almost complete disappearance within another seven days. The chronic inflammation, representing the reaction of the alveolar membrane, reaches its acme in ten days and then gradually resolves, but remnants of the inflammation are still demonstrable more than one month later. The results of this experimental study offer a ready explanation for the protracted resolution and other complications reported in some human cases of kerosene pneumonitis.

A64-80002
THE EFFECT OF AGE AND PERIPHERAL CIRCULATION ON THE PERCEPTION OF VIBRATION.
Franz U. Steinberg and Alan L. Graber.
Archives of Physical Medicine and Rehabilitation, 44 (12):645–650. Dec. 1963. 17 refs.

The vibratory threshold was determined in the lower extremities of 98 subjects, ranging in age from 20 to 90 yr. All were free of any disease which may affect vibratory perception; 69 had a normal arterial peripheral circulation as determined by palpation of the pulses and oscillometry, and 29 had impaired arterial circulation. The threshold of vibratory sensation rose with age. The logarithms of the thresholds were directly proportional to the age. In the normal controls the spread of threshold values increased with age. Impairment of the peripheral circulation raised the vibratory threshold, compared to the normal control group of the same age. The difference was statistically significant. Unilateral impairment of peripheral circulation raised the vibratory threshold of the affected limb.

A64-80003
CORTICAL EVOKED POTENTIALS BY PHOTIC STIMULATION AT VARIOUS ADAPTATION LEVELS OF RETINA IN MAN.
Mituru Ebe, Tomohisa Mikami, and Hirotaka Ito (Toranomon Gen. Hosp., Akasaka Aoi Cho, Minato Ku, Tokyo, Japan).
Tohoku Journal of Experimental Medicine, vol. 80, June 25, 1963, p. 9–17. 19 refs.

The potentials of the visual cortex evoked by a flash of light were analyzed in 37 subjects under the conditions of dark adaptation and light adaptation to 4, 30, and 60 lux. Although some individual differences were observed concerning the effect of light adaptation upon the evoked potentials, two tendencies were observed, i.e., the decrease of amplitude and changes in relative dominance among the components of the evoked potential. The culmination times of some components of evoked potentials were prolonged in dark adaptation when the intensity of the stimulus was reduced. Either prolongation or shortening was caused by the reduction of the intensity of stimulation depending upon the adaptation level.

A64-80004
INTERPRETATION OF HEARING TESTS.
F. Harbert and I. M. Young (Jefferson Med. Coll., Philadelphia, Pa.)
Eye, Ear, Nose and Throat Monthly, 42 (10):31–32, 34–36. Oct. 1963. 8 refs.

Hearing tests are reviewed with respect to their diagnostic capacities, the underlying pathology of the auditory system, and useful function. Methodological considerations include use of forks, masking, recruitment, abnormal threshold adaptation, and functional deafness. Audiologic findings in peripheral deafness are summarized in a table.

A64-80005
RAT BASAL RESISTANCE LEVEL UNDER STRESS AND NONSTRESS CONDITIONS.
Rachel Kaplan (Michigan U., Ann Arbor).
Journal of Comparative and Physiological Psychology, vol. 56, Aug. 1963, p. 775–777. 5 refs.
Grant No. PHS-G-M-4239.

A study was designed to test whether basal resistance level (BRL) would function as a useful measure of the arousal component of motivation in rats. On 4 consecutive days 56 male hooded rats were placed in Skinner boxes for 90 min. A new skin-resistance measure was employed to determine the basal resistance level reflected in the shifts of palmar and planter sweating, which is registered through the grid of the Skinner box. On days 3 and 4, subjects received a 5-sec shock 30 min after being placed in the box. The results indicate (1) significant gradual progression of BRL toward greater relaxation both within a day and across days as the subject adapts to the situation and (2) significant drop in resistance level as a function of shock.

A64-80006
URINARY EXCRETION OF THE TRYPTOPHAN-RICH PREALBUMIN AFTER STRENUOUS PHYSICAL EFFORT.
Jacques Poortmans (Inst. Natl. de l'Education Physique et des Sports, Brussels, Belgium).
Life Sciences, no. 5, May 1963, p. 334–336. 9 refs.

Patterns of proteinuria in men after a cross-country run of 9 km were studied. A large fraction of tryptophan-rich prealbumin was observed in 50% of the subjects studied. Subsequent starch gel electrophoresis and immunoelectrophoresis indicated that this fraction was identical to that of a similar study. It is suggested that this increased elimination of prealbumin after strenuous physical exercise might be caused by increased glomerular filtration and simultaneous saturation of tubular reabsorption.

A64-80007
PHYSIOLOGIC AND MEDICAL ASPECTS OF NAVY SHELTER HABITABILITY TRIALS.
David Minard (Naval Med. Res. Inst., Stress Physiol. Div., Bethesda, Md.)
New York State Journal of Medicine, vol. 63, Dec. 1, 1963, p. 3431–3434.

One hundred men living under survival conditions in a protective shelter for two weeks, once in winter and once in summer, emerged in satisfactory physical condition with no significant evidence of dehydration, salt depletion, nutritional deficiency, or impairment of physical fitness. In the summer test, environmental heat caused a high incidence of heat rash as well as a small number of other heat illnesses. The total incidence of clinical disorders was three times higher in the summer trial than in the winter trial. To what extent the greater environmental stress may have been a contributing factor is uncertain. Pathogenic bacteria were not a significant factor in the etiology of illness in these trials, but the rapid spread of respiratory diseases of virus origin indicates that the hazard of virulent contagious disease being brought into the shelter by a carrier is a major unsolved problem in shelter habitability.

A64-80008
HEART RATE RESPONSE TO THE VALSALVA MANEUVER AS A TEST OF CIRCULATORY INTEGRITY.
Edward I. Elisberg.
Journal of the American Medical Association, vol. 186, Oct. 19, 1963, p. 200–205. 16 refs.

The blood pressure and heart rate responses to the Valsalva maneuver as measured during cardiac catheterization are a reliable index of cardiovascular integrity. The present study indicates that the heart rate itself, as monitored by the electrocardiograph, is an equally reliable index of the dynamic changes occurring during and after straining. In a normal group of subjects the heart rate slowed with the onset of straining (phase 1), increased during (phase 2) and after straining (phase 3), and was followed by a marked bradycardia (phase 4). These responses occurred to a significantly lesser degree in subjects with advanced cardiac disease, the absence of the greatest statistical importance. Using these criteria, subjects with cardiovascular abnormalities of uncertain dynamic significance were separated into clinically valid groups of reactors and nonreactors.

A64-80009
EFFECT OF LOW BLOOD-ALCOHOL CONCENTRATIONS IN SIMULATED DAY AND NIGHT DRIVING.
Rudolf G. Mortimer (Gen. Motors Res. Lab., Warren, Mich.)
Perceptual and Motor Skills, vol. 17, Oct. 1963, p. 399–408. 9 refs.
Grant No. PHS-G-AC-87.

A study was carried out to determine the influence of low concentrations of alcohol in the blood upon performance in a simulated driving task, under day and night driving conditions. Sixteen male subjects were administered three orange drinks, the last two containing pure alcohol. Mean peak blood-alcohol concentrations of 0.012% and 0.068% were obtained. After each drink the subject was given some vision tests and then received three trials lasting 12 min each on the simulator at daylight and night illumination, and with glare. Four subjects also served as controls. The larger dose significantly reduced tracking accuracy under all three driving conditions. The

smaller dose detrimentally affected performance in the glare condition but not in the other two treatments. Visual acuity was significantly decreased for the large dose. It was suggested that the legal limit describing alcoholic influence in driving was too conservative, and that it should be reduced in night driving conditions.

A64-80010
EFFECTS OF NOISE ON DISCRIMINATION REACTION TIME.
Henry H. Reiter.
Perceptual and Motor Skills, vol. 17, Oct. 1963, p. 418.

Discrimination reaction times were measured for 38 male subjects against a background of graded simulated industrial noise. At a specific noise level between -5 and 0μv the reaction times were reduced. It is suggested that the performance of certain discrimination tasks in industrial settings may be actually improved at certain noise levels.

A64-80011
MANNED SPACE STATIONS.
Starr J. Colby (Office of the Secretary of Defense, Washington, D.C.)
Ordnance, vol. 48, Nov.–Dec. 1963, p. 308–311.

A proposal is made to begin immediately to program a manned space station as a multipurpose base having joint priorities as significant as any single operational mission. The specific activities for such a space station include measuring the environmental conditions, determining tthe environmental effects on men and machines, training for orbital operations, and developing space equipment. The physical characteristics, cost, and development of the space station are discussed. The growth of the orbital base could evolve slowly in steps by the periodic addition of equipment. A schedule is proposed giving the time and function of these additions.

A64-80012
THE EFFECT OF THE RESPIRATORY RHYTHM ON THE REACTION TIME |DER EINFLUSS DES ATEMRHYTHMUS AUF DIE REAKTIONSZEIT|.
G. Hildebrandt and P. Engel (U., Physiol. Inst., Marburg/Lahn, Germany).
Pflugers Archiv fur die gesamte Physiologie, vol. 278, 1963, p. 113–129.
54 refs. In German.

Variations in reaction time for auditory or visual signals were measured in 44 subjects in relation to respiratory phase. Reaction time was found to be significantly decreased during inspiration, and increased during expiration. Reaction time changed gradually throughout the respiratory cycle, so that the pattern of change was dependent on the type of respiration. The amplitude of change tended to be negatively correlated with respiratory frequency, and positively correlated with pulse frequency. Variations in reaction time were also observed during inspiratory or expiratory breath-holding. The effect of respiration on reaction time is attributed to an alarm effect of inspiration on the central nervous system, and a consequent increase in muscular tension.

A64-80013
INFORMATION–THEORETICAL ASPECTS OF SENSORY-PHYSIOLOGICAL PHENOMENA |ZUR INFORMATIONS THEORETISCHEN BETRACHTUNG SINNESPHYSIOLOGISCHER VORGANGE|.
E. Zuhrt.
IN: Physikalische Grundlagen der Medizin: Abhandlungen aus der Biophysik, no. 3. Edited by Walter Beier. Leipzig, Georg Thieme, 1963, p. 76–85.
15 refs. In German.

Information theory is applied to sensory physiological processes, reviewing the adaptation of the transmission channels to signal characteristics, filtering processes, information value of the signals, and the quantitative evaluation of the efficiency of human sense organs. Man is considered in his different roles as a sender, a transmitter, and a receiver. The last role requires establishment of the maximum reception capacity of individual sense organs and also that of the total organism. Sensory physiological and psychological experiments have been conducted using simple signals such as pure tones, monochromatic light, and symmetrical black and white geometrical figures. The results indicate a maximum reception and channeling capacity of 25 bits per second for the total organism under optimum conditions. In comparison with the theoretical reception capacity of the sense organs this value is very low. Nevertheless, since it is sufficient for survival of life, apparently only vitally important information is preserved, with the rest of partial signals filtered out in the processing. No satisfactory technical model has been developed as yet; this type of information processing seems to be a characteristic of highly developed organisms.

A64-80014
SOME EXPERIMENTAL OBSERVATIONS OF THE HIGH-FREQUENCY ELECTROMAGNETIC FIELD IN VIVO AND IN VITRO |NEKTERA EXPERIMENTALNI POZOROVANI UCINKU VYSOKOFREKVENCNIHO ELEKTROMAGNETICKEHO POLE IN VIVO A IN VITRO|.
K. Marha (Ustav Hygieny Prace a Choreb, Prague, Czechoslovakia).
Pracovni Lekarstvi, vol. 15, Aug. 1963, p. 238–242. 6 refs. In Czech. English summary.

The effect of lethal doses of electromagnetic centimeter waves on the living organism was studied in groups of rats. The biological effects of an acute exposure are reversible below a certain dose of irradiation. Biological effectiveness of centimeter waves increases with repeated irradiations pointing to a cumulative effect due to altered sensitivity of the organism to irradiation. The biological effectiveness also depends on the shape of the signal, its amplitude, and, secondarily, the average density. The author considers the activity of a nonthermal component in addition to the thermal effects. The mechanism of the biological action of high-frequency electromagnetic fields is assumed to be a complex one rather than a simple destruction of molecules.

A64-80015
THE EFFECT OF VIOLENT EXERCISE ON TISSUE GLYCOGEN IN ALBINO MICE.
Charles G. Wilbur (Kent State U., Kent, Ohio; Armed Forces Inst. of Pathol., Washington, D.C.)
Life Sciences, no. 8, Aug. 1963, p. 564–568. 7 refs.
Contract No. DA-49-193-MD-2216.

Albino mice were forced to swim to exhaustion in water baths of different temperatures. Histochemical and microchemical analyses of various tissues from exercised and control mice were made. There was found a positive correlation between the following: bath temperature and swimming time; liver glycogen and body weight; muscle and liver glycogen. Negative correlations were found between liver glycogen and bath temperature; liver glycogen and swimming time. Muscle glycogen is held relatively constant after the first 20 minutes of swimming.

A64-80016
EFFECT OF BODY POSITION ON ARTERIAL AND END-EXPIRATORY CARBON DIOXIDE PRESSURE, RESPIRATORY VOLUME, AND PHYSIOLOGICAL DEAD SPACE |EINFLUSS DER KOPERLAGE AUF DEN ARTERIELLEN UND ENDEXSPIRATORISCHEN KOHLENSAUREDRUCK, DAS ATEMVOLUMEN UND DEN PHYSIOLOGISCHEN TOTRAUM|.
J. Bande, K. P. van de Woestijne, M. Nyst, and A. Gyselen.
Pflugers Archiv fur die gesamte Physiologie, vol. 278, 1963, p. 35. In German.

Studies were made of the effects of body position on various respiratory and circulatory parameters. In six normal subjects, a change from the lying to the sitting to the standing position produced a decrease in end-expiratory carbon dioxide pressure, increases in respiratory minute volume and heart rate, and no significant change in respiratory rate or tidal volume. Eleven hospital patients without heart or lung pathology showed similar changes, except for an increase in tidal volume with a change from the sitting to the standing position. Tendencies toward a decrease in arterial CO_2 pressure and an increase in the physiological dead space were also observed.

A64-80017
HUMAN BEHAVIOR UNDER STRESS–FROM COMBAT TO SOCIAL PSYCHIATRY.
Kenneth L. Artiss (Walter Reed Army Inst. of Res., Div. of Neuropsychiatry, Washington, D.C.)
Military Medicine, vol. 128, Oct. 1963, p. 1011–1015. 26 refs.

Certain trends have evolved in American psychiatry through experiences in World War II. Socioenvironmental variables were recognized as determinants of behavior. According to these principles, behavior disruptions were best treated immediately, in close proximity to the place of their occurence, and within the customary milieu, with full expectation of a recovery of function in a short time. Research at Walter Reed Army Institute of Research has since substantiated the empirical concepts by showing a large response of 17-hydroxycorticosteroids to social stimuli. Also, following an exorbitant demand, the endocrine system may take several days to recover. This finding may be related to the empirical 3 days required for the recovery of the disabled combat soldier.

A64-80018
ADAPTATION TO LIVING AND WORKING IN THE DESERT: A PSYCHIATRIC SURVEY AMONG UNITED STATES ARMY PERSONNEL IN THE LIBYAN SAHARA.
Hans J. Nieporent (Brooklyn State Hosp., Res. Facility, Brooklyn, N.Y.)
Military Medicine, vol. 128, Oct. 1963, p. 1016–1023. 13 refs.

A psychiatric questionnaire, supplemented by individual interviews in some subjects, was administered to fifty-five U. S. Army personnel stationed in the Libyan Sahara to elicit information on their adaptation to a desert environment. The discussion relates some of these findings to reports of groups living in isolated areas and to experimental studies in sensory deprivation.

A64-80019
COMMUNICATION THROUGH THE SKIN—"TICKLE TALK."
Glenn R. Hawkes and Earl A. Alluisi.
Lockheed Georgia Quarterly, vol. 1, Fall 1963, p. 8–11.

A cutaneous-communication code and system was devised to provide a first-level test of the feasibility of doing more work toward developing a system for transmitting linguistic information via the skin. The cutaneous code used in this test is described. Subjects were trained to use this code during just 12 hours. Not only were they able successfully to associate language symbols with different skin sensations according to code or alphabet, but also to achieve quite respectable rates of information transmission. The maximum rate achieved was 38 words per minute—a rate that is nearly 60% faster than the "expert" rate attained after 6 months of training in Morse code. The relationship of this system to two other cutaneous-communication systems is discussed. Systems of this type may be useful where vision or audition is limited, nonexistent, or highly subject to error, as when trying to hear in a noisy environment.

A64-80020
ANTHROPOMETRIC EVALUATION OF BODY COMPOSITION THROUGHOUT LIFE.
Albert R. Behnke (Calif. U. Med. Center, San Francisco).
Annals of the New York Academy of Sciences, vol. 110, Sep. 26, 1963, p. 450–464. 10 refs.

Anthropometric analyses previously limited to adults have been extended to individuals and groups of widely different ages. Principles and examples supporting the unity and coherence of anthropometric data are presented, which bear on body composition and the interrelationships between structural components that render anatomical data meaningful. Also presented are definitions, symbols, or formulas for lean body weight, circumferences and body weight, diameters and reference weights, and diameters and lean body weight. The anthropometric technique provides rapid presumptive estimates of body fat, excess muscle, and lean body weight. It is useful, therefore, as a screening procedure.

A64-80021
IS IT IMPACT OR CONTINUOUS NOISE?
Haven L. Williams (Dept. of Health, Lewistown, Pa.) and Andrew J. Majer.
Archives of Environmental Health, vol. 7, Oct. 1963, p. 411–414. 6 refs.

This study was undertaken to determine the number of impulses per second that an impact noise source would have to produce before the resultant noise would behave as steady-state noise. Tests of auditory discrimination of rapidity of impulses indicate that repeated impulses exceeding 22.2 impulses per second will be observed by an individual as a steady-state noise. It is concluded that noise resulting from repeated impulses in excess of 18 impulses per second willl tend to behave as steady-state noise. In future noise evaluations, impacts in excess of 18 per second will be treated as steady-state noise.

A64-80022
HYPERVENTILATION AND ABDOMINAL REFLEX INHIBITION IN THE RAT.
Hall Downes (Letterman Gen. Hosp., Anesthesia and Operative Serv., San Francisco, Calif.)
Anesthesiology, vol. 24, Sep.–Oct. 1963, p. 615–619. 16 refs.

The excitability of abdominal reflexes in the rat was investigated during varying degrees of passive pulmonary inflation with 100% O_2 with low concentrations of CO_2 in oxygen. Hyperventilation was found to produce inhibition of abdominal muscle reflexes not referable to hypocapnia or hypotension. Possible mechanisms involved in the inhibition of abdominal reflexes during hyperventilation are discussed.

A64-80023
MEASUREMENT OF THE INTERSYSTOLIC INTERVALS WITH THE AID OF A RAPID-RESPONSE FREQUENCY METER [INTEGRATION DES INTERVALLES INTERSYSTOLIQUES A L'AIDE D'UN FREQUENCEMETRE ANALOGIQUE A REPONSE RAPIDE].
R. Puccinelli, M. B. Cailler, R. Flandrois, and P. Bouverot.
Revue de Médecine Aéronautique, vol. 2, Aug.–Sep. 1963, p. 371–375. 5 refs. In French.

A device is described for the cycle-by-cycle measurement of cardiac frequency. The device consists of: (1) a system for the detection of ventricular systoles by measurement of cardiac electric potentials; (2) a 3-stage amplifier that permits a written recording of cardiac frequency, counting of cardiac pulsations in relation to time, and auditory surveillance of cardiac frequency; and (3) a built-in frequency scale. The apparatus allows instantaneous measurements of cardiac frequencies ranging from 30 to 480 cycles/minute. The device has been used in dogs simultaneously with measurements of arterial pressure, to test cardiovascular responses to adrenaline and pressure breathing; in rats, to test the cardiac response to smoke inhalation; and in men, at rest and during muscular exercise.

A64-80024
MODIFICATION OF THE ELECTROCARDIOGRAPHIC CRITERIA OF AURICULAR HYPERTROPHY IN SINUS TACHYCARDIA [MODIFICATION DES CRITERES ELECTROCARDIOGRAPHIQUES DE L'HYPERTROPHIE AURICULAIRE DANS LA TACHYCARDIE SINUSALE].
G. Fragoyannis and E. Georgiadis.
Revue de Médecine Aéronautique, vol. 2, Aug.– Sep. 1963, p. 375–379. In French. 10 refs.

A discussion is presented of the electrocardiographic indications of auricular hypertrophy and their diagnostic value. Analysis of 1,591 cases shows that the diagnostic value of electrocardiographic criteria is diminished under the influence of certain normal or pathological factors. Sinus tachycardia is the most important of these factors, and pulmonary P waves with a cardiac frequency greater than 100 per minute are often observed in healthy individuals. Consideration of these factors is especially important in the examination and selection of flying personnel.

A64-80025
PRELIMINARY STUDY ON HYGROMETRY ON A FOUR-JET CIVIL AIRLINER [ETUDE PRELIMINAIRE DE L'HYGROMETRIE A BORD D'UN QUADRIREACTEUR CIVIL]
André Corteel (Faculté de Med., Paris, France) and J. Colin (Centre d'Essais en Vol, Bretigny-sur-Orge, France).
Revue de Médecine Aéronautique, vol. 2, Aug.–Sep. 1963, p. 395–399. In French.

Measurements of air humidity were made with a psychrometer in the cabin of a DC-8 airliner during a commercial flight. The cabin atmosphere was found to be very dry during long-distance, high-altitude flight. It is suggested that the insensible water loss produced by exposure to dry air at altitude may result in significant dehydration, which cannot be rapidly compensated by the ingestion of water.

A64-80026
HYPEROPIA, EXOPHORIA, AND SPACE.
Robert B. Pomeranz.
Review of Optometry, vol. 100, Dec. 15, 1963, p. 29–31.

Accommodation and convergence are considered within the context of visual adjustment to the spatial environment. The best and physiologically most economical adjustment is made possible by + 0.75 O.U. (hyperopia) and 1/2 diopters of exophoria. This allows the individual to "close in" or localize the distant object and then identify it by manipulating in front and behind the object with his range of + 0.75 O.U. Correction of refractive error should take into consideration the individual's method of adjustment to his space environment.

A64-80027
VIBRATION MECHANICS OF THE SPINAL COLUMN [DAS SCHWINGUNGSMECHANISCHE VERHALTEN DER WIRBELSAULE].
Horst Krause (Max-Planck-Inst. fur Arbeitsphysiologie, Dortmund, Germany).
Internationale Zeitschrift fur angewandte Physiologie einschliesslich Arbeitsphysiologie, vol. 20, 1963, p. 125–155. 14 refs. In German.

The biomechanics of the human spinal column was studied at vibrations of 10 to 40 cycles per second. It was possible to measure the relative translatory motion of two adjacent vertebrae from the 5th to the 2nd lumbar vertebra, and the torsion and flexion angles of the vertebrae from the pelvic girdle to the 4th thoracic vertebra. Analysis of these data showed the largest deformations of the intervertebral disk between the 4th and 3rd lumbar vertebrae. Flexion causes the greatest deformation of the disk at vibration frequencies of 10 and 35 to 40 cycles per second; torsion exerts the greatest stress at 20 and 32.5 to 40 cycles per second. The same pair of vertebrae suffers the greatest strain also during longitudinal vibrations. Stress analyses of the deformation of this intervertebral disk may be the best starting point for a study of the stress–strain phenomena in the intervertebral disks.

A64-80028
ON WATER ELIMINATION THROUGH THE RESPIRATORY PASSAGES [SUR LES ELIMINATIONS D'EAU PAR LES VOIES RESPIRATOIRES].
Yvon Houdas and René Falet.
Revue de Médecine Aéronautique, vol. 2, Aug.–Sep. 1963, p. 409–410. In French.

Quantitative measurements were made of the water content of expired air of six subjects. Expired water was measured by weighing after recovery from the expired air by cooling and by exposure to sulphuric acid. The average water content of expired air was found to be 30.8 mg/g of dry expired air. Since this value is less than that corresponding to complete saturation of air at 37° C, it is concluded that either the saturated air is expired at a temperature less than 37°, or the expired air has a temperature of about 37° but is unsaturated.

A64-80029
AIR TRANSPORTATION OF PASSENGERS SUFFERING FROM CONGENITAL HEART DISEASES [LE TRANSPORT AERIEN DES CARDIOPATHIES CONGENITALES].
M. Durand and J. Bourdinaud.
Revue de Médecine Aéronautique, vol. 2, Aug.–Sep. 1963, p. 410–414. 45 refs. In French.

A review was made of 423 cases of congenital heart disease in which the patient was transported by air to the examination site. Air transportation resulted in fatalities, major incidents, or significant deterioration in the general condition of the patients. Polycythemic patients had no incidents of thrombosis, and showed no significant change in the number of red cells. It is concluded that air transportation in pressurized aircraft is permissible or preferable in most patients able to travel on land or sea. A plane designed for medical use is desirable, and the presence of a trained medical attendant is necessary in some cases. Transport aircraft carrying cardiac patients should preferably possess oxygen equipment and a medical facility isolated from other passengers. Air transportation is contraindicated in cases of congenital cyanosis and chronic or paroxysmal dyspnea which do not respond to therapy, in paroxysmal cyanosis, and in cases in which sudden death may occur under minimal stress.

A64-80030
MEASUREMENTS OF RADIOACTIVITY ON COMMERCIAL AIRLINES [MESURES DE RADIO-ACTIVITE SUR LES AVIONS COMMERCIAUX].
R. Laplane, J. Bernard (Services de Securité, Direction du Matériel d'Air-France, Paris), and E. Lafontaine (Service Méd. d'Air-France).
Revue de Médecine Aéronautique, vol. 2, Aug.–Sep. 1963, p. 419–421. In French.

A brief discussion is presented of the program for the routine measurement of radioactivity levels on airliners of the Air France company. Measurements over a 3-year period have shown radioactivity levels less than 0.5 mr/hr, except for five measurements showing levels of 0.75 to 2 mr/hr. It is concluded that the radioactivity encountered by passengers and crews of commercial aircraft is well below established safety levels.

A64-80031
THE ROLE OF LABYRINTHINE STIMULI IN VEGETATIVE REACTIONS OBSERVED IN THE RAT DURING ACCELERATION [ROLE DES AFFERENCES LABYRINTHIQUES DANS LES REACTIONS VEGETATIVES OBSERVEES CHEZ LE RAT AU COURS DE CENTRIFUGATIONS].
R. Grandpierre, R. Angiboust, G. Chatelier, J. B. Coin, J. Ginet, and J. Rozier.
Revue de Médecine Aéronautique, vol. 2, Aug.–Sep. 1963, p. 430–436. 23 refs. In French.

Heart and respiratory rates were recorded in normal, anesthetized, and labyrinthectomized rats during acceleration up to 30 g. In normal animals the heart rate decreased 15% during progressive acceleration. During stable acceleration at 30 g in the head–tail direction it was increased 15% above the resting rate, and was either increased or returned to the resting value for dorsal–ventral acceleration. During stable ventral–dorsal acceleration the heart rate remained low and returned to the resting value with right side–left side acceleration. Deceleration produced marked bradycardia, followed by a return to resting values 8 to 10 min after cessation of centrifugation. The respiratory rate was greatly increased in normal animals during acceleration below 5 g. At 5g, apnea occurred, followed during constant acceleration by a return to normal for the head–tail direction, and by slow respiratory movements in the transverse position. It tended to return to normal during deceleration. Results obtained with anesthetized and labyrinthectomized animals were slightly different. It is concluded that the changes in respiratory and cardiac rates are due to the combined action of hemodynamic, vestibular, and emotional factors.

A64-80032
STATISTICAL DATA CONCERNING NEPHRITIC COLICS AND RENAL LITHIASIS IN MEMBERS OF THE FLIGHT PERSONNEL OF THE AIR FORCE [DONNEES STATISTIQUES CONCERNANT LES COLIQUES NEPHRETIQUES ET LA LITHIASE RENALE, CHEZ LES MEMBRES DU PERSONNEL NAVIGANT DE L'ARMEE DE L'AIR].
P. Galban.
Revue de Médecine Aéronautique, vol. 2, Aug.–Sep. 1963, p. 437–439. In French.

Of 9,000 members of the French Air Force examined during the period 1959 to 1962, 154 were found to have experienced one or more episodes of nephritic colic, associated with probable lithiasis in 71 cases. The occurrence of lithiasis was more common in older subjects and in personnel stationed overseas, and was less common in fighter pilots than in transport pilots, regardless of age.

A64-80033
INTRAVENOUS UROGRAPHY IN MILITARY FLIGHT PERSONNEL (STATISTICAL STUDY COVERING THREE YEARS OF HOSPITAL PRACTICE) [L'UROGRAPHIE INTRAVEINEUSE DANS LE PERSONNEL NAVIGANT MILITAIRE (ETUDE STATISTIQUE DE TROIS ANS DE PRATIQUE HOPITALIERE)].
R. Delahaye, L. Tabusse, and R. Jolly (Hopital Militaire d'Instruction Dominique Larrey, Versailles, France).
Revue de Médecine Aéronautique, vol. 2, Aug.–Sep. 1963, p. 441–443. In French.

A statistical analysis was made of 146 cases in which intravenous urography was performed in flying personnel. Among 54 cases of nephritic colic, 26 pathological urograms were recorded, indicating lithiasis in 12 cases and congenital anomalies in 14. Lithiasis was also found in 12 of 31 patients presenting hematuria, and in 4 of 18 cases of pyuria. All patients with lithiasis had been stationed in warm countries, and more than half were over 30 years of age.

A64-80034
FRONTAL MUCOCELE REVEALED BY BAROTRAUMA (MUCOCELE FRONTALE REVELEE PAR BARO-TRAUMATISME).
L. R. Bordes, P. Robert, and R. Delage (Hopital Militaire Dominique Larrey, Versailles, France).
Revue de Médecine Aéronautique, vol. 2, Aug.–Sep. 1963, p. 446–448. In French.

A report is given of a case of mucocele found in the right frontal sinus of a young pilot. The mucocele was revealed by radiography after the pilot reported the regular occurrence of right frontal pain during flight, and one incident of massive nasal discharge during flight. The mucocele was surgically removed, and the pilot was returned to flight duty. It is suggested that without the aggravation of barotrauma, the mucocele would not have been discovered until bony erosion and externalization of the tumor into the eye had occurred.

A64-80035
MEDICAL AIR EVACUATIONS: STUDY OF TECHNIQUES, STATUS, AND RESULTS DURING THE WAR OF RESISTANCE OF THE A. F. N. AIR AMBULANCE CENTER OF THE 5TH AIR REGION (1957 to 1962). II. [LESS EVACUATIONS SANITAIRES AERIENNES: ETUDE DES TECHNIQUES BILANS ET RESULTATS REALISES AU COUR DE LA GUERRE SUBVERSIVE D'A. F. N. CENTRE DE TRANSIT SANTE AIR DE LA 5e REGION AERIENNE (1957 A 1962). II].
E. Franque.
Revue de Médecine Aéronautique, vol. 2, Aug.–Sep. 1963, p. 451–458. In French.

A review is presented of the medical techniques employed by the French for air evacuation of patients during the Algerian War. Techniques taught at the training school for air medical attendants are outlined. Problems of respiratory insufficiency are discussed, and types of respiratory apparatus and therapeutic techniques are described. Approximately 20,000 patients were transported from 1957 to 1962 without medical fatality or serious incident.

A64-80036
COMBINED EXAMINATION OF CIRCULATION AND RESPIRATION UNDER DIFFERENT OXYGEN CONCENTRATIONS [EXAMENS COMBINES DE LA CIRCULATION ET DE LA RESPIRATION SOUS DIVERSES CONCENTRATIONS D'OXYGENE].
H. W. Kirchoff (Luftfahrtmedizinisches Inst., Furstenfeldbruck, Germany).
Revue de Médecine Aéronautique, vol. 2, Aug.–Sep. 1963, p. 463–466. In French.

Respiratory oxygen concentrations of 14%, 12%, and 10% produced no change in oxygen consumption, and only slight increases in carbon dioxide production, respiratory equivalent (ratio of respiratory rate to oxygen consumption), respiratory rate, and pulse frequency. Systolic blood pressure remained stable, diastolic pressure and heart rate were slightly decreased. Electrocardiographic studies showed no change in the ST segment or T wave. Ventilation with 8% oxygen resulted in a 30%–50% increase in respiratory rate, an increase in pulse rate to over 100/minute, and a significant increase in blood pressure. Subjects with respiratory difficulty reacted to mild levels of hypoxia with a marked increase in respiratory rate and respiratory equivalent. Pulse frequency was greatly increased in subjects with circulatory difficulty, and hypertensive subjects showed an increase in diastolic pressure. Subjects with cardiac insufficiency showed significant changes in the electrocardiogram. It is concluded that tests of the effects of hypoxia on a variety of respiratory and circulatory parameters would be useful in the diagnosis of pathological conditions in pilots.

A64-80037
BIOASTRONAUTICS: THE STATE OF THE ART–1963.
Charles E. Goshen (W. Va. U. School of Med., Dept. of Psychiatry Morgantow
Industrial Medicine and Surgery, vol. 32, Dec. 1963, p. 500–507. 15 refs.

A discussion is presented of the accomplishments, problems, and implications of bioastronautics. Proposed American manned space flight projects are described, including the Gemini project, Apollo project, the orbital research laboratory, a space station, and interplanetary expeditions. Prerequisites for a habitable ecology in space are outlined, including provision for metabolic requirements, protection against space hazards, and consideration of potential psychological problems. Implications of bioastronautics research for industrial medicine are also discussed.

A64-80038
FEEDING EXPERIMENTS WITH ALGAE.
Marion E. McDowell and Gilbert A. Leveille (Fitzsimons Gen. Hosp., U.S. Army Med. Res. and Nutrition Lab., Denver, Colo.)
Federation Proceedings, vol. 22, Nov.–Dec. 1963, p. 1431–1438. 40 refs.

A review is presented of experimental studies concerning the nutritive value of algae. Subjects discussed include (1) the nutrient composition of algae and its variation with different growth and processing conditions; (2) feeding studies with chickens, rats, and men, and the effect of amino acid supplementation; (3) processing methods; (4) digestibility and acceptability if algae; and (5) toxic contamination of algal preparations. It is concluded that further studies are necessary in all these areas. Algae will probably play an important role in long-lasting space flights as both photosynthetic gas exchangers and sources of food.

A64-80039
CALORIC REQUIREMENTS UNDER ADVERSE ENVIRONMENTAL CONDITIONS.
Robert E. Johnson (Ill. U., Dept. of Physiol. and Biophys., Urbana).
Federation Proceedings, vol. 11, Nov.–Dec. 1963, p. 1439–1446. 28 refs.
Contracts No. AF 18(600)-80; DA-49-193-MD-2222.

A review is presented of data concerning the caloric requirements of healthy young men, and the effects of physical work, environmental temperature, and weightlessness in space flight. The effects of prolonged space flight on metabolic rate, specific dynamic action, and calorie loss in the excreta are discussed. A theoretical analysis is made of the energy cost of motion and locomotion in a space ship, and a generalized balance sheet of energy input and output is presented. Studies of the composition and effects of survival rations are briefly reviewed.

A64-80040
RELATIONSHIP BETWEEN CHANGES IN RESPIRATION AT A HIGH ENVIRONMENTAL TEMPERATURE AND THE POSITION OF THE ANIMAL.
A. O. Navakatikian.
Bulletin of Experimental Biology and Medicine, vol. 54, Nov. 1963, p. 1117–1120. 10 refs. Translation from Biulleten' Experimental'noi Biologii i Meditsiny, vol. 54, Oct. 1962, p. 60–63. In Russian.

Increase of amoient temperature to 40° to 45° C produces a positive correlation between the respiratory rate and its acceleration in freely moving and immobilized rabbits. At room temperature and high temperatures, the respiratory rate is lowered in rabbits tied on their backs to a stand. In high ambient temperature, the variational coefficients of the respiratory rate decreased as the body temperature increased. Apparently, reduced individual differences of some functional indices are characteristic of conditions that tend to increase the requirements on the organism.

A64-80041
THE EFFECT OF THE STRESS REACTION ON HIGHER NERVOUS ACTIVITY.
N. A. Nikolov (I. P. Pavlov Higher Med. Inst., Dept. of Pathophysiol., Plovdiv, Bulgaria).
Bulletin of Experimental Biology and Medicine, vol. 54, Nov. 1963, p. 1121–1123. 2 refs. Translation from Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 54, Oct. 1962, p. 63–66. In Russian.

Experiments with conditioned reflexes were carried out on four dogs. As established, stress reaction resulting from injection of formalin (2 ml. of 10% solution) into the right forepaw causes many changes in the higher nervous activity. During the first day, they are manifested in a marked (up to a total) inhibition in the cortex and subcortex and eosinophil count reduction by more than 50%– the phase of shock. A phase of countershock develops within the next three days, merging with the stage of resistance. The nervous system becomes inhibited again at the stage of exhaustion. The fourth stage, or the restitution stage, is described as well. In stress reaction, the excitatory process in the brain cortex suffers more than in subcortical nervous formations. This is explained by the greater resistance of the latter to strong stimuli formed during the phylogenesis.

A64-80042
REMOVAL AND COLLECTION OF EXCRETA FROM DOGS IN EXPERIMENTS LASTING SEVERAL DAYS.
O. G. Gazenko, A. A. Giurdzhian, G. A. Zakhar'ev, and L. I. Karpova.
Bulletin of Experimental Biology and Medicine, vol. 54, Nov. 1963, p. 1176–1178. Translation from Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 54, Oct. 1962, p. 123–126. In Russian.

A description is given of a device for the removal and collection of excreta of dogs in an isolated chamber during extended experiments. This device is made from rubber-impregnated stockinet and is placed on the animal. Excreta are collected into a special reservoir. This device functioned well without traumatizing the animal, providing freedom of movement for 20 experimental days.

A64-80043
IN VIVO STUDY OF OXYGEN TENSION IN BRAIN DURING PROLONGED ACCELERATION.
E. A. Kovalenko, V. L. Popkov, and I. N. Cherniakov.
Federation Proceedings, vol. 22, Nov.–Dec. 1963, Translation Supplement, p. T1112–T1114. 19 refs. Translation from Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 55, no. 1, 1963, p. 43. In Russian.

Accelerative overload of 2 to 4 g in the head-pelvis direction produced a transient increase of 5% to 10% in the brain oxygen tension of dogs, followed by a slight decrease. At 6 to 12 g, the oxygen tension again showed a transient increase, followed by a decrease to 72% to 84% of the initial value. Respiration was decresed, and the electroencephalographic waves decreased in frequency and increased im amplitude. With increasing accelerative overload in the pelvis-head direction, brain oxygen tension was gradually decreased to 84% of the initial level at 8 g. The animals developed sinus bradycardia, and the respiration rate was sharply reduced. Transverse accelerations up to 8 g produced little change in brain oxygen tension, and at 12 g the decrease was only to 80%. Changes in pulse and respiration were less marked than during acceleration in the pelvis–head or head–pelvis directions. It is concluded that the pathologic disturbances associated with acceleration involve other factors in addition to brain anoxia.

A64-80044
FUNCTIONAL CHANGES OF CIRCULATION AND RESPIRATION WITH AGE.
V. V. Frol'kis, S. F. Golovchenko, S. M. Dukhovichnii, and S. A. Tanin. (USSR Acad. of Med. Sciences, Inst. of Gerontology and Expt. Pathol., Physiol. Lab., Kiev, U.S.S.R.)
Federation Proceedings, vol. 22, Nov.–Dec. 1963, Translation Supplement, p. T1169–T1172. 14 refs Translation from Klinicheskaia Meditsina, vol. 40, no. 12, p. 82. In Russian.

Studies were made of cardiovascular and respiratory responses to exercise (graded wrist ergograph and orthostatic tests) in 80 subjects 20 to 30 years old, 130 subjects 60 to 70 years old, and 50 subjects 70 to 80 years old. The relationship between the size of the workload and the degree of functional changes was found to be considerably less in old subjects. No change in the duration of the systole occurred in old subjects, while young subjects showed a decrease in systole duration and a greater increase in heart rate. In old subjects a smaller increase in heart rate occurred after atropine injection, and a smaller decrease after hydroergotamine injection than in young subjects. Systolic blood pressure was increased less in old subjects, while diastolic pressure tended to increase. Increases in pulse and heart rates, minute output, and stroke volume were also less in old subjects, and energy expenditure and oxygen consumption during strenuous exercise were lower. The recovery was longer and less uniform in old subjects.

A64-80045
HEMOGLOBIN AT HIGH ALTITUDE AS RELATED TO AGE.
D. B. Dill, J. W. Terman, and F. G. Hall (Ind. U., Dept. of Anat. and Physiol., Bloomington).
Clinical Chemistry, vol. 9, Dec. 1963, p. 710–716. 17 refs.
Contract No. FA-2049.

During the summer of 1962 the early phase of acclimatization to high altitude was studied in six of those who participated in the international high-altitude expedition to Chile in 1935. Ages of the six ranged from 58 to 71. Two also had taken part in a high-altitude study in 1929. In their earlier years these subjects had had an increase in hemoglobin concentration beginning with their arrival at high altitude. This response has been well established, especially by the Pike's Peak party led by Haldane and the work of Hurtado and associates in Peru. On the other hand, five of the six in the 1962 party exhibited a decrease in hemoglobin concentration during the first few days. The greatest decrease was observed in the oldest subject. His hemoglobin was 88% of his sea level value after nine days at altitude and remained below his sea level value for another week. No observations were made on blood volume; hence, one can only speculate regarding possible related changes.

A64-80046
THE MECHANISM OF COLD HYPERPNEA IN THE RAT [SUR LE MECANISME DE L'HYPERPNEE AU FROID CHEZ LE RAT].
A. Chassain and E. Florentin (Faculte de Med., Lab. de Physiol. et Lab. de Physiol. Appl., Paris, France).
Journal de Physiologie, vol. 55, May–Jun. 1963, p. 413–423. 20 refs. In French.

Alveolar carbon dioxide pressure was calculated from measurements of oxygen consumption, alveolar ventilation, and the respiratory quotient in rats exposed to cold. Alveolar pCO_2 was found to be greater at 20° than at 30°, suggesting regulation of ventilation in moderate cold by chemical feedback. At 10° and 5°, alveolar pCO_2 was decreased markedly below the level at 30°. It is concluded that the increase in respiratory debt in extreme cold results from a physical stimulation of respiration originating in the peripheral receptors, rather than from chemical regulation of ventilation.

A64-80047
ELECTROMYOGRAPHIC ANALYSIS OF A SIMPLE VOLUNTARY MOVEMENT AND OF ITS SIMULTANEOUS EFFECT ON THE CONTRALATERAL INACTIVE EXTREMITY IN HEALTHY SUBJECTS [ELEKTROMYOGRAFICKA ANALYZA JEDNODUCHEHO VOL OVEHO POHYBU A JEHO IRADICIA NA KONTRALATERALNU INAKTIVNU KONCATINU U ZDRAVYCH OSOB].
F. Podivinsky (Ustav Experimentálnej Med. SAV, Bratislava, Czechoslovakia).
Bratislavské Lekárske Listy, vol. 2, 1963, p. 426-434. 13 refs. In Slovak.

Electromyographic activity in simply voluntary movements of extremities was studied with healthy subjects in relation to intensity of the contralateral motor irradiation and hemisphere dominance. Dominant and subordinate extremities did not differ significantly with respect to the magnitude of motor activity on the active extremity. Coinnervation of the antagonist muscle is considerable in proportion to the strength and rapidity of the movement. The intensity of the contralateral motor irradiation from the dominant flexor is significantly higher than that from the subordinate muscle; in extensors, motor irradiation from the subordinate to the dominant side is slightly higher. Motor irradiation from the dominant extremity is characterized by greater plasticity than that from the subordinate extremity. The mean intensity curves of motor irradiation from the dominant muscles present a parallel course — the irradiation from the dominant flexor drives the irradiation from the dominant extensor. This relation is not valid on the subordinate side.

A64-80048
ELECTROCARDIOGRAM OF THE YOUNG ANIMAL IN HYPOTHERMIA AND IN HYPERTHERMIA [ELECTROCORTICOGRAMME DU JEUNE ANIMAL SOUS HYPOTHERMIE ET SOUS HYPERTHERMIE].
D. Blozovski and M. Blozovski (Faculte des Sci., Lab. de Physiol. Gen., Paris, France).
Journal de Physiologie, vol. 55, Mar.–Apr. 1963, p. 115–116. In French.

Electrocardiograms were obtained from curarized young and adult rabbits and chickens during immersion in warm or cold water. No significant differences were observed in the response of young and adult animals to moderatee hypothermia (25° C). Cooling to 15° C was associated with a progressive decrease in the frequency of cortical discharges. The reestablishment of the cortical rhythm during rewarming was slower in adult animals. During moderate hyperthermia (42° C), the amplitude and frequency of discharges were increased in all animals, but convulsive activity was more frequent in young animals. Extreme hyperthermia (45° to 46° C) produced a further increase in the amplitude of discharges, while the frequency decreased until irreversible arrest occurred.

A64-80049
EARLY RESPIRATORY AND CIRCULATORY EFFECTS OF THE IMMERSION OF THE DOG IN COLD WATER [EFFETS RESPIRATORIES ET CIRCULATOIRES PRECOCES DE L'IMMERSION DU CHIEN EN EAU FROIDE].
G. Dupuy, R. Joley, and G. Rougier (Lab. de Biol. Appl. a L'Education Phys., Bordeaux, France).
Journal de Physiologie, vol. 55, Mar.–Apr. 1963, p. 138–139. In French.

Measurements of various resporatory and circulatory values were made in anesthetized dogs during complete immersion in water at a temperature of 15° to 16° C for 20 minutes. Three phases of reaction to immersion were observed. Apnea and vasomotor instability occurred during the first 30 seconds, with rapid vacillations of arterial pressure, the splenic oncogram, and circulatory debt. The apneic phase was followed by a period of hyperventilation, associated with an increase in heart rate, moderate arterial hypertension, splenic vasodilatation, and an increase in carotid debt. The third phase was characterized by stabilization or reversal of certain values. Immersion a second time produced a similar, but generally more marked, response. Rapid death occurred in two cases. Large individual variations of response to immersion were observed.

A64-80050
ELECTROMYOGRAPHY OF THE RESPIRATORY MUSCLES UNDER CONTINUOUS POSITIVE PRESSURE [ELECTROMYOGRAPHIE DES MUSCLES RESPIRATORIES SOUS PRESSION POSITIVE CONTINUE].
C. Jacquemin, P. Richard, and P. Varene (Centre d'Essais en Vol, Serv. de Physiol., Bretigny-sur-Orge, France).
Journal de Physiologie, vol. 55, Mar.–Apr. 1963, p. 153–154. 5 refs. In French.

Electromyographic studies were made of the respiratory muscles during breathing at normal pressure and at positive pressures of 10, 20, 30, and 40 cm of water. Electrical activity during inspiration was observed in the diaphragm at normal pressure and at all levels of positive pressure. Activity was observed in the scalene, sternocleidomastoid, and lumbar muscles only during forced inspiration at normal and positive pressures. The intercostal muscles were active during inspiration and expiration with forced breathing. It is concluded that the normal rhythm of respiratory muscle activity is maintained during positive pressure breathing.

A64-80051
EFFECT OF SIZE, SEX, AND AGE ON THE PULMONARY DIFFUSION CAPACITY OF THE NORMAL ADULT [EFFET DE LA TAILLE, DU SEXE ET DEL'AGE SUR LA CAPACITE DE DIFFUSION PULMONAIRE DEL'ADULTE NORMAL].
L. Billiet, W. Baisier, and J. P. Naedts (Clin. U. Sainte-Barbe, Pellenberg, Louvain, Belgium).
Journal de Physiologie, vol. 55, Mar.–Apr. 1963, p. 199–200. 5 refs. In French.

The relationship between pulmonary diffusion capacity and size, age, and sex was determined in 57 men aged 20 to 75 years, and 41 women aged 20 to 68 years. Pulmonary diffusion capacity was found to be more dependent on height than on body surface area, and was increased linearly with height. A significant interrelationship was found between the effects of height and age on pulmonary diffusion capacity. Diffusion capacity was generally lower in women, regardless of age or height.

A64-80052
STUDY OF THE EFFECT OF CARBON DIOXIDE ON VENTILATION AT DIFFERENT LEVELS OF OXYGENATION IN THE UNANESTHETIZED DOG [ETUDE DU STIMULUS CO_2 DE LA VENTILATION A DIFFERENTS NIVEAUX D'OXYGENATION CHEZ LE CHIEN EVEILLE].
P. Bouverot, R. Flandrois, R. Puccinelli, and P. Dejours (Centre d'Enseignment et de Rech. de Med. Aeron., Paris, France).
Journal de Physiologie, vol. 55, Mar.–Apr. 1963, p. 206–207. 8 refs. In French.

Measurements of the ventilatory response to transitory hypercapnia were made at various levels of oxygenation in unanesthetized intact or chemodenervated dogs. In intact dogs, inhalation of 7% CO_2 produced an increase in ventilation after 5 seconds. The hyperventilatory effect was greater at lower levels of oxgenation, and was largely suppressed during hyperoxia. Chemodenervated dogs showed only a slight increase in ventilation from 20 to 25 seconds after CO_2 inhalation, regardless of the level of oxygenation. It is concluded that chemoreflex factors are involved in the stimulation of ventilation by CO_2, and that a positive interaction of O_2 and CO_2 stimuli occurs at the level of the chemoreceptors.

A64-80053
MECHANISMS OF ACTION OF THE CARBON DIOXIDE STIMULUS ON RESPIRATION DURING PROLONGED HYPERCAPNIA [MECANISMES D'ACTION DU STIMULUS CO_2 DE LA RESPIRATION AU COURS DES HYPERCAPNIES PROLONGEES].
P. Bouverot, R. Puccinelli, R. Flandrois, and E. Papiernik (Centre d'Enseignement et de Rech. de Med. Aeron., Paris, France).
Journal de Physiologie, vol. 55, Mar.–Apr. 1963, p. 207–208. 4 refs. In French.

A study was made of the role of chemoreflex factors in the hyperventilation associated with prolonged hypercapnia. The effect of hypercapnia was determined in unanesthetized intact dogs and in dogs chemodenervated by section of the Hering nerves. Measurements of ventilation were made while the dogs breathed 35% oxygen with or without 3% or 5% CO_2 for 4 or 10 minutes. Hypercapnia in intact dogs produced a marked hyperventilation after 5 to 10 seconds, which became stable after several minutes. Chemodenervated dogs showed a lesser increase in ventilation, which began only after 20 to 25 seconds of hypercapnia. It is concluded that chemodenervation suppresses one of the factors responsible for the increase in ventilation during hypercapnia.

A64-80054
ON THE MECHANISM OF HYPERPNEA DUE TO COLD IN THE RAT [SUR LE MECANISME DE L HYPERPNEE AU FROID CHEZ LE RAT].
A. Chassain and E. Florentin (Faculte de Med., Paris, France).
Journal de Physiologie, vol. 55, Mar.–Apr. 1963, p. 221–222. 6 refs. In French.

Measurements of alveolar carbon dioxide pressure in rats at ambient temperatures ranging from 30° to 5° C were made to determine whether the hyperpnea associated with cold exposure is induced by chemical or physica factors. Alveolar carbon dioxide values were calculated from measurements of the ventilatory debt, oxygen consumption, and respiratory quotient. Alveolar pCO_2 at 20° was increased over that observed at 30°, suggesting regulation of ventilation by chemical feedback. At 10° and 5°, alveolar pCO_2 was decreased, indicating the intervention of physical factors in the induction of hyperventilation.

A64-80055
MAXIMAL OXYGEN CONSUMPTION AT DIFFERENT TYPES OF WORK [CONSOMMATION MAXIMALE D'OXYGENE AUX DIFFERENTS ERGOMETRES].
J. Damoseau, R. Deroanne, and J. M. Petit (Inst. Superieur d'Education Phys., Physiol., Liege, Belgium).
Journal de Physiologie, vol. 55, Mar.–Apr. 1963, p. 235–236. 6 refs. In French.

The effect of using different muscular groups on measurements of maximum oxygen consumption was investigated. Determinations of ventilation, oxygen consumption, intrathoracic pressure, and the electrocardiogram were made in four subjects performing various exercises leading to exhaustion in 6 minutes. The ergometers used were the bicycle, windlass, rowing machine, treadmill, step-test, and weight-lifting. Maximum oxygen consumption with exercises involving the arms was less than obtained with other exercises. Pulmonary dynamic work in relation to ventilation was similar for all exercises except weight-lifting, in which contraction of the glottis apparently occurred. The variations in maximum oxygen consumption with different exercises are attributed to regional fatigue and differences in the muscular groups utilized.

A64-80056
SPONTANEOUS VARIATIONS OF THE VENTILATORY PATTERN AND THE COMPOSITION OF THE ALVEOLAR AIR IN THE UNANESTHETIZED MAN [VARIATIONS SPONTANEES DU REGIME VENTILATOIRE ET DE LA COMPOSITION DE L'AIR ALVEOLAIRE CHEZ L'HOMME EVEILLE].
P. Dejours, J. Raynaud, P. Monzein, and R. Puccinelli (Centre Marie-Lannelongue, Lab. de Physiol., Paris, France).
Journal de Physiologie, vol. 55, Mar.–Apr. 1963, p. 236. In French.

A method is described for the continuous measurement of the composition of alveolar air. Samples of respired air are taken continuously from a face mask, which is connected to a pneumotachograph. Partial pressures of oxygen and carbon dioxide are measured with a mass spectrometer, and carbon dioxide pressure is measured by rapid infrared analysis. Simultaneous spirographic registration permits the calculation of tidal volume, respiratory period, total ventilatory debt, and the respiratory quotient. Studies can be made of the cycle-by-cycle relationship between alveolar air composition and ventilatory pattern.

A64-80057
THE USE OF PRESSURE-VOLUME DIAGRAMS IN THE STUDY OF POSITIVE PRESSURE BREATHING [L'UTILISATION DES DIAGRAMMES PRESSION-VOLUME POUR L'ETUDE DE LA RESPIRATION EN SURPRESSION].
C. Jacquemin and P. Varene (Centre d'Essais en Vol, Serv. de Physiol., Bretigny-sur-Orge, France).
Journal de Physiologie, vol. 55, Mar.–Apr. 1963, p. 267. 6 refs. In French.

A modification in the interpretation of the pressure-volume diagram described by Rahn is proposed in order to explain experimental observations of respiratory muscle activity during inspiration and during expiration in relaxation positive-pressure breathing. The reference pressure utilized is the oronasal pressure equal to the alveolar pressure at the level of the functional residual capacity, regardless of breathing pressure. Use of this reference pressure reveals no expiratory activity during positive-pressure breathing, whereas Rahn's diagram showing alveolar pressure in relation to volume indicates that expiration is totally active at pressures above 10 mm Hg.

A64-80058
MEASUREMENT OF THE PULMONARY DYNAMIC WORK IN THE UPRIGHT AND RECUMBENT POSITIONS [MESURE DU TRAVAIL DYNAMIQUE PULMONAIRE EN POSITIONS DEBOUT ET COUCHEE].
J. Troquet, J. Damoiseau, and J. M. Petit (Inst. Leon-Fredericq, Physiol., Liege, Belgium).
Journal de Physiologie, vol. 55, Mar.–Apr. 1963, p. 347. 8 refs. In French.

Various measurements and calculations were made to interpret discrepancies reported in the literature concerning the mechanism underlying the increase in the esophageal-pleural pressure difference with a change from the standing to the recumbent position. The authors conclude that the mediastinal factor is not a source of error in the calculation of pulmonary dynamic work. The increase in dynamic work with a change from the standing to the recumbent position is attributed to a decrease in the diameter of the air passage.

A64-80059
CURVES OF COMPLIANCE AND POSITIVE PRESSURE BREATHING [LES COURBES DE COMPLIANCE ET LA RESPIRATION EN SURPRESSION].
P. Varene and C. Jacquemin (Centre d'Essais en Vol, Serv. de Physiol., Bretigny-sur-Orge, France).
Journal de Physiologie, vol. 55, Mar.–Apr. 1963, p. 355. 5 refs In French.

Methods are described for the determination of static pulmonary and total (thoracopulmonary) compliance during positive pressure breathing. Both measurements are made with the "body box" technique of Rahn. Total compliance is computed from the spirographic volume and the oronasal pressure. Mouth pressure in relaxation and at equilibrium volume is always equal to the atmospheric pressure chosen as the zero reference. Curves are obtained that shift toward an increase in inspiratory volume as a function of pressure. Determinations of pulmonary compliance are made by the simultaneous measurement of esophageal pressure and the depression in the "body box" as a function of time. These two values vary equally in relation to the reference atmospheric pressure, so that a single curve of pulmonary compliance is obtained.

A64-80060
THE EFFECT OF REPEATED DEEP HYPOTHERMIA ON THE CONTENT AND DISTRIBUTION OF ASCORBIC ACID IN THE ADRENAL CORTEX OF THE RAT.
B. Neskovic, V. Vidovic, and V. L. Vidovic (Serbian Acad. of Sci. and Arts; and Belgrade U., Faculty of Nat. Sci. and Math., Belgrade, Yugoslavia).
(Acta Medica Iugoslavica, vol. 16, 1962, p. 77–92.) Acta Medica Iugoslavica, vol. 16, 1963, p. 41–49. 13 refs. Translation.
OTS 62-11760/1.

Three groups of rats were cooled in a chamber to a body temperature of 15° to 18° C. The groups were cooled once, eight and twenty times, respectively. Decrease of body temperature from normal was followed by a constant and gradual decrease of the ascorbic acid content of the adrenal cortex. The zonal distribution of this substance disappeared during cooling. No significant difference in the content and distribution of ascorbic acid was found between animals that underwent hypothermia once, eight, or twenty times. During rewarming there was a gradual accumulation of ascorbic acid in the adrenal cortex with a reappearance of zonal distribution. Normal content and distribution of ascorbic acid was attained 48 hours following the restoration of normothermia.

A64-80061
SPACE MEDICINE BEYOND THE MOON.
Hubertus Strughold (Aerospace Med. Div., Brooks AFB, Tex.)
Texas State Journal of Medicine, vol. 59, Dec. 1963, p. 1166–1172. 17 refs.

A discussion is presented of the solar radiation environment of interplanetary space, and the physical and chemical properties of planetary environments. Data are presented on intensity differences of solar electromagnetic, ultraviolet, visible light, and heat radiations from Pluto to Mercury. The environments of the planets, particularly Mars, are described, and their implications for space medicine are discussed.

A64-80062
MODIFICATION OF THE DOERFLER-STEWART TEST FOR THE DETECTION OF NON-ORGANIC HEARING LOSS.
Frederick N. Martin (Bailey Ear Clinic, Little Rock, Ark.) and Richard R. Hawkins (Children's Hearing and Speech Center, Little Rock, Ark.)
Journal of Auditory Research, vol. 3, Jul. 1963, p. 147–150.

A monaural modification of the Doerfler–Stewart test (D-S) for nonorganic hearing loss is described, using pure tones in lieu of spondee words, and white instead of sawtooth noise. The test depends upon the fact that it is extremely difficult to maintain consistent suprathreshold responses to pure tones when a noise is introduced to the test ear, intensified to mask the tone, and removed. The Modified D-S test has proved to be of particular value in cases of hearing loss where a patient cannot or will not give consistent responses to speech stimuli.

A64-80063
LEFT-RIGHT DIFFERENCES IN TACHISTOSCOPIC RECOGNITION.
M. P. Bryden (Waterloo U., Waterloo, Ont., Can.) and Christopher A. Rainey (Queen's U., Belfast, Northern Ireland).
Journal of Experimental Psychology, vol. 66, Dec. 1963, p. 568–571. 6 refs.
Grant No. DRB-G-9401-11.

Three types of material, letters, geometric forms, and outline drawings of familiar objects, were presented tachistoscopically to 32 subjects. In one series, the figures appeared successively in either the left or the right visual field; in a second series, two figures appeared simultaneously, one in each field. In the simultaneous presentation condition, all types of material were more readily recognized in the left visual field, a phenomenon that appears related to order of report. With successive presentation, a right-field superiority, greatest for letters and least for geometric forms, was observed. It is suggested that the left–right differences in successive presentation increase with increasing stimulus familiarity. Emphasizing fixation instructions decreased overall accuracy and accentuated left–right differences in both presentation conditions.

A64-80064
RELATION BETWEEN PHYSIOLOGICAL RESPONSES TO ENVRONMENTAL HEAT AND TIME JUDGMENTS.
C. R. Bell and K. A. Provins (London School of Hyg. and Tropical Med., Med. Res. Council Unit, London, Gt. Brit.)
Journal of Experimental Psychology, vol. 66, Dec. 1963, p. 572–579. 15 refs.

In three experiments, changes in the magnitude of estimation of standard intervals of 45 sec, 100 sec, 4 min, 9 min, and 13 min were examined when body temperature and pulse rates had been increased by exposure to high-temperature environmental conditions. Three methods of estimation were used: counting at an estimated rate of one digit per second, verbal estimation of time passed in a given activity, and the production of an interval named, but not demonstrated by experimenter. No consistent relationship was found between changes in either body temperature or pulse rate. Wide intersubject-variation was found in both direction and extent of change in estimate size, with significant increases in body temperature and pulse rate.

A64-80065
FUNCTIONAL RELATIONSHIPS BETWEEN THE RESPIRATORY MUSCLES AND MUSCLES PERFORMING DYNAMIC WORK.
A. M. Kulik (Acad. of Med. Sciences USSR, Inst. of Normal and Pathological Physiol., Moscow, USSR).
(Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 54, Nov. 1962, p. 17–21. In Russian). Bulletin of Experimental Biology and Medicine, vol. 54, Nov. 1963, p. 1197–1201. 5 refs.

A study was made of the electrical activity of respiratory muscles and working muscles of individuals on a bicycle ergometer. A close two-way connection is established between the electrical activity of respiratory muscles and muscles (gastrocnemius and femoral) participating in dynamic work. Stabilization of electric activity occurs earlier in the working muscles than in the respiratory muscles. This fact points to the leading role played by afferent impulses from the muscles participating in the dynamic work for the elaboration of respiration adequate for this work. On the other hand, the electrical activity of working muscles dropped when conditions disturbing the established adequate respiration character were created in the individuals under study.

A64-80066
THE EFFECT OF SEVERE HYPOTHERMIA ON THE CENTRAL NERVOUS SYSTEM AND ON PERIPHERAL NERVES.
H. B. Benjamin, P. Jochimsen, W. Jochimsen, and A. Becker (Marquette U. School of Med., Milwaukee, Wis.)
Revue Canadienne de Biologie, vol. 22, Sep.–Dec. 1963, p. 433–436. 9 refs.

In comparing the brains and sciatic nerves of rats that had survived severe hypothermia (body temperature, 45° to 55° F) by immersion in a water bath for periods ranging from 25 to 90 minutes with those of normothermic animals that were sacrificed, no alterations were seen on a gross and histological basis. Controls were indistinguishable from experimental animals. The cause of the temporary paresis, obviously a reversible phenomenon, has no adequate explanation.

A64-80067
EFFECTS OF EXERCISE AND CONFINEMENT ON GROWTH, MAZE LEARNING, AND ORGAN WEIGHTS IN RATS.
Bennett J. Cohen and Louis J. Serrano (Calif. U. School of Med., Los Angeles).
Laboratory Animal Care, vol. 13, Oct. 1963, p. 689–696. 8 refs.
Grant PHS-TG-2G-460.

Effects on male rats of confinement and of voluntary or forced exercise were determined. Confined rats weighed more and ingested more food between 21 and 61 days of age than exercising groups. Voluntarily exercising rats demonstrated superior ability to solve maze problems between 67 and 83 days of age. The thymus gland weighed less in voluntarily exercising rats than in confined rats at 84 days of age; but adrenal and testes weights were not different in the three groups. These results illustrate the importance of controlling physical activity in the housing environment for growing rats.

A64-80068
EFFECT OF GAS DENSITY AND VISCOSITY ON THE MAXIMAL EXPIRATORY FLOW-VOLUME RELATIONSHIP.
Donald P. Schilder, Albert Roberts, and Donald L. Fry (Natl. Heart Inst., Bethesda, Md.)
Journal of Clinical Investigation, vol. 42, Nov. 1963, p. 1705–1713. 15 refs.

Flow-volume curves (FV) were taken repeatedly for 3 weeks from four trained subjects as they expired gases of known density and viscosity. The gases were various mixtures of oxygen, carbon dioxide, nitrogen, sulfur fluoride, helium, and neon. The FV curve is divided into the α-β and β-γ segments. The lower part of the α-β segment, which spans most of the vital capacity and corresponds to the isovolumetric pressure flow, is greatly affected by gas viscosity. The upper segment of the α-β portion is more strongly affected by gas density. It is predicted that the slope of the α-β segment would vary inversely with the product of lung compliance and a lower airway resistance constant. This prediction is borne out by published evidence.

A64-80069
TWO MEASURES OF ANXIETY: A VALIDATION.
William D. Winter, Antonio J. Ferreira, and Robert Ransom (San Jose State Coll., San Jose, Calif.)
Journal of Consulting Psychology, vol. 27, Dec. 1963, p. 520–524. 14 refs.
Grant NIH MH-06560-01.

Nineteen undergraduates were subjected to two conditions of low anxiety, two of experimentally produced high anxiety, and two of examination anxiety. During each situation the subjects were administered the Affect Adjective Check List (AACL) and the Palmar Sweat Index (PSI), and later the Taylor Manifest Anxiety scale (MA). The findings were: (1) Both the AACL and PSI validly reflected anxiety. (2) Both yielded stable scores characteristic of the subject. (3) PSI did not correlate with AACL. (4) MA scale correlated with AACL, but not with PSI. (5) PSI and AACL responded differently to examination anxiety. (6) On the PSI, certain fingers seemed to sweat more than others. These findings indicate a lack of congruence between these verbal and physiological anxiety measures.

A64-80070
FORM RECOGNITION AT BRIEF DURATIONS AS A FUNCTION OF ADAPTING FIELD AND INTERVAL BETWEEN STIMULATIONS.
Charles W. Eriksen and Melvin Hoffman (Illinois U., Urbana).
Journal of Experimental Psychology, vol. 66, Nov. 1963, p. 485–499. 22 refs.
Grant NIH GM-1206.

Two experiments explored the question of whether an unrecognized stimulation has an effect upon the recognition of a subsequent stimulation and the duration of the time interval between successive presentations of a weak stimulus in order for the recognitions of the stimulus to be independent of one another. By means of a 3-field tachistoscope the recognition for a form presented twice, with an interval between presentations of 0, 5, 250, or 450 msec, was compared with recognition for a single exposure of the form at the same duration. Four conditions involving variation of the brightness of adapting field and of the interval between form presentations were investigated. In Experiment I, five practiced subjects made judgments under all conditions. In Experiment II, 12 subjects were assigned, 3 to each condition. Recognizability was found to be a complex function of whether a form was followed or preceded by a flash of light, the lag time between stimulations, and the brightness of the adapting field. The results were explained in terms of brightness summation that resulted in reduced figure–ground contrast for the form. Double presentation was slightly superior to single presentation, the amount of gain being a negatively accelerated function of lag time between the two presentations.

A64-80071
EFFECTS OF EXPOSURE VARIABLES ON FIGURAL AFTEREFFECTS UNDER TACHISTOSCOPIC PRESENTATION.
Elizabeth Fehrer and Donald Ganchrow (Brooklyn College, Brooklyn, N.Y.)
Journal of Experimental Psychology, vol. 66, Nov. 1963, p. 506–513. 15 15 refs.
Grant NSF G-19199.

Figural aftereffects with three of the Kohler and Wallach stimulus pairs were measured under tachistoscopic exposures. Inspection figure durations were varied from 5 to 1700 msec and interstimulus intervals from 0 to 1000 msec. Test figure exposures were held constant at 15 msec. With the shorter inspection periods, the curves relating magnitude of figural aftereffect to interstimulus interval were in the shape of an inverted U. With two stimulus pairs, the longest inspection periods resulted in monotonic curves, the magnitude of the effect decreasing with increase in interval. With the third stimulus pairs, all curves were U-shaped. The data indicate a reciprocal relation between inspection period and interstimulus interval for the production of maximal aftereffects. This relation is the same as one of Kort's laws for optimal phi, and suggests that brief exposure figural aftereffects and phi may have a similar physiological basis. The Kohler and Wallach and the Osgood and Heyertheories do not seem able to explain the U-shaped curves and certain other anomalous findings.

A64-80072
THE ORIGIN OF THE AUTOKINETIC EFFECT.
R. L. Gregory and O. L. Zangwill (Cambridge Psychol. Lab., Cambridge, Eng.)
Quarterly Journal of Experimental Psychology, vol. 15, Nov. 1963, p. 252–261. 21 refs.

After deviation of the eyes to an extreme position, fixation of a small light source with the eye in the central position gives rise to an immediate and pronounced autokinetic effect. This apparent movement is typically in the same meridian as that of the ocular deviation and is often, at all events at first, in the opposite direction. Similar results are obtained after induction

of unbalanced fatigue in the neck musculature. The autokinetic effect observed under these conditions warrants treatment as a primary illusion of movement and does not involve a standard of reference. The causal factor is concluded to be spontaneous minor fluctuations in the neural system which monitors the outward signals controlling eye movement.

A64-80073
PULMONARY DAMAGE DUE TO HIGH PRESSURE OXYGEN BREATHING IN RATS. IV. QUANTITATIVE ANALYSIS OF SULPHYDRYL AND DISULPHIDE GROUPS IN RAT LUNGS.
Dana Jamieson, Kathryn Ladner, and H. A. S. van den Brenk (Cancer Inst. Board, Radiological Res. Unit, Melbourne, Australia).
Australian Journal of Experimental Biology and Medical Science, vol. 41, Oct. 1963, p. 491–497. 14 refs.

The sulphydryl (-SH) and disulphide (-SS-) contents of rat lungs were measured before and after exposure of rats to oxygen at 5 atmospheres absolute (OHP). After 45 minutes at this pressure, lung damage occurred, and a decrease in -SH groups together with an increase in -SS- groups was found, such that the -SH/-SS- ratio in the lung tissue was halved. Injections of pentobarbital sodium, which protect against OHP lung damage, reduce auto-oxidation of -SH content of lung homogenate exposed to air in vitro and also reduce -SH oxidation in lungs of OHP-exposed rats.

A64-80074
CCl_4 TOXICITY. III. HEPATO-STRUCTURAL AND ENZYMATIC CHANGE.
Bertram D. Dinman (Ohio State U., Dept. of Preventive Med., Columbus), Ebtissam A. Hamdi (Cairo U., Faculty of Med., Sharia Hadiket El-ormane, Cairo, Egypt), C. Fred Fox (Chicago U., Dept. of Biochem., Chicago, Ill.), and Walter J. Frajola.
Archives of Environmental Health, vol. 7, Dec. 1963, p. 630–646. 45 refs.
Grants NIH-G-RG-6963; and NIH-G-A-5548.

Simultaneous serial examinations of serum enzyme activity and of alteration of liver structure at cellular and subcellular levels were performed on rabbits following six hours' exposure to 500 ppm CCl_4. Concomitantly, quantitation of structural modification and correlation with enzyme activity were attempted. The sequence of events in CCl_4 hepatotoxicity suggests that damage to cell membranes and/or ergastoplasm is the primary site of attack by this agent. However, one cannot absolutely eliminate the possibility of early damage of mitochondria, which produces interference with steady-state levels of nucleoside diphosphate and triphosphate and oxidative phosphorylation with consequent early impairment of the energy-dependent control of cellular permeability.

A64-80075
EVALUATION OF FLUCTUATING CARBON MONOXIDE EXPOSURES.
John R. Goldsmith (Calif. State Dept. of Public Health, Berkeley), Jean Terzaghi, and Jack D. Hackney.
Archives of Environmental Health, vol. 7, Dec. 1963, p. 647–663. 24 refs.

Carbon monoxide fluctuation over time and place is a major factor in effects of exposures of human populations. The mechanism of action is predominantly the impairment of the oxygen transport function of the blood. A mathematical approach for predicting the time course of carboxyhemoglobin, given the temporal fluctuation of carbon monoxide, was derived. The mathematical expressions required some simplifying assumptions. The latter were used to develop a computer program, and, with a simulated set of sinusoidal exposure data, the expected carboxyhemoglobin was calculated by using a method of iterative integration. Several sets of experimental data were approximated by both analog and digital computer techniques. The possible synergistic effect of other pollutants is reviewed.

A64-80076
RADIATION HAZARDS IN HIGH-POWER RADARS.
John D. McCarthy (Raytheon Co., Missile Systems Div., Radar and Electronics Lab., Bedford, Mass.)
Safety Maintenance, vol. 126, Dec. 1963, p. 46–49, 62–63.

Two major sources of radiation, RF energy and X-rays, associated with high-power radars, are discussed. Procedures and equipment for measuring this radiation and assuring that personnel are controlled in the hazardous areas are described. The film badges worn by almost all radiation workers can give a cumulative account of X-radiation. There is no equivalent measuring device for radiofrequency radiation, and the effect of this radiation is known to be cumulative. For this reason, radiofrequency radiation is potentially more dangerous than the X-radiation associated with high-power radars. It is hoped that the procedures and details of operation associated with them will continue to allow safe operation.

A64-80077
EFFECTS OF NOISE LEVEL AND DIFFICULTY OF TASK IN PERFORMING DIVISION.
James F. Park, Jr. and M. Carr Payne, Jr. (Ga. Inst. of Tech., Atlanta).
Journal of Applied Psychology, vol. 47, Dec. 1963, p. 367–368. 5 refs.

Subjects worked division problems for 20 minutes in the presence of 98 to 108 db of noise while subjects of comparable mean ability in arithmetic worked the problems under conditions of room noise. Under each condition, one group of subjects worked "easy" problems, and another group worked "difficult" problems. Intense noise produced no effect on mean number of problems correctly solved. Variability of performance was significantly greater with easy problems under intense noise conditions than under room-noise conditions, although there was no difference with difficult problems. There was no evidence of a decrement in performance within the 20-minute session attributable to noise level.

A64-80078
DOUBLING THE RATE OF SIGNAL PRESENTATION IN A VIGILANCE TASK DURING SLEEP DEPRIVATION.
D. W. J. Corcoran (Med. Res. Council, Applied Psychol. Res. Unit, Cambridge, England).
Journal of Applied Psychology, vol. 47, Dec. 1963, p. 412–415. 7 refs.

An experiment was conducted to test the effect of doubling the amount of work required of subjects after loss of sleep. Subjects were required to detect defined sequences of three digits ("signals") within an apparently random series. Digits were presented continuously for 30 minutes either at one per second (slow) or two per second (fast). The slow condition contained 20 signals; the fast condition 40. Slow and fast groups were tested on three successive days of a 60-hour vigil and two similar groups under control conditions. The results showed that loss of sleep affects performance under fast less than under slow. These and other results suggest that stimulation reduces the effect of sleepiness on performance.

A64-80079
RESPIRATORY AND METABOLIC CHANGES DURING PASSIVE AND ACTIVE MOVEMENT OF THE LOWER EXTREMITIES.
William Bierman and H. J. Ralston (Calif. U., Dept. of Physical Med. and Rehabil. and Biomech. Lab., San Francisco).
Archives of Physical Medicine and Rehabilitation, vol. 44, Oct. 1963, p. 560–564. 13 refs.
Grant No. HEW-G-RD-572.

Respiratory and metabolic changes were studied in 10 healthy human subjects in the supine position during passive and active movement of the lower extremities. The rates used were 24, 56, 88, and 120 motions per minute. The results indicate that passive movement of the lower extremities at the rate of 24 motions per minute causes little or no increase in metabolic demand. At the rates of 56, 88, and 120 motions per minute energy expenditure increases gradually from about 20% to about 40% above the resting level.

A64-80080
EFFECT OF IMMERSION IN HOT AND COLD WATER UPON RECOVERY OF MUSCULAR STRENGTH FOLLOWING FATIGUING ISOMETRIC EXERCISE.
David H. Clarke (Calif. U., Dept. of Physical Ed., Berkeley).
Archives of Physical Medicine and Rehabilitation, vol. 44, Oct. 1963, p. 565–568. 9 refs.
California U., Berkeley Faculty Res. Found-supported research.

Two fatiguing exercise bouts were given to 30 male subjects. They were separated by one week and each consisted of a single contraction of the hand-gripping muscles held maximally for 2 minutes. Maximum strength samples were taken at intervals of 60 seconds thereafter for a period of 10 minutes, during which time the arm was immersed in a water bath on one occasion at 10° C and on the other at 46° C. The recovery curves were described mathematically by a two-component exponential equation. The two occasions did not differ significantly in the total amount of recovery obtained; however, there was a significant difference between the means at 120 seconds. It was concluded that the local application of hot and cold water after the cessation of exercise did not appreciably alter the return of strength.

A64-80081
AN APPRAISAL OF EXERCISE FITNESS TESTS.
Leonard M. Linde (Calif. U., School of Med., Dept. of Pediat. and Physiol., Los Angeles).
Pediatrics, vol. 32, Oct. 1963, p. 656–659. 24 refs.

Fitness is defined as medical or health fitness. In this context the main interests include cardiovascular, respiratory, and chemical fitness. Various tests that measure these factors in different ways are mentioned. The measurement of maximal oxygen uptake gives the best indication of excercise capacity. Tests that allow estimation of maximal oxygen uptake by performance of submaximal workloads and measurement of heart rate response are described. Extrapolation of the heart rate up to 180 beats per minute can be used reliably to estimate maximal oxygen uptake.

A64-80082
CIRCULATORY CHANGES IN THE LUNGS DURING EXERCISE.
John T. Shepherd (Mayo Clin. and Mayo Found., Sect. of Physiol., Rochester, Minn.)
Pediatrics, vol. 32, Oct. 1963, p. 683–687. 15 refs.

During exercise the normal pulmonary vessels can accommodate a three to fourfold increase in flow with about a 50% increase in perfusion pressure. There is about a 10% increase in the total volume of blood in the lungs, which may be accounted for mainly by an increase in capillary blood volume. The diffusion capacity is increased, the concentration of red blood cells is increased, and a relatively uniform ventilation-perfusion ratio is achieved throughout the lung.

A64-80083
TEMPERATURE REGULATION IN EXERCISE.
Sid Robinson (Ind. U., Dept. of Anat. and Physiol., Bloomington).
Pediatrics, vol. 32, Oct. 1963, p. 691–702. 31 refs.

Body temperature response to work in general, as well as to work performed under cold, cool, and hot conditions, is discussed. Only in a hot environment does inadequate heat dissipation and the resulting excessive elevation of body temperature become a limiting factor in the performance of work. The regulation of body temperature by sweating and heat transfer is discussed. Recent experiments indicate that during work, sweating may be regulated by reflexes originating from thermal receptors in the veins draining warm blood from the muscles, summated with reflexes from the cutaneous thermal receptors, both acting through the hypothalamic center, the activity of which is increased in proportion to its own temperature. At the beginning of work the demand for blood flow to the muscles results in reflex vasoconstriction in the skin. As the body temperature rises, the thermal demand predominates and the cutaneous vessels dilate, increasing heat conductance to the skin. Large increments in cardiac output and compensatory vasoconstriction in the abdominal viscera make these vascular adjustments in work possible without circulatory embarrassment.

A64-80084
THE EFFECT OF HYPOTHERMIA ON CIRCULATORY REFLEXES IN THE HUMAN.
Emil Blair, R. Adams Cowley, Safuh Attar, and William G. Esmond (Md. U., School of Med., Dept. of Surgery, Baltimore).
Surgery, Gynecology, and Obstetrics, vol. 117, Nov. 1963, p. 553–558. 8 refs.
Grant NIH-G-HE-06154-02.

Total circulatory occlusion and release result in hemodynamic phenomena, which provide an index of integrity of some cardiovascular reflexes. These include carotid sinus and aortic baroceptors, arteriolar vasomotor tone, and venomotor reactivity. Baroceptor depression appears at a more moderate le el of cooling than does the sympathetic vasomotor depression. Below 28° C both are significantly depressed, although probably not totally abolished. The level of 28° C is a critical physiological level and may represent an important limit in the clinical use of hypothermia.

A64-80085
THE RESPONSE OF CEREBROSPINAL FLUID COMPOSITION TO SUSTAINED HYPERCAPNIA.
Howard L. Bleich, Peter M. Berkman, and William B. Schwarts (Tufts U. School of Med., Medford, Mass; Pratt Clinic-New England Center Hosp., Boston, Mass.)
Journal of Clinical Investigation, vol. 43, Jan. 1964, p. 11–16. 14 refs.
Grant Nos. PHS-G-H-759; PHS-G-HTS-5309.

Cerebrospinal fluid (CSF) and plasma pH, CO_2, bicarbonate, and electrolytes were measured in dogs exposed to 12% CO_2 for 1/2, 3, 8, or 24 hr, or 5 days. CSF bicarbonate rose gradually during the first 8 hr of exposure, remaining at the same level during the next 4 days. Plasma water bicarbonate was increased after 1/2 hr, and showed no further significant increase until a measurement was made after 5 days. Plasma bicarbonate was higher than CSF bicarbonate after 1/2 hr, lower after 24 hr, and the same after 5 days. Hydrogen ion concentrations in both fluids were increased to a maximum during the first 1/2 hour of hypercapnia, and decreased slightly thereafter. Plasma and CSF chloride were decreased after 5 days by an amount equivalent to the rise in bicarbonate concentration. Sodium and potassium concentrations were not significantly changed. The CSF/plasma ratios of all electrolytes were the same after prolonged hypercapnia as in the control state, suggesting that any existing transmembrane potentials governing ion distribution in the two fluids were maintained during hypercapnia.

A64-80086
INFLUENCE OF DEXTRAN OF LOW AND HIGH MOLECULAR WEIGHT ON THE ELECTROCARDIOGRAM OF HYPOTHERMIC DOGS.
Bengt W. Johansson and Matti Huttunen (Allmanna Sjukhuset, Dept. of Med., Malmo, Sweden).
American Journal of Cardiology, vol. 12, Dec. 1963, p. 792–794. 12 refs.

Dogs were cooled three times to 20° or 22° C. They received low-molecular-weight dextran during one cooling, high-molecular-weight dextran during another, and the third cooling was used as a control when they were given no dextran at all. A 12-lead electrocardiogram was recorded during the cooling. There were no definite differences in the electrocardiograms from the different series. The hypothesis was presented that the aggregation of blood corpuscles, "sludging," during hypothermia might impair the circulation and produce anoxia causing the ST-T changes. This hypothesis was not corroborated by the present results.

A64-80087
STROKE VOLUME CHANGES IN BABOONS DURING SPONTANEOUS ACTIVITY AND EXERCISE.
Dean L. Franklin and Robert L. Van Citters (Scripps Clinic and Res. Found., Inst. for Cardio-Pulmonary Diseases, La Jolla, Calif.)
American Journal of Cardiology, vol. 12, Dec. 1963, p. 816–821. 9 refs.
Natl. Heart Inst. Res. Grant No. HE-5575.

Heart rate, stroke volume, cardiac output, and duration of ventricular ejection were calculated from continuous recordings of blood flow in the ascending aorta in baboons during spontaneous activity, postural changes, and treadmill exercise. The waveform of blood flow in baboons was generally the same as that recorded in dogs and man. Startle reactions, postural changes, and onset of exercise were all accompanied by increases in heart rate, decreases in the duration of ejection, and a higher peak ejection velocity. Stroke volume remained essentially constant, and never changed by more than 25% of the initial value despite wide variations in cardiac output and heart rate. During spontaneous postural changes, the change in heart rate often occurred up to 15 sec before any observable physical movement.

A64-80088
PHOSPHORUS METABOLISM IN COLD-EXPOSED RATS.
John R. Beaton (Defence Res. Med. Labs., Toronto, Ont.)
Canadian Journal of Biochemistry and Physiology, vol. 41, Nov. 1963, p. 2209–2214. 10 refs.

Male rats weighing 2.07 ± 2.38 grams were exposed to cold (2° to 3° C) for a period of 7 days during which urine and feces were collected daily and analyzed for phosphorus. As a consequence of cold exposure, urinary excretion of phosphorus is increased. With free access to food, the increased food (and hence phosphorus) intake of the animals compensates for the increased urinary excretion and a normal phosphorus balance results. Cold exposure was without significant effect upon blood concentrations of acid-soluble, inorganic, organic, or lipid phosphorus. Increased inorganic and decreased organic, nonlipid phosphorus levels were observed in livers of cold-exposed rats. These observations suggest the breakdown of organic phosphates to inorganic phosphorus.

A64-80089
INFLUENCE OF DIET COMPOSITION AND CALORIC INTAKE ON BODY WEIGHT OF WARM- AND COLD-ACCLIMATED RATS.
A. Des Marais and P. A. Lachance (Ottawa U., Dept. of Biol., Ottawa, Canada).
Canadian Journal of Biochemistry and Physiology, vol. 41, Nov. 1963, p. 2225–2235. 23 refs.
Natl. Res. Council of Canada Proj. No. MT-698.

The well-known reduction in growth rate of cold-acclimated rats has been shown to depend on a decreased gain in total body fat, without change in the gain in lean body weight. This has been observed in rats fed "lab chow" or a high-fat diet ad libitum. In those groups fed a high-carbohydrate diet ad libitum or calorie-restricted high-fat or high-carbohydrate diets, exposure to cold had no effect on the gain in either total body weight or lean body weight, which were already reduced by the diet; in those animals, the significant decrease in the gain in total body fat upon exposure to cold was compensated by a slight but insignificant increase in the gain in lean body weight, so that differences in gain in total body weight were not significant.

A64-80090
SUBJECTIVE EVALUATION OF THE ANNOYANCE PROVOKED BY AIRPLANE NOISES [EVALUATION SUBJECTIVE DE LA GENE PROVOQUE PAR DES BRUITS D'AVIONS].
E. Perret (Inst. d'Hygiene et de Physiol. du Travail, Zurich, Switz.), E. Grandjean (Lab. Fédéral d'Essai des Materiaux, Zurich, Switz.), and A. Lauber (Inst. de Rech., Zurich, Switz.)
Helvetica Physiologica et Pharmacologica Acta, vol. 21, Nov. 1963, p. C40–C42. In French.

A study was made of the annoyance produced by simulated aircraft noises varying in intensity, duration, noise spectrum, frequency, and number of repetitions. The average annoyance level was increased linearly as a function of intensity in decibels, and was increased as a function of duration. Annoyance was greater with high-spectrum noise than with low-spectrum noise. The frequency of noise exposures had no effect on annoyance levels, but repetition of the same noise produced a slight decrease in annoyance.

A64-80091
INTERMITTENT LIGHT STIMULATION AND FUSION FREQUENCY [STIMULATION LUMINEUSE INTERMITTENTE ET FREQUENCE DE FUSION].
P. Rey and J. -P. Rey (Geneve U., Inst. de Physiol., Geneva, Switz.)
Helvetica Physiologica et Pharmacologica Acta, vol. 21, Nov. 1963, p. C52–C55. In French.

An experiment was conducted to determine whether the decline in flicker fusion frequency (FFF) during the performance of certain visual tasks is caused by the intermittency of stimulus signals. FFF was measured in subjects viewing intermittent light signals or a sequence of letters presented at various frequencies. Intermittent light stimulation at frequencies lower than the FFF was found to decrease FFF, while stimulation at frequencies above the FFF had no effect. The extent of the decrease in FFF was dependent on the frequency of light stimulation, and was greatest for frequencies between 20 and 25/second. FFF declined rapidly at the onset of stimulation, and more slowly thereafter. The relationship between the decrease in FFF after 2, 4, 6, and 8 minutes of stimulation and the decrease after 10 minutes was constant for all frequencies of stimulation. Identical results were obtained when subjects viewed letters rather than light signals. It is concluded that tasks involving intermittent visual stimulation can produce a decline in FFF.

A64-80092
OPERATION TIME AS A FUNCTION OF FOOT PEDAL DESIGN.
Don Trumbo (Kansas State U., Manhattan) and Morris Schneider (Texas Technol. Coll., Lubbock).
Journal of Engineering Psychology, vol. 2, Oct. 1963, p. 139–143.

Response times in depressing 5-ft pedals were compared for 10 subjects in a replicated 5 x 5 Latin square design. Foot pedals varied in the location of the fulcrum and the presence or absence of a heel rest, but were alike in spring constant and the angular movement required to complete the response. The results show a consistent relationship between response time and placement of the fulcrum with pedals pivoted at the heel and requiring a downward movement of the toes yielding the best performance.

A64-80093
RELATIVE MUSCLE LOADING AND ENDURANCE.
Lee S. Caldwell (U.S. Army Med. Res. Lab., Fort Knox, Ky.)
Journal of Engineering Psychology, vol. 2, Oct. 1963, p. 155–161. 7 refs.

The maximum strength of manual pull was determined for both male and female subjects. Each subject was then required to maintain control forces at several proportions of his maximum strength. As the relative load was increased from 25% to 100% of maximum strength, the response endurance decreased at a diminishing rate from 252 seconds to 2 seconds. No statistically significant difference in endurance was obtained between sexes, despite the fact that the mean absolute loads sustained by the males were approximately twice those for the females. The subjects differed significantly in endurance, but this was not attributable to differences in strength, or the actual loads maintained. Thus, when individual differences in strength were removed through use of the relative loading technique, there was no statistically significant relationship remaining between the actual force sustained and the endurance of a static response.

A64-80094
A REVIEW OF BIOMEDICAL MONITORING ACTIVITIES AND REPORT ON STUDIES MADE ON F-105 PILOTS.
W. M. Helvey, G. A. Albright, and I. Axelrod (Republic Aviation Corp., Space Environment and Life Sci. Lab., Farmingdale, N.Y.)
Aerospace Medicine, vol. 35, Jan. 1964, p. 23–27. 9 refs.

Higher performance and increasing complexity of aircraft have diversified and extended man's role as part of the vehicle system in face of mounting hazards and psychophysiological stresses. Together with the dynamic monitoring of test aircraft, biomedical telemetry was developed to gather data on the organism's response to physiological and psychological stresses of flight. Military research programs have developed methods of measuring and transmitting physiological parameters such as electroencephalogram, electrocardiogram, galvanic skin response, respiratory rate, and body temperature. The value of these has been demonstrated during the balloon flights Stratolab and Manhigh; during the extensive in-flight monitoring program of the F-105, a Mach-2 Fighter-Bomber involving maximal stress maneuvers; and in suborbital flights. Physiological and psychological reactions to various stresses were identified and differentiated. Extension of biotelemetry to experimental and clinical medicine is planned. A 15-channel, lightweight solid-state PAM/FM biomedical telemetry system has been developed and is in use. The aim is to achieve empirical standards for normal responses to dynamic stressful situations with a validity similar to existing clinical standards.

A64-80095
PSYCHOLOGICAL CORRELATES OF BIODYNAMIC STRESS: DESCRIPTION OF SIX SUBJECTS SUSTAINING OVER 500 ACCUMULATIVE "G."
Ray A. Craddick (N. Mex. State U., University Park).
Aerospace Medicine, vol. 35, Jan. 1964, p. 40–42. 11 refs
Contract No. AF 29(600)-3473.

Six men, members of the "500 G Club" (mean age 38.8 years, mean accumulated g-stress experience 648.4 g's), were administered the following battery of psychological tests: (1) Minnesota Multiphasic Personality Inventory (MMPI); (2) Strong Interest Test; (3) Wechsler Adult Intelligence Scale (WAIS); (4) Rorschach Ink Blot Test; (5) Thematic Apperception Test (TAT); (6) Trail Making Test (TM); (7) Graham-Kendall Memory for Designs Test (MFD); and (8) Kahn Test of Symbol Arrangement (KTSA). The results for the group fail to reveal any deficit in intellectual or central brain functioning. Intellectually, the group functions at the top of the bright–normal category on the WAIS. Clinically, their personality adjustment appears to be satisfactory. Certain interesting presonality dimensions appeared to be characteristic of the individuals in this group.

A64-80096
DEFINITIVE SURGICAL TREATMENT OF SPONTANEOUS PNEUMOTHORAX.
Philip A. Cox and John M. Keshishian (Andrews AFB; George Washington U. Hosp., Wash., D.C.)
Aerospace Medicine, vol. 35, Jan. 1964, p. 62–65. 6 refs.

The etiology, pathology, diagnosis, and treatment of spontaneous pneumothorax are discussed in detail. Indications for definitive treatment by open thoracotomy, bleb excision, and pleural roughening are cited. In certain selected cases of flying personnel (pilot, navigator, copilot, engineer, paratrooper), definitive surgery is indicated when cysts are demonstrated on routine chest X-ray or when only one episode of spontaneous pneumothorax has occurred. Six weeks after surgery pulmonary function studies are performed for reevaluation of their flying status. No recurrences have been noted in those cases operated definitively.

A64-80097
A SMALLPOX IMMUNITY SURVEY AT A LARGE INTERNATIONAL AIRPORT
Joseph M. Miller, Grace B. Bissonette, and Kenneth T. Bird (Mass. Gen. Hosp., Boston; Harvard Med. School, Boston, Mass.)
Aerospace Medicine, vol. 35, Jan. 1964, p. 68–69. 2 refs.

A smallpox vaccination program was offered to 142 employees of the Massachusetts Port Authority working at Loagn International Airport in Boston, Massachusetts. Sixty persons (42%) availed themselves of smallpox vaccination; while the remainder (58%) did not. The 80% of those vaccinated had not been previously vaccinated within 5 years and were below optimal protection against smallpox. Two-thirds of those not submitting to vaccination were nonimmune by the usual 5-year criterion and nevertheless chose to avoid vaccination. The implication and importance of satisfactory immunity among airport personnel is discussed in relation to the global epidemiology of smallpox. The need for intensive education of potentially susceptible persons is apparent.

A64-80098
CONTACT DERMATITIS TO FLIGHT GLOVES.
Paul H. Jacobs, Theodore A. Tromovitch, and Herbert W. Coone (Andrews AFB Hosp., Wash., D.C.)
Aerospace Medicine, vol. 35, Jan. 1964, p. 70–71. 3 refs.

Severe dermatitis of hands of a year's duration in a 27-year-old jet pilot was diagnosed to be a case of contact dermatitis. Patch tests revealed sensitivity to chromates and nickel. The onset of dermatitis was related to the wearing of unlined chrome-tanned flight gloves, NB3A. Topical therapy plus avoidance of contact with leather and metals enabled the pilot to return to flight duty. The importance of the use of patch tests in the service cannot be overlooked in view of the high cost of specialized training of the personnel plus the added cost of premature disability retirement and/or loss of working time due to hospittalization.

A64-80099
ACETATE-1-C14 METABOLISM OF WHITE FAT FROM HAMSTERS IN COLD EXPOSURE AND HIBERNATION.
Joan Baumer and Arliss Denyes (Queen's U., Biol. Dept., Kingston, Ont., Canada).
American Journal of Physiology, vol. 205, Nov. 1963, p. 905–908. 17 refs.
NRC of Canada and Ontario Res. Found.-supported research.

Incorporation of C^{14} from acetate-1-C^{14} into lipid and CO_2 by epididymal fat from golden hamsters kept at room temperature, acclimated to $5^{\circ} \pm 1^{\circ}$ C, in hibernation, and arousing from hibernation was measured in vitro at 37° C. Summer and winter series were compared. The C^{14} O_2 production by tissue from control and acclimated animals was similar, but the C^{14} O_2 production of tissue from hibernating and arousing hamsters was significantly greater than that from acclimated animals. There was a large increase in the lipid-C^{14} of tissue from cold-acclimated animals, and this increase persisted into hibernation but was slightly depressed in tissue from arousing animals.

Many acclimated and all hibernating hamsters had involuted testes and a greater incorporation of C^{14} into lipid than those with noninvoluted tests. A greater percentage of hamsters hibernated in the cold room during the winter, and at this time the incorporation of C^{14} into lipid by the fat pad was greater than in the summer.

A64-80100
ATP CONTENT IN THE CENTRAL NERVOUS SYSTEM OF RATS EXPOSED TO CHRONIC HYPERCAPNEA.
Sofia Navón and Alberto Agrest (Buenos Aires U., Inst. de Investigaciones Medi., Hosp. Tornu, Buenos Aires, Argentina).
American Journal of Physiology, vol. 205, Nov. 1963, p. 957–958. 15 refs.

Concentration of adenosine triphosphate (ATP) in the medulla oblongata and in the forebrain of rats exposed continuously to gas mixtures containing 6% to 8% CO_2 shows an exponential decay up to the 12th day. The exponential decay of ATP concentration has a slope of k = 0.10, and it levels off between the 12th and 15th day of hypercapnia.

A64-80101
EFFECTS OF ARTERIAL HYPOXIA ON THE HEART AND CIRCULATION: AN INTEGRATIVE STUDY.
Cecil E. Cross, P. Andre Rieben, Charles I. Barron, and Peter F. Salisbury (St. Joseph Hosp., Dept. of Med. Res., Lockheed Aircraft Corp., Burbank, Calif.)
American Journal of Physiology, vol. 35, Nov. 1963, p. 963–970. 37 refs.
Natl. Heart Inst. HE-G-06766; Tobacco Ind. Res. Comm. Grant.

An integrative series of investigations progressed from simplified systems, where cause-and-effect relations were relatively clear, to the virtually intact animal with separately perfused carotid arteries. Arterial oxygen tension (pO_2) below 40 mm Hg (about 75% oxygen saturation) caused edema of the heart muscle; however, the contractile strength and performance of isolated hearts were compromised severely only when the arterial pO_2 had fallen below 15 mm Hg (about 25% saturation). The "acute circulatory crisis" which is known to occur when the arterial oxygen saturation falls below 80% was not caused by weakness of the heart muscle but by reflexes from the carotid artery territory: even when the oxygen saturation of systemic arterial blood had fallen as low as 50% this did not cause heart failure as long as the carotids were perfused with blood of normal pO_2. Severe heart failure occurred when the blood in the carotid arteries was moderately hypoxic (pO_2 below 50, sat. below 80%) while the rest of the circulation was fully oxgenated.

A64-80102
ELECTROSHOCK SEIZURES AND BRAIN CHEMISTRY AFTER ACUTE EXPOSURE TO MODERATE COLD.
Rodolfo Petschek and Paola S. Timiras (Calif. U., Dept. of Physiol., Berkeley).
American Journal of Physiology, vol. 205, Dec. 1963, p. 1163-1166. 22 refs.
Grant PHS-G-GM-09267-02.

Adult male rats were exposed to 2.5° C for 60 hours, and responses to threshold and supramaximal electroshocks were studied. Body weights, adrenal and thymus weights, and concentrations of water, sodium, potassium, chloride, and glycogen (or glucose) in brain, liver, muscle, and plasma were determined. Cold exposure markedly lowered seizure threshold, but failed to affect the pattern of maximal seizures. It also caused a significant drop in body weight, as well as the adrenal hypertrophy and thymic involution usually observed under stress. Biochemical studies revealed brain (cortex, cerebellum, and brain stem studied separately) to be much more stable in water and electrolyte content than are liver, muscle, and plasma. Sodium retention in muscle and liver and potassium depletion in muscle occurred in the cold-exposed rats, probably as a result of increased secretion of mineralocorticoids, but these changes were not apparent in brain. Calculations of distribution of water and electrolytes in brain showed a significant increase in effective extracellular sodium in the cortex. Cold exposure caused hyperglycemia and a significant drop in glycogen content in all tissues analyzed.

A64-80103
INFLUENCE OF HEMATOCRIT RATIO ON SURVIVAL OF UNACCLIMATIZED DOGS AT SIMULATED HIGH ALTITUDE.
Elvin E. Smith and Jack W. Crowell (Miss. U. Med. Center, Dept. of Physiol. and Biophys., Jackson).
American Journal of Physiology, vol. 205, Dec. 1963, p. 1172-1174. 16 refs.
Contract No. DA-49-193-MD-2219.

Dogs with various hematocrit ratios were obtained by natural selection, hemorrhage, transfusion, and pretreatment with phenylhydrazine. Fifty-one dogs were placed in a closed chamber, and a 40,000 ft altitude was simulated by proper adjustment of the oxygen-to-nitrogen ratio. This altitude was maintained for 6 hr. Most dogs with hematocrits less than 24 or greater than 66 died before the simulated altitude was attained; those with hematocrits of 24 to 30 survived from 1/2 to 5 hr. No dogs with hematocrits from 37 to 54 died. The same procedure was repeated at a simulated altitude of 50,000 ft with a group of 38 dogs. The survival group was composed of dogs with hematocrits of 36 to 46. Dogs with hematocrits of 40 to 41 remained conscious and active, whereas those with hematocrits on either side of this value became comatose. These data indicate that the optimum hematocrit ratio for survival of the unacclimatized dog at acutely induced high altitude is about 40. Deaths occurring on both sides of the optimum value may be explained by a simultaneous consideration of the curves depicting oxygen-carrying capacity of the blood and blood viscosity at all ranges of hematocrit.

A64-80104
ACCELERATION.
Evan F. Lindberg and Earl H. Wood (Mayo Clin. and Mayo Found., Rochester, Minn.)
IN: Physiology of Man in Space. Edited by J. H. U. Brown (National Inst. of Health, Bethesda, Md.) New York and London, Academic Press, 1963, p. 61–111. 28 refs.
Contract No. AF 33(616)-7594.

This chapter is concerned primarily with the objective studies of physiological changes in human subjects produced by the inertial forces resulting from acceleration. The following are included: (1) the human centrifuge; (2) subjective sensations of acceleration; (3) objective changes during headward acceleration (effects on the cardiovascular system, cerebral circulation, respiration); (4) footward acceleration; (5) acceleration perpendicular to the long axis of the body; (6) methods of protection against the effects of acceleration (development of antiblackout suits, water immersion, and protective devices for footward and transverse acceleration); and (7) angular acceleration.

A64-80105
HUMAN TOLERANCE.
Bruno Balke (USAF School of Aviation Med., Randolph Air Force Base, Tex.)
IN: Physiology of Man in Space. Edited by J. H. U. Brown (National Institute of Health, Bethesda, Md.) New York and London, Academic Press, 1963, p. 149–171. 10 refs. $13.00.

Some aspects of human tolerance for various space flight stresses are presented. These are approached from the standpoint of an "average" individual and/or of one who has used all potential training and conditioning facilities for achieving the maximum level of adaptive capacity for the stresses anticipated. Included are the following: (1) psychophysiological stress; (2) tolerance for gravitational forces (acceleration, deceleration, and weightlessness); (3) the psychophysiological problem of hyperventilation; (4) high altitude tolerance (breathing normal air, breathing 100% oxygen, breathing oxygen under pressure, and pressure suit); (5) dysbarism or decompression sickness; (6) tolerance for hypercapnia; (7) tolerance for temperature extremes; and (8) tolerance for physical work (functional limitations, metabolic limitations, and environmental effects on work capacity).

A64-80106
EFFECT OF DIFFERENT PRESSURE BREATHING PATTERNS ON ALVEOLAR-ARTERIAL GRADIENTS IN DOGS.
Norman A. Bergman (Utah U., Coll. of Med., Div. of Anesthesiology; Veterans Adm. Hosp., Salt Lake City, Utah).
Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1049–1052. 14 refs.
PHS-G-H-5786.

Arterial end-tidal carbon dioxide gradients were measured, and alveolar-arterial oxygen gradients were estimated in dogs during intermittent positive pressure ventialtion at constant inflating pressure; four curves having differing pressure profiles were used. The smallest gradients for both oxygen and carbon dioxide occurred when mean pressure during respiratory cycles was high, and decreases in mean pressure were consistently associated with increases in both oxygen and carbon dioxide gradients. Profile of the applied pressure curve per se did not influence magnitude of the gradients. It is concluded that during intermittent positive pressure breathing, relative distribution of pulmonary capillary blood flow and inspired gas may vary with mean pressure during the respiratory cycle and is more uniform when mean pressure during the respiratory cycle is high.

A64-80107
EFFECT OF OXYGEN INHALATION ON COLD THRESHOLDS.
D. M. MacCanon and J. Resnik (Chicago Med. School, Div. of Cardiovascular Res., Chicago, Ill.)
Journal of Applied Physiology, vol. 18, Nov. 1963, p 1057–1060. 16 refs.
Dept. of the Army Grant No. DA-MD-49-193-62-G43; PHS HE-KE-K3-13, 433-C1.

The effect of oxygen inhalation on cutaneous thresholds for cold sensation was determined by exposing a 50-cm^2 area on the chest to a radiant cold source of variable intensity for 2-sec intervals in 11 healthy 23- to 26-year-old nude subjects at two ambient temperatures. Oxygen breathing produced a similar significant increase in cold thresholds in both cool (22.4° to 23.5° C) and warm (36.6 to 39.3° C) environments. Observations at warm ambient temperatures substantiate the oxygen effect independent of suspected reflex vasoconstriction in the cold environment.

A64-80108

FREQUENCY-DEPENDENT COMPLIANCE AT DIFFERENT LEVELS OF INSPIRATION IN NORMAL ADULTS.

R. J. Mills, G. Cumming, and P. Harris (Birmingham U., Queen Elizabeth Hosp., Dept. of Med., Birmingham, England).

Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1061–1064. 15 refs.

Measurements of pulmonary compliance were made at different respiratory frequencies in 11 normal adults. The observations were carried out at three levels of inspiration, the constancy of the volume of air in the lungs being checked by body plethysmography. Compliance decreased with an increasing respiratory frequency at each level of inspiration. The effect was greatest at the lowest lung volume, and least at the middle lung volume. Variations in respiratory frequency had no significant effect on the pulmonary resistance.

A64-80109

RESPIRATORY ACCLIMATIZATION TO CARBON DIOXIDE.

K. E. Schaefer, B. J. Hastings, C. R. Carey, and G. Nicols, Jr. (U.S. Naval Submarine Base, Med. Res. Lab., Groton, Conn.)

Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1071–1078. 39 refs.

Twenty-one subjects were exposed to 1.5% carbon dioxide in 21% oxygen for 42 days with preexposure and postexposure periods on air for 9 days. Respiratory minute volume (Ve) and alveolar carbon dioxide tension (pCO_2) were increased throughout the exposure to CO_2. After transition to air, Ve decreased, whereas pCO_2 remained elevated for 9 days. CO_2 retention with uncompensated respiratory acidosis lasted for 23 days. CO_2 excertion was increased during the 9-day recovery period indicating release of CO_2 from the CO_2 stores. Oxygen consumption did not change significantly during the experiment. Respiratory acclimatization to CO_2 involved a continuous increase in tidal volume, while the respiratory rate declined slowly after an initial increase. Changes in respiratory pattern were associated with an increase in physiological and anatomical dead space. A significant increase in the arterial-alveolar pCO_2 and alveolar-arterial oxygen tension gradient indicated the development of an alveolar dead space. The ventilatory response to 5% CO_2 was markedly reduced at the end of CO_2 exposure.

A64-80110

CALCIUM PHOSPHORUS METABOLISM IN MAN DURING ACCLIMATIZATION TO CARBON DIOXIDE.

K. E. Schaefer, G. Nichols, Jr., and C. R. Carey (U.S. Naval Submarine Base, Med. Res. Lab., New London, Conn.)

Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1079–1084. 12 refs.

The calcium phosphorus metabolism was studied in 20 subjects who were exposed for 42 days to 1.5% carbon dioxide. Plasma calcium mirrored the changes of the pH, showing a decrease during the first 23 days of exposure, a return to initial levels during the latter part of exposure, a marked rise above control values during the 8 to 9-day recovery period following exposure, and a return to normal values after 4 weeks of recovery. Changes in plasma calcium were found to correspond to changes in pulmonary CO_2 excretion indicating a significant role of bone CO_2 stores in acclimatization and deacclimatization to carbon dioxide. Plasma inorganic phosphorus was elevated throughout the exposure period and recovery period. At the end of the exposure period to CO_2, red cell calcium had increased and red cell phosphorus had decreased. After 9 days as well as after 4 weeks of recovery on air, the calcium content of the red cells continued to increase and the inorganic phosphorus values remained lowered.

A64-80111

DISCREPANCY BETWEEN HEART RATE AND OXYGEN CONSUMPTION DURING WORK IN THE WARMTH.

Lucien Brouha, Mary E. Maxfield, Paul E. Smith, Jr., and Gordon J. Stopps (E. I. du Pont de Nemours and Co., Haskell Lab. for Toxicol. and Indust. Med., Wilmington, Del.)

Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1095–1098. 8 refs.

These experiments compare the usefulness of oxygen consumption and heart rate as indicators of the strain produced by repetitive work in various environments. When the length of the rest periods was determined by the time for oxygen consumption to return to its resting level, a steady state of heart rate and oxygen consumption was achieved in a comfortable environment. In warm surroundings, oxygen consumption reached again a steady state but the heart rate increased during repetitive work cycles. When the duration of the rest periods was arbitrarily fixed, both oxygen consumption and heart rate reached constant steady states in repeated work cycles when the environmental stress was light. When it was severe, oxygen consumption remained at the same average value from cycle to cycle and failed to indicate the presence of accumulated strain revealed by increasing heart rates.

A64-80112

VALIDITY OF HEART RATE AS AN INDICATOR OF CARDIAC STRAIN.

Mary E. Maxfield and Lucien Brouha (E.I. du Pont de Nemours and Co., Haskell Lab. for Toxicol. and Indust. Med., Wilmington, Del.)

Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1099–1104. 13 refs.

Total cardiac cost is a measurement of the area under the curve obtained by plotting the heart rate for each minute during work and recovery. In a constant environment it varies with the work accomplished in a given time and, for a constant work performance, it varies with the severity of the conditions. The work accomplished per beat has a reciprocal relation to total cardiac cost when work and recovery times are constant. Recovery cost and the average of three early recovery heart rates, P_1, P_2, and P_3, vary linearly with total cardiac cost when work or environmental stress increases. In these experiments, P_1, P_2, and P_3 are the heart rates per minute recorded during the last 30 seconds of the 1st, 2nd, and 3rd minutes, respectively, of the recovery period. These recovery pulse rates provide a simple measurement of the degree of cardiac strain induced by work in any environment.

A64-80113

TEMPERATURE REGULATION BY HYPOTHALAMIC PROPORTIONAL CONTROL WITH AN ADJUSTABLE SET POINT.

H. T. Hammel, D. C. Jackson, J. A. Stolwijk, J. D. Hardy, and S. B. Stromme (John B. Pierce Found. Lab., New Haven, Conn.)

Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1146–1154. 28 refs.

The role of the hypothalamic and skin temperatures in controlling the thermal response of a resting animal (dog or rhesus monkey) was studied. The results indicate that (1) a resting animal shivers in a cold environment with the same or higher hypothalamic temperature as the same animal in a neutral environment; (2) a resting animal pants in a hot environment with the same or lower hypothalamic temperature as the same animal in a neutral environment; (3) the hypothalamus is nonetheless strongly responsive to an increase or decrease of 1° C; (4) the rate of heat loss increases at the onset of sleep while the hypothalamic temperature is 1° to 2° C lower during sleep even though thermoregulatory responses are the same as when awake; and (5) the rate of heat loss decreases upon awakening while the hypothalamic temperature is rising. The discussion of these results includes a suggestion that the set point for temperature regulation is decreased by a rising or elevated skin and extrahypothalamic core temperature, increased by a falling or lowered skin and extrahypothalamic core temperature, and decreased upon entering and during sleep and increased upon awakening.

A64-80114

RESPIRATORY CONTROL AT HIGH ALTITUDE SUGGESTING ACTIVE TRANSPORT REGULATION OF CSF pH.

J. W. Severinghaus, R. A. Mitchell, B. W. Richardson, and M. M. Singer Calif. U. Med. Center, Cardiovascular Res. Inst. and Dept. of Anesthesia, San Francisco).

Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1155–1166. 62 refs. PHS Grants No. HE-06265; RG-5831; and 2G-63.

The role of cerebrospinal fluid (CSF) pH and HCO_3–ion in stimulating respiration was studied in four men during acclimatization from sea level to 3,800 meters for 8 days. Mean CSF and arterial blood values for sea level control and 2nd and 8th day at altitude were determined. Ventilatory response to four levels of alveolar CO_2 was determined while subjects breathed high oxygen to eliminate peripheral chemoreceptor drive, and for each value of alveolar carbon dioxide tension ($PACO_2$), arterial and CSF pH were computed. The displacement of the ventilation response curves at altitude from the sea level curves was: -10 mm Hg $PACO_2$, + 0.06 pH unit for arterial blood, but -0.01 for CSF pH. CSF HCO_3 was 4 to 5 meq/liter lower than control within 1 to 2 days at altitude, whereas renal buffer base excretion only reduced blood standard bicarbonate 1 meq/liter after a week. CSF HCO_3 chloride and lactose rose about 6 and 1 meq/liter. Thus, medullary respiratory chemoreceptor drive, initially reduced at altitude by hyperventilation alkalosis, is restored to normal during acclimatization by reduction in CSF HCO_3, the incremental ventilatory drive being supplied by peripheral chemoreceptors. The data suggest that CSF pH is thus regulated by active transport through the blood-CSF barrier.

A64-80115

VARIOUS HORMONE CHANGES DURING SIMULATED SPACE STRESSES IN THE MONKEY.

W. D. Winters (Calif. U. Med. Center, Space Biol. Labs., and Dept. of Pharmacol., Los Angeles).

Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1167-1170. 12 refs. Grant No. AF-AFOSR-61-81.

Experiments with monkeys were undertaken to study the alteration in urinary excretion of 17-ketogenic steroid, catecholamine, and urine output during several simulated space stresses, i.e., centrifugation, libration, and isolation with restraint. The results indicated a variability of responses depending on the type and degree of stress. Reduction in urine volume was observed in all instances. A fall in steroid and slight elevation in catecholamine excretion was observed following vibration and centrifugation. The centrifugation appeared to be slightly more stressful. Isolation with restraint appears to be a severe stress to the animals as demonstrated by a marked elevation of amine, and a marked reduction in both urine output and steroid excretion.

A64-80116
EFFECT OF PARTIAL IMMERSION IN WATER ON RESPONSE OF HEALTHY MEN TO HEADWARD ACCELERATION.
Earl H. Wood, Evan F. Lindberg, Charles F. Code, and Edward J. Baldes (Mayo Clin. and Mayo Found., Rochester, Minn.)
Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1171–1179. 18 refs.
Contract No. AF 33(616)-7594; NIH Res. Grant No. H-3532.

Protection against the effects of headward acceleration afforded by immersion in water was assayed on 15 trained subjects in the human centrifuge. The protection afforded the various physiologic variables (vision, ear opacity, ear pulse, heart rate) increased with the magnitude of acceleration tested. Protection against loss of consciousness may be greater than protection against blackout and is probably similar to the protection afforded ear pulse and heart rate. The cardiovascular reactions produced by headward acceleration are qualitatively similar with and without water immersion. This finding does not support the concept that impediment to venous return is the primary determinant of man's tolerance to headward acceleration. Visual symptoms occurred at greater amplitudes of ear pulse (and presumably at greater blood pressures at head level) during water immersion than during control runs.

A64-80117
REGULATION OF BREATHING AT BEGINNING OF EXERCISE.
F. N. Craig, E. G. Cummings, and W. V. Blevins (U.S. Army Chem. Res. and Develop. Labs., Appl. Physiol. Branch, Edgewood Arsenal, Md.)
Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1183-1187. 23 refs.

In initial 20-sec periods of running on the treadmill, raising the slope to 12% increased by 50% the integrated muscle action potential recorded from the underside of the thigh, without affecting the ventilation in four men. Five men worked for 1 min at four tasks, two on the treadmill and two on the horizontal cycle ergometer. Each pair of tasks consisted of slow and rapid leg movements at the same rate of work. Ventilation often continued at about the resting rate for the first few seconds of work, unaffected in any significant way by frequency of leg movement. In the subject responding to the onset of exercise by a sudden, sharp, involuntary increase in ventilation, the nature of the nervous respiratory drive is not clear. Whatever drive arises from the work itself may be strongly modified by training or by complexities in the work situation.

A64-80118
INSENSIBLE WEIGHT LOSS OF CLOTHED RESTING SUBJECTS IN COMFORT ZONE TEMPERATURES.
J. F. Hall, Jr., and F. K. Klemm (6570th Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1188–1192. 10 refs.

Thirty-nine experiments were conducted on 10 male subjects wearing light clothing (0.9 clo) and exposed for 2 hours at 22°, 23.9°, 26.7°, 29.4°, and 32.2° C, and at constant (10 mm Hg) ambient water-vapor pressure. The first hour was for equilibration. Mean skin and body temperatures were measured with 17 thermistors and rectal thermistor, respectively. At ambient temperatures 22° to 26.7° C insensible loss rate increased slightly (21 to 26.5 g/m^2 hour). From 26.7° to 32.2° C, however, increase was marked (26.5 to 64 g/m^2 hour) with an abrupt rate increase at 26.7° C ambient and a mean skin temperature of 34.6° C. The importance of ambient air temperature as a control factor in total water loss of subjects in closed space systems in shown.

A64-80119
SOME EFFECTS OF VIBRATION ON TOTALLY IMMERSED CATS.
R. W. Pape, F. F. Becker, D. E. Drum, and D. E. Goldman (Naval Med. Res. Inst., Bethesda, Md.)
Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1193–1200. 11 refs.

Twenty-five of 55 cats survived exposure to sinusoidal vertical vibration with acceleration peaks of 15 g for periods averaging 47 min. A decrease in peak acceleration from 15 to 10 g caused a large decrease in mortality. Time of exposure, within limits of 15 to 120 min, also affected mortality, but much less strikingly than acceleration. The heart rate and mean respiratory rate are little changed during severe vibration. Respiration becomes irregular, and the tidal volume is greatly depressed. At 15 g peak acceleration, electrocardiographic changes of ischemia and injury occur, especially in those cats that die later. The most significant gross pathological findings are pulmonary collapse and hemorrhage, involving especially the peripheral parts of the lower lobes, and gastrointestinal hemorrhage. The major changes appear to be related to vascular change, either by rupture, leakage, or changes in tone. The resulting ischemia contributes to tissue damage and death.

A64-80120
EFFECT OF TEMPERATURE ON SENSITIVITY OF THE FINGER.
Laurence Irving (Alaska U., Lab. of Zoophysiology, College, Alaska).
Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1201-1205. 14 refs.
Grant PHS-G-GM-10402; Grant NSF-G-11205.

Subjects reported the detection of impacts from objects falling upon the ball of the finger. On six days, for one of the subjects, the threshold of perceptible impact was least at about 35° C. It increased rapidly as the finger was cooled to 20° C. In five other subjects falling droplets of mercury and falling steel ball bearings showed the threshold for detection to increase rather regularly for each individual as the skin was cooled, but with considerable individual variation. The variation in sensation threshold for impact with temperature raises the question of how heterothermous organisms can estimate and react suitably to some peripheral conditions that must be assessed on absolute scales by means of neural processes that are so thermolabile.

A64-80121
TOLERANCE TO EXTREME COLD AT ALTITUDE IN A NEPALESE PILGRIM.
L. G. C. E. Pugh (Natl. Inst. for Med. Res., Div. of Human Physiol., London, England).
Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1234-1238. 17 refs.

Body temperature and respiratory experiments are reported on a Nepalese pilgrim who survived, uninjured, 4 days of exposure at 15,000 to 17,500 ft in midwinter, wearing only light clothing and no shoes or gloves. His resistance to cold depended on elevation of metabolism and, unlike tolerance of immersion in cold water, was not related to subcutaneous fat thickness. He slept soundly in spite of the cold and so did not become exhausted. In 3 to 4 hr experiments at 0° C (clothed), rectal temperature and skin temperature over the trunk showed only minor changes; hand and foot temperatures did not fall below 10° to 13° C. Maintenance of body temperature was accounted for by elevation of metabolism.

A64-80122
THE EFFECT OF BRIEF PROFOUND HYPOXIA UPON THE ARTERIAL AND VENOUS TENSIONS IN MAN.
J. Ernsting (Roy. Air Force Inst. of Aviation Med., Farnborough, Hants England).
Journal of Physiology, vol. 169, Nov. 1963, p. 292-311. 24 refs.

Continuous recordings of arterial and venous blood oxygen saturation and pH were made in subjects hyperventilating with 100% nitrogen for 16 sec. Hyperventilation with nitrogen reduced the end-tidal oxygen tension to below 19 mm Hg, and the calculated arterial oxygen tension was reduced to a minimum of 16 mm Hg. The minimum calculated arterial carbon dioxide tension was 22.5 mm Hg, and the end-tidal CO_2 tension was 17 mm Hg. Venous blood pH showed no change during nitrogen hyperventilation. Venous oxygen tension was reduced most rapidly and to the greatest extent in the jugular venous blood, followed by the pulmonary arterial blood and the femoral venous blood. Heart rate was increased, and a secondary increase occurred in arterial pressure and calf blood flow. No significant effects were observed on the electrocardiogram or electroencephalogram.

A64-80123
THE FOVEAL ABSOLUTE VISUAL THRESHOLD FOR SHORT FLASHES AND SMALL FIELDS.
F. H. C. Marriott (Oxford U., Lab. of Physiol., Oxford, England).
Journal of Physiology, vol. 169, Nov. 1963, p. 416-423. 11 refs.

For 1.2-msec flashes of a 1-minute field foveal thresholds ranged from 494 to 879 quanta of light of 550 mμ. The frequency-of-seeing curves were rather steeper than those found for similar experiments in the periphery. There was no reason to associate the variability directly with quantum fluctuations, but the steepness of the curves excludes simple 2-, 3-, and 4-quanta theories of vision.

A64-80124
THE DYNAMICS OF COSMIC MEDICINE.
Constantine D. J. Generales, Jr. (N.Y. Med. Coll., N.Y.)

New York State Journal of Medicine, vol. 64, Jan. 15, 1964, p. 225-235. 4 refs.

General implications of the research effort of space scientists are discussed. Subjects considered include the origin of life, closed ecological systems, unusual effects of weightlessness, measuring instruments, effects of radiation, and the sociopolitical impact of international cooperation and competition in space flight.

A64-80125

PHYSIOLOGIC AND PSYCHOLOGIC ASPECTS OF THE GRAVITY SPECTRUM (Continued).

Cleto Di Giovanni, Jr., (Lankenau Hosp., Div. of Res., Philadelphia, Pa.) and Randall M. Chambers (U.S. Naval Air Develop. Center, Aviation Med. Acceleration Lab., Johnsville, Pa.)

New England Journal of Medicine, vol. 270, 9 Jan. 1964, p. 88-94. 48 refs.

PHS-Fellowship MPD-18119.

A discussion is presented of the possible effects of acceleration on psychomotor performance, and the effects of subgravity and weightlessness on the cardiovascular system. Pertinent data are presented from laboratory and clinical experiments and orbital flights. The human centrifuge is described, and techniques for the study of weightlessness are discussed, including the keplerian trajectory, orbital flight, bed rest, and water immersion.

A64-80126

PHYSIOLOGIC AND PSYCHOLOGIC ASPECTS OF THE GRAVITY SPECTRUM (Concluded).

Cleto Di Giovanni, Jr., (Lankenau Hosp., Div. of Res., Philadelphia, Pa.) and Randall M. Chambers (U.S. Naval Air Develop. Center, Aviation Med. Acceleration Lab., Johnsville, Pa.)

New England Journal of Medicine, vol. 270, 16 Jan. 1964, p. 134-139. 88 refs.

PHS-Fellowship-MPD-18119.

A discussion is presented of the possible physiologic and psychologic effects of subgravity and weightlessness. Problems considered include excess calcium mobilization, muscular atrophy, and bone demineralization; disorientation, oculogravic illusion, and vestibular disturbances; psychomotor performance, visual acuity, and sleep; and orthostatic intolerance. Pertinent evidence is presented from laboratory experiments, zero-gravity trajectory flights, and suborbital and orbital flights.

A64-80127

A MATHEMATICAL TREATMENT OF THE BLOOD DISSOCIATION CURVE FOR OXYGEN.

Rodolfo Margaria (Milan U., Ist. di Fisiol. Umana, Milan, Italy).

Clinical Chemistry, vol. 9, Dec. 1963, p. 745-762. 23 refs.

A quantitative description of Bohr's effect can be made from the oxygen dissociation curves of hemoglobin (Hb) at different pH, and the disociation constants of the O_2-linked acidic group of Hb ($K\bar{R}$) and HbO_2 (K_O) have been calculated as, respectively, 1.29×10^{-8} and 3.42×10^{-7} at 37° C. On the assumption that the oxygenation of hemoglobin takes place in four successive steps, the constant for each equilibrium can easily be calculated and the values giiiiven. It appears that the oxygenation takes place with the same affinity for the first three steps, whereas the affinity for the fourth oxygenation is 125 times greater. A simplification of Adair's formula is given and contains only two constants, one (K) being representative of the affinity of the oxygen for the first three hemes, and the other (m) being the increase of affinity for the fourth oxygenation. This formula seems to fit most data in the literature of hemoglobin solutions and of blood in vivo and in vitro. The physiological effects and the functional importance of the increased affinity for the fourth oxygenation are described, and the possibility that disturbances of the Hb oxygenation process may be due to the lack of this process is considered.

A64-80128

RORSCHACH PERFORMANCE AND INTELLECTUAL FUNCTIONING IN THE AGED.

Carl Eisdorfer (Duke U., Durham, N. C.)

Journal of Gerontology, vol. 18, Oct. 1963, p. 358-363. 14 refs.

Grants No. PHS-G-M 900C; PHS-G-H 3582; PHS-G-M 2109.

The Rorschach test was administered to 242 subjects, aged 60 to 94, who had received the Wechsler Adult Intelligence Scale examination as one aspect of a study of older persons in the community. Subjects were categorized according to age and intellectual status, and their protocols were compared with the literature on Rorschach performance in the aged. The results indicated that level of intellectual functioning, perhaps more than age, plays an important role in the Rorschach performance of this aged sample. In addition, it was noted that generalizations about the aged based on Rorschach findings from institutionalized subjects, or without regard to intellectual level, were not supported by data from the present sample of aged persons of adequate intelligence and adaptation to the community at large. The results are presented in an effort to offer some baseline values for normal Rorschach performance in aged persons.

A64-80129

EFFECTS OF AGE, PRESENTATION SPEED, AND SENSORY MODALITY ON PERFORMANCE OF A "VIGILANCE" TASK.

Larry W. Thompson, Edward Opton, Jr., and Louis D. Cohen (Duke U. Med. Center, Durham, N.C.)

Journal of Gerontology, vol. 18, Oct. 1963, p. 366-369. 12 refs.

Grant PHS-G-GM-05385.

Thirty young men and 25 old men were tested on the odd-even task in both the auditory and visual modality and at three presentation speeds (4, 2, and 1 sec). This task required the subject to push a key when perceiving combinations of successive odd or even numbers. No age difference in performance was apparent at the slower speeds of 4- and 2-sec intervals between stimuli. However, the elderly subjects showed marked decrement in performance at the fastest speed (1-sec interval). It is suggested that when tasks designed for the measurement of vigilance are presented at fast speeds, there may be contamination by a perceptual-motor factor. These findings are consistent with other results in the literature, suggesting that the observed decrement in the elderly may reflect a well-known deficit in perceptual-motor performance.

A64-80130

A FURTHER NOTE ON THE EFFECT OF AGING ON AUDITORY VIGILANCE PERFORMANCE: THE EFFECT OF LOW SIGNAL FREQUENCY.

D. R. Davies and S. Griew (Bristol U., Dept. of Psychol., Bristol, England).

Journal of Gerontology, vol. 18, Oct. 1963, p. 370-371. 5 refs.

Fifteen young (aged 17 to 29 years) subjects and 15 old (aged 41 to 58 years) subjects listened to a tape recording of a series of digits presented at the rate of one per second for 75 minutes. Each subject was required to record the occurrence of any three consecutive odd digits by pressing a button. There were 30 such groups of digits in the course of the session. No difference was found between the level of signal detection of the young and old subjects. The results are thought to confirm the results of a previous experiment that employed a high signal rate and a shorter task. Both experiments failed to show an age difference, and the conclusion if offered that auditory vigilance performance is unaffected by age throughout middle life, that is, at least to age 58 years.

A64-80131

AGE AND THE TENDENCY TO WITHHOLD RESPONSE.

Irwin Silverman (New York State U., Buffalo).

Journal of Gerontology, vol. 18, Oct. 1963, p. 372-375. 6 refs.

Old and young subjects were matched on ability to recognize tachistiscopically presented words under a forced-response condition and compared with regard to the number of responses given in an equivalent task administered under a voluntary-response condition. The hypothesis that old subjects would give fewer responses relative to their actual perceptual ability than young subjects was partially supported.

A64-80132

PATHOLOGY INVESTIGATION OF AIRCRAFT ACCIDENTS.

Frank M. Townsend and W. Harley Davidson (Armed Forces Inst. of Pathol., Wash., D.C.)

Physician's Panorama, vol. 1, Dec. 1963, p. 26-28.

The events leading to the establishment of the Aerospace Pathology Branch of the Armed Forces Institute of Pathology are reviewed. Its role in the investigation of the adverse conditions leading to the death of the flight crew in relation to the aircraft extends to three areas: (1) environmental factors (hypoxia, stress, mental status, drugs, food); (2) traumatic factors (injury patterns revealing equipment or aircraft failure); and (3) preexisting disease. The last has come into prominence with the increased incidence of light-aircraft accidents resulting from the boom in civilian flying. The importance of new procedures for he medical certification and monitoring of civilian pilots is stressed.

A64-80133

FOOD TECHNOLOGICAL PROBLEMS IN ADVERSE ENVIRONMENTS.

C. O. Chichester (U. of Calif., Dept. of Food Sci. and Technol., Davis).

Federation Proceedings, vol. 22, Nov.-Dec. 1963, p. 1447-1450. 16 refs.

A discussion is presented of the technological problems of food supply in manned space flight. Subjects considered include the recycling of water from intensible perspiration, urine, and feces; storage and manipulation of solid dehydrated, formula-type liquid, and semiliquid food; utilization of gaseous exhange photosynthetic tissue and other biological systems for food; and use of high-energy synthetic metabolites.

A64-80134
FOOD AND NUTRITIONAL PROBLEMS IN PROLONGED SPACE TRAVEL: DISCUSSION.
N. S. Scrimshaw (Mass. Int. of Tech., Cambridge), J. Y. Roshal, C. O. Chichester (Calif. U., Davis), D. M. Hegsted (Harvard U., Cambridge, Mass.), Robert E. Johnson (Ill. U., Urbana), and Marion E. McDowell (Fitzsimmons Gen. Hosp., Denver, Colo.)
Federation Proceedings, vol. 22, Nov.–Dec. 1963, p. 1451–1459.

A panel discussion is presented of the dietary problems of space flight. Subjects considered include the rlationship of water requirements to environmental temperature and protein and mineral intake, loss of the water supply by leakage from the space capsule, desirability and acceptability of formula-type diets, utilization and storage of feces, low-residue diets, effect of weightlessness on caloric requirements, individual differences in nutritional requirements, amino acid requirements, intestinal flora, photosynthetic food regenerating systems, and processing of algae for food.

A64-80135
DYNAMICS OF THE FUNCTIONAL CHANGES IN THE HUMAN CIRCULATORY SYSTEM IN HIGH AMBIENT TEMPERATURE AND HUMIDITY [DYNAMIKA ZMIAN CZYNNOSCIOWYCH W UKLADZIE KRAZENIA U LUDZI POD WPLYWEM WYSOKIEJ TEMPERATURY I WILGOTNOSCI POWIETRZA].
Franciszek M. Spioch and Romuald Kobza (Ints. Med. Pracy PW. i H., Zabrze-Rokitnica, Poland).
Acta Physiologica Polonica, vol. 14, 1963, p. 411–418. 12 refs. In Polish.

In miners, after 2 hours' stay in a humid heat environment in a climatic chamber, the pulse rate was increased by 54%, systolic pressure fell 8%, (diastolic pressure fell 26%, stroke volume increased by 42%,) and minute volume increased by 119%. After 20 minutes at room temperature the pulse rate still exceeded the normal by 14%, whereas the other parameters had returned to the normal range. Vital capacity was almost unaffected by heat stress. The most significant changes in the physiological parameters during recovery took place in the first 5 minutes after return to room temperature.

A64-80136
ACCLIMATIZATION TO HIGH ALTITUDES.
Alberto Hurtado (U. of Med. and Biol. Sci., High Altitudes Res. Inst., Lima, Peru).
IN: Perspectives in Biology. Edited by C. F. Cori, V. G. Foglia, L. F. Leloir, and S. Ochoa, Amsterdam, Elsevier Publishing Co., 1963, p. 348–352. 12 refs. $21.75.

Various physiological aspects of man living in a high-altitude environment are presented. The adaptive mechanisms found in the high-altitude native fall, in general, into two categories: first, those that make possible a considerable economy in the drop of the oxygen tension gradient from the inspired air to capillary and mixed venous blood; and, those concerned with an easier diffusion of oxygen from blood to tissues and its subsequent use by the active cells, even in the presence of a low tension. Hyperventilation, circulating blood volume, pH level, tissue chemistry, diseases resulting from loss of acclimatization, pulmonary hypertension, and some cardiovascular processes are discussed.

A64-80137
THE CONTRIBUTION OF NONDEPRIVATION FACTORS IN THE PRODUCTION OF SENSORY DEPRIVATION EFFECTS: THE PSYCHOLOGY OF THE "PANIC BUTTON."
Martin T. Orne (Harvard Med. School, Boston, Mass.) and Karl E. Scheibe (Calif. U., Berkeley).
Journal of Abnormal and Social Psychology, vol. 68, Jan. 1964, p. 3–12. 22 refs.
Contract No. AF 49(638)-728; Grant No. PHS-G-M-3369.

Experimental reproduction of the effects of sensory deprivation was attempted by manipulation of the demand characteristics (social cues) while holding the effect of the physical environment constant. Experimental subjects were exposed to preexperimental conditions, which implied that sensory deprivation effects were expected to emerge. The same physical conditions were structured for control subjects in such a way as to lead them to expect nothing to happen. Results show that the groups were significantly different on a number of before and after tests, as well as in general clinical appearance. An interpretation is offered of the operation of demand characteristics as a factor interacting with treatment conditions. Ways of taking demand characteristics into account in sensory deprivation research are suggested.

A64-80138
EFFECTS OF INCREASED HEART RATE ON INTELLECTUAL PERFORMANCE.
Michael Burgess and Jack E. Hokanson (Fla. State U., Tallahassee).
Journal of Abnormal and Social Psychology, vol. 68, 1964, p. 85–91. 17 refs.

A significant correlation found in a pilot study between heart rate and Digit Symbol performance was utilized to investigate effects of type of arousal induction on performance. Sixty subjects were arranged in a 3 x 2 factorial design, divided into high and low drive via heart rate. Subjects first performed on a Digital Symbol task; followed by a frustating experience, physical exertion, or nonfrustating task; followed by a frustating experience, alternate form of the first Digit Symbol problem. The results showed that the relation between activation and performance in most instances followed the hypothetical inverted U function.

A64-80139
A TEST OF THE INVARIANCE OF THE RATIO OF PERCEIVED SIZE TO PERCEIVED DISTANCE.
Walter C. Gogel, Eugene R. Wist, and George S. Harker.
American Journal of Psychology, vol. 76, Dec. 1963, p. 537–553. 18 refs.

Interrelation of perceived absolute size and perceived absolute distance was studied, using three values of effective interpupillary distance. Independent measures of perceived size and perceived distance were obtained for objects subtending a constant visual angle at 152.4, 304.8, 457.2, and 609.6 centimeters. Convergence of the eyes to a distance of 381.0 cm was held constant for all values of base. A positive correlation was obtained between perceived absolute size and perceived distance; however, the ratio of perceived absolute size to perceived absolute distance varied as a function of both base and physical distance. The different interpupillary devices used in this study resulted only in changes in the binocular disparity cues to relative depth. Perceptually, for the distances used, a change in perceived absolute size and distance occurred, with perceived relative size and distance showing less effects.

A64-80140
THE EFFECT OF BODY-POSITION ON MERIDIONAL VARIATIONS IN SCOTOPIC ACUITY.
S. M. Luria (U.S. Naval Med. Res. Lab., Groton, Conn.)
American Journal of Psychology, vol. 76, Dec. 1963, p. 598–606. 30 refs.

Visual acuity threshold were determined for checkerboard targets in horizontal-vertical and diagonal orientations for four observers seated in (1) normal upright position, (2) upright position with the head tilted, and (3) a tilted chair. Cues of the vertical were provided. Targets parallel to the median plane of the head gave the best thresholds; however, the difference between the two orientations varied with the observer's posture. The greatest difference occurred in the upright position, the smallest difference with the head tilt, and intermediate difference with the body and heat tilt. Lowered acuity thresholds found with the unusual postures are interpreted in support of the sensory-tonic theory. The appearance of the full-orientation phenomenon apparently depends upon an equivocal conception of verticality regardless of its accuracy.

A64-80141
ACCOMMODATION AS A DISTANCE-CUE.
Hans Wallach (Oxford U., Oxford, Gt. Brit.) and Cynthia M. Norris (Swarthmore Coll., Swarthmore, Pa.)
American Journal of Psychology, vol. 76, Dec. 1963, p. 659–664.

An experiment was conducted to explore the function of accommodation as a distance cue by having it compete with perspective cues. The size-matches showed that accommodation is a potent cue for distance in that it reduced the effect of perspective cues for distance by 45%. It is possible, however, that it may operate most effectively only at distances within the range of high effectiveness of accommodation, i. e., distances up to 1 m.

A64-80142
STUDIES ON SOME HEMODYNAMIC CHANGES PRODUCED BY ORTHOSTATISM AT NORMAL AND AT ELEVATED TEMPERATURES AND THE EFFECT OF THE ANTI-G SUIT ON THESE CHANGES [CERCETARI ASUPRA UNOR MODIFICARI HEMODINAMICE PRODUSE DE ORTOSTATISM LA TEMPERATURA NORMALA SI LA TEMPERATURA RIDICATA SI INFLUENTA COSTUMULUI ANTI-G ASUPRA ACESTORA].
N.R. Zamfirescu, B. Felberg, C. Teodorescu, M. Stoian, I. Pintilie, and V. Filcescu (Academia Republicii Populare Romine, Bucharest, Rumania).
Studii si Cercetări de Fiziologie, vol. 8, 1963, p. 619–630. 26 refs. In Rumanian, Russian and French summaries.

A study was made of the effect of an anti-g suit inflated to the level of the diastolic pressure on the cardiovascular response of 21 young men to passive orthostatism at normal and elevated (48° C) ambient temperatures. Tilting to 80° C without an anti-g suit produced a significant increase in heart rate and a significant decrease in the duration of ventricular ejection at both temperatures. Wearing of an anti-g suit eliminated the cardiovascular changes produced by tilting at normal temperature, but had less effect at 48° C.

A64-80143
PHYSIOLOGIC AND PSYCHOLOGIC ASPECTS OF THE GRAVITY SPECTRUM.
Cleto Di Giovanni, Jr. (Lankenau Hosp., Div. of Res., Philadelphia, Pa.) and Randall M. Chambers (U.S. Naval Air Develop. Center, Aviation Med. Acceleration Lab., Johnsville, Pa.)
New England Journal of Medicine, vol. 270, 2 Jan. 1964, p. 35–40. 22 refs.

A discussion is presented of basic concepts in acceleration tolerance and acceleration protection. Types of acceleration environments and their association with space flight operations are outlined. Criteria for the determination of physiologic tolerance to acceleration are discussed, and curves are presented that show tolerance limits in relation to the magnitude and duration of acceleration for positive, negative, and transverse accelerations. Methods of acceleration protection are considered, including the G-suit, the contour couch, and oxygen breathing. The effects of acceleration on vision and vestibular and proprioceptive sensations are discussed.

A64-80144
CHEMICAL PROTECTION OF THE BODY AGAINST IONIZING RADIATION.
V. S. Balabukha, Editor.
(International Series of Monographs on Pure and Applied Biology, Division: Modern Trends in Physiological Sciences, vol. 17.) Oxford, &c., Pergamon Press, 1963, xii+ 168 p. Many refs. (Translation of: KHIMICHESKAIA ZASHCHITA ORGANIZMA OT IONIZIRUIUSHCHIKH IZLUCHENII. Moscow, Atomizdat, 1960. In Russian.)

This is a collection of papers by various authors on drug protection of the body against ionizing radiation. The following are of interest to aerospace medicine: (1) V. S. Balabukha, Present state of chemical protection against penetrating radiations (p. 3–10); and (2) G. Ye. Fradkin, Possibility of using chemical compounds as traps for energy in protection against penetrating radiation (p. 97–114).

A64-80145
THE SILKEN ANGELS: A HISTORY OF PARACHUTING.
Martin Caidin.
Philadelphia and New York, J. B. Lippincott Co., 1964 [copyright 1963]. 264 p. $4.95.

A history of parachuting is presented. It begins with one of the first jumps in 1785, progresses through both World Wars, and concludes with ejections from jet fighters and jumps from balloon gondolas. The problems encountered and the men who helped solve them are discussed.

A64-80146
ISOLATION AND SENSORY DEPRIVATION.
Neal M. Burns (Honeywell Aeron. Div., Space and Armaments Systems, Minneapolis, Minn.) and Douglas Kimura (United Aircraft Corp. Systems Center, Farmington, Conn.)
IN: Unusual Environments and Human Behavior. Edited by Neal M. Burns and others. London, Free Press of Glencoe, 1963, p. 167–192. 94 refs. $10.00.

A review is presented of the outstanding features from studies and reports on confinement and isolation with emphasis on the application of these data to further research. The material is drawn from the literature on animal experimentation, confinement and isolation experiments with humans, and anecdotal reports on the effects of confinement, isolation, and extreme hazard. Neurophysiological research, particularly that illuminating the role of the ascending brain stem reticular system, is related to some of the sensory deprivation phenomena. According to some theories a U-shaped function governs the relation between central nervous organization and sensory inputs; both very high and very low sensory inputs disrupt the central nervous integration and deprive the cortex of facilitatory input from the brain stem. Further, the disruption of biological rhythms and merging of the sleep-wakefulness cycle due to the removal of environmental regulators is also a potent variable in producing the sensory deprivation stress phenomena.

A64-80147
OPERATOR PERFORMANCE IN ACCELERATION ENVIRONMENTS.
Randall M. Chambers (Naval Air Develop. Center, Aviation Med. Acceleration Lab., Johnsville, Pa.)
IN: Unusual Environments and Human Behavior. Edited by Neal M. Burns and others. London, Free Press of Glencoe, 1963, p. 193–319. 230 refs. $10.00.

Research findings on the effects of acceleration stress on human performance are reviewed, including: the effect of g's on vestibular, kinesthetic, proprioceptive, vision, hearing, and orientation senses; and the human ability to perform simple and complex psychomotor tasks in various acceleration environments. The problems of measuring interactions between acceleration environments and human behavior are evaluated. Some of the major problems and preliminary studies concerning the measurement of higher mental functioning during exposure to acceleration are summarized, as well as attempts to measure the effects of acceleration stress on personality, emotional behavior, and motivation. Error characteristics of performance impairment, and the utilization and quantification of these error characteristics are reported. Some of the applications of the results of acceleration research to training and conditioning of human subjects, to the design of equipment for use in acceleration environments, and to treoretical considerations are discussed. A series of performance tolerance maps along various dimensions of human ability is suggested as an aid in the human engineering of space vehicles.

A64-80148
VIBRATION.
Aaron B. Nadel (Gen. Electric Co., TEMPO, Santa Barbara, Calif.)
IN: Unusual Environments and Human Behavior. Edited by Neal M. Burns and others. London, Free Press of Glencoe, 1963, p. 379–934. 25 refs. $10.00.

The effects of vibratory forces upon biological systems, particularly the human organism are reviewed. These effects encompass nausea, vomiting, and dizziness produced by stimulation of the vestibular apparatus; severe chest pain; gastrointestinal and rectal hemorrhage in man; hemorrhages in the pericardium, lungs, brain, heart, mesenteric tears, etc., in animals; and impairment of visual acuity. A theory of resonant frequency of different parts of the body is advanced to explain the particular types of damage occurring in particular parts of the body during whole-body vibration exposure. Establishment of tolerance limits is hindered by anatomical size, volume, and weight differences between man and animals. Human studies on the behavioral effects indicate an increase in amplitude is, potentially, a more disturbing element in the complex effect of vibration than either the frequency or plane of vibration, although all of these contribute. Various methods of protection against vibration are discussed. Control of exposure time is still important to reduce the possibility of accidents favored by vibration-aggravated fatigue.

A64-80149
EFFECT OF CERTAIN NOISES UPON DETECTION OF VISUAL SIGNALS.
William H. Watkins (Electronic Systems Div., Decision Sci. Lab., Bedford, Mass.)
Journal of Experimental Psychology, vol. 67, Jan. 1964, p. 72–75. 10 refs.

The influence of auditory noise stimulation upon detection of a visual signal was investigated by manipulation of two variables: noise type and mode of presentetion. Six trained observers each performed 1,200 forced-choice trials in which they were required to select one of four temporal observation intervals as that in which the visual signal occurred. It was found that detection performance was substantially better when noise was presented only during the observation intervals than when it was continuously present. Steady white noise and auditory flutter, both at 75-db sound pressure level, were equally effective in the apparent facilitation of visual detection.

A64-80150
EFFECTS OF MEPROBAMATE ON CONTINUOUS ATTENTION BEHAVIOR.
Leonard Uhr, Arthur Platz, Stephen S. Fox, and James G. Miller (Mich. U., Mental Health Res. Inst., Ann Arbor).
Journal of General Psychology, vol. 70, Jan. 1964, p. 51–57. 15 refs.

The Michigan Continuous Attention Task was administered to twelve subjects under double-blind conditions of meprobamate and of placebo. Drug effects were evaluated in relation to assessed anxiety and to electric shock conditions. High performance, indicating maintained sustained attention and alertness, was significantly related to high anxiety, as measured by the Taylor Manifest Anxiety Scale. Meprobamate, in a single 1,600-mg dose, significantly improved performance on the entire task, including both shock and nonshock conditions. The two conditions did not yield different results, suggesting that the anticipation of shock may, in itself, arouse drive.

A64-80151
STUDIES OF MOTION SICKNESS. XIX. THE EFFICIENCY OF LABORATORY TESTS OF THE PREVENTIVE ACTION OF DRUGS.
Carson Johnson and G. R. Wendt (Rochester U., Dept. of Psychology, Rochester, N.Y.)
Journal of Psychology, vol. 57, Jan. 1964, p. 71–79. 10 refs.
Contract N6ori-126, T. O. 1, and Lilly Res. Labs. Grant.

Certain known variables were selected for an empirical test of the feasibility of laboratory evaluation of motion sickness preventives. By using dramamine and scopolamine as proven preventives, motion sickness susceptibility as a proven effective variable, and by replicating the experiment five times with two wave frequencies of motion, it was possible to estimate the size of the group necessary to obtain repeatable rank ordering of the drugs. The same rank ordering of treatments (scopolamine, dramamine, placebo) was obtained in 10 comparisons with 24 subjects. Histadyl was only slightly better than placebo.

A64-80152
STUDIES OF MOTION SICKNESS. XX. EFFECTS OF SICKNESS ON PERFORMANCE IN CODE SUBSTITUTION AND MIRROR DRAWING.
Carson Johnson and G. R. Wendt (Rochester U., Dept. of Psychology, Rochester, N.Y.)
Journal of Psychology, vol. 57, Jan. 1964, p. 81–84. 6 refs.
Contract N6 ori-126, T. O. 1, the Lilly Res. Labs., and Rochester U.

In the first study, a difficult code substitution task was given to 119 subjects before and after exposure to motion on a vertical accelerator. The 44 subjects who became sick showed a 2% mean deterioration in speed; 75 subjects who did not get sick showed a 4% mean improvement. Accuracy declined negligibly in both groups. In the second study, 240 subjects were given a mirror star-tracing test before and after exposure to motion on the same vertical accelerator. Only a slight difference in performance was noted between the 50 sick subjects and 190 nonsick subjects. In both studies, subjects who had vomited did better than those who were only nauseated.

A64-80153
STUDIES OF MOTION SICKNESS. XXI. A SECOND FAILURE TO FIND AIR TEMPERATURE AN EFFECTIVE VARIABLE.
Carson Johnson and G. R. Wendt (Rochester U., Dept. of Psychology, Rochester, N.Y.)
Journal of Psychology, vol. 57, Jan. 1964, p. 85.
Contract N6 ori-126, T. O. 1, Lilly Res. Lab. and Rochester U.

A study was made of the effect of 20-min vertical accelerator motion for 240 subjects exposed to ambient temperatures, half at 100° and half at 60° F. Relative humidity was maintained at 50% air movement was perceptible, and equilibration to temperature was allowed for 2 min prior to acceleration. Fifteen subjects became nauseated and 9 vomited at 100°, whereas 13 became nauseated and 13 vomited at 60°. It is concluded that ambient temperature had no significant effect on the response to vertical motion.

A64-80154
HEMATOCRIT CHANGES UNDER HYPERBARIC OXYGEN.
Julian T. Buxton, Jr., J. Manly Stallworth, and Gilbert B. Bradham (South Carolina Med. Coll., Dept. of Surgery, Charleston).
American Surgeon, vol. 30, Jan. 1964, p. 18–22. 15 refs.
John A. Hartford Foundation-supported research.

In dogs anesthetized with pentobarbital and subjected to 100% oxygen at 3 atm, a marked hematocrit rise occurs immediately. The effect does not occur in control animals at 1 atm, in splenectomized dogs, or in those subjected to buffering agents or respiratory alkalosis. This implicates contraction of the spleen, which is probably due to a stress response stimulated by a tissue hypercarbia. These data suggest that metabolic and hormonal changes occur quickly in the presence of hyperbaric oxygen even at the clinical range of 3 atm of absolute pressure.

A64-80155
THE EFFECTS OF VIBRATION ON THE WATER METABOLISM.
Ichiro Saito, Masaaki Iwane, Mitsuru Ishizaki, and Sigeyuki Yagura.
Japanese Journal of Aerospace Medicine and Psychology, vol. 1, Nov. 1963, p. 3–10. 20 refs. In Japanese, English summary.

The effects of vertical vibration of 400 cpm with 5 mm of amplitude on urine volume and excretion of sodium, potassium, and creatinine were examined in healthy male subjects. The urine volume increased moderately during or immediately after the stress, without regard to prior hydrated or dehydrated conditions. The amount of sodium excretion in unit time increased under stress, although the sodium-concentration curve showed a mirror pattern to the urine volume. Potassium excretion was similar but less than sodium. Creatinine was more stabilized than both electrolytes. It is suggested that these changes are due to the variation in the secretion of the antidiuretic hormone.

A64-80156
THE BIOLOGICAL EFFECTS OF THE CORIOLIS ACCELERATION.
I. Saito, M. Iwane, and M. Ishizaki.
Japanese Journal of Aerospace Medicine and Psychology, vol. 1, Nov. 1963, p. 11–15. 5 refs. In Japanese, English summary.

Electrocardiograms, nystagmic eye movements, galvanic skin response (GSR), finger plethysmograms, and blood pressure of 12 healthy subjects subjected to Coriolis acceleration were examined. The Coriolis effect was caused by inclining heads right and left during application of a constant 1.4-g force. In most cases, pulse rates changed with transient tachycardia, but in a few instances, transient bradycardia took place instead. Blood pressures rose moderately in 11 cases. The GSR appeared to correlate with susceptibility to motion sickness. Nystagmus was observed only once. All subjects experienced positional illusion to a greater or lesser extent. Three subjects were nauseated. These subjective symptoms do not seem to parallel individual motion-sickness susceptibility.

A64-80157
ON THE CHANGE OF GAS METABOLISM IN MAN DURING PHYSICAL EXERCISE IN THE LOW PRESSURE ENVIRONMENT.
Ryohei Yurugi, Michihiko Iizuka, and Teruko Akiyama.
Japanese Journal of Aerospace Medicine and Psychology, vol. 1, Nov. 1963, p. 26–32. 6 refs. In Japanese, English summary.

Pulse rate, respiratory rate, minute volume, oxygen uptake, and carbon dioxide output were measured in 4 adult men before, during, and after physical exercise alone, hypoxia alone, or the two stresses combined. Hypoxia was achieved in a low-pressure chamber at a simulated altitude of 400 meters maintained for 1 hour. Physical exercise at a constant workload was performed on a bicycle ergometer that was set up in the chamber for 30 minutes at sea level and at a simulated altitude. Oxygen uptake during exercise at the altitude was found to be almost the same or slightly less than that at sea level, while respiratory minute volume during excercise did not increase at the altitude as much as at sea level. On the contrary, heart rate during exercise increased more at the altitude than at sea level. It is suggested that the compensatory hyperfunction during moderate exercise and in a mild hypoxic environment occurs mainly in the cardiovascular system by an increase in heart rate, and that the respiratory compensation is not as great as had been expected.

A64-80158
SOME MEDICAL PROBLEMS OF THE CIVILIAN AVIATION.
Y. Ueda, K. Sakata, and O. Yamaguchi.
Japanese Journal of Aerospace Medicine and Psychology, vol. 1, Nov. 1963, p. 55–59. In Japanese.

Fatigue in aircrews was investigated by gathering statistics on subjective complaints, including somatic, sensory, and mental symptoms, and asthenopia before and after the flight. In general, fatigue is greater in the cockpit crew than in the cabin crew. Less experienced crews showed larger diurnal and latitude-dependent variations of 17-hydroxycorticosteroids excreted in urine. Blood pressure tends to rise in the hypertonic and fall in the hypotonic members of the aircrew during the flight. The rate of emergencies including airsickness for passengers on the Japan Air Line was 0.05%–0.19% in the jet aircraft, and 0.27%–0.53% in the propeller aircraft. A number of diseases are named that should exclude passengers from boarding the flight.

A64-80159
SOME EFFECTS OF HYPOTHERMIA ON THE CARDIOVASCULAR SYSTEM AND ECG OF CATS.
R. W. Dahlen (Seton Hall Coll. of Med. and Dentistry, Dept. of Physiol., Jersey City, N. J.)
Proceedings of the Society for Experimental Biology and Medicine, vol. 115, Jan. 1964, p. 1–4. 9 refs.
USPHS-supported research.

Adult cats were cooled by packing in ice until cardiac failure occurred. Asystole was the most frequent cause of death. The decreased heart rate observed under hypothermia was primarily due to a lengthening of the Q-T interval. Systolic and diastolic blood pressure decreased when body temperature reached 30° C. There was no change in amplitude of the R-wave of the electrocardiogram. The T-wave was upright in the control record and became inverted as cooling progressed. The temperature of the first appearance of the H-wave, which was present in each experiment, coincided with the temperature at which the T-wave became inverted.

A64-80160
CONTRIBUTIONS TO THE PROBLEM OF RESPIRATORY REGULATION DURING ALTITUDE ACCLIMATIZATION [BEITRAGE ZUM PROBLEM DER ATEMREGULATION UTER HOHENADAPTATION].
H. G. Pauli (Bern U., Medizinische Poliklinik, Bern, Switzerland).
Pflugers Archiv für die gesamte Physiologie, vol. 278, 1964, p. 447–466. 60 refs. In German, English summary.

Respiratory regulation was studied in 18 subjects during residence at an altitude of 1,780 ft and during visits of 2 to 25 days at 11,340 ft. Values for respiratory minute volume during air breathing and the reduction in minute volume with 40% to 60% oxygen breathing were both elevated during exposure to altitude. Arterial hemoglobin concentration was increased at altitude, arterial oxygen saturation was generally decreased, and blood carbon dioxide tension was decreased. The respiratory response to arterial acid–base changes was slightly reduced at altitude. No significant change was observed in the buffering capacity of the blood. Cerebrospinal fluid acid-base values remained at a more stable level than arterial values at altitude.

A64-80161
HAS THE ORGUEIL METEORITE FURNISHED EVIDENCE OF EXTRATERRESTRIAL LIFE? [LA METEORITE D'ORGUEIL A-T-ELLE APPORTE LES D'UNE VIE EXTRA-TERRESTRE?]
Gaston Cohen
Science Progress: La Nature, no. 3345, Jan. 1964, p. 18–26. In French.

A review is presented of laboratory studies and theories concerning the presence of extraterrestrial life forms in the meteorite that fell on Orgueil, France, in 1864. Infrared absorption analyses showed that the meteorite contained hydrocarbons similar to those formed on earth by the degradation of living molecules rather than by industrial "inorganic" processes. Microscopic studies by Claus and Nagy revealed five types of "organized elements" that resembled certain microscopic algae, did not exhibit birefringence under polarized light, and reacted positively to organic staining tests. The conclusion that the organized elements represent the remains of extraterrestrial life forms have been rejected by many scientists, chiefly on the basis of studies suggesting contamination of the meteorite by terrestrial life.

A64-80162
CARDIOVASCULAR PHYSIOLOGY UNDER HYPOTHERMIA.
E. T. Angelakos and J. C. Torres (Boston U. School of Med., Boston, Mass.)
IN: Cardiovascular Problems. Edited by John B. Stetson (Harvard Med. School, Boston, Mass.) Boston: Little, Brown and Co., Nov. 1963, p. 27–42. 16 refs. (Intern. Anesthesiology Clinics, vol. 2, No. 1963.)
Grant No. HE-04355; Contracts No. AF33(616)-6767; AF 33(616)-3805; AF33 (657)-10755.

Hypothermia produces distinct alterations in the electrophysiology of the heart. Heart rate is decreased as a result of a decrease in the rate of rise of the pacemaker prepotential. The duration of the auricular and ventricular action potential is increased, and the rate of depolarization and repolarization decreases. The repolarization phase assumes a pattern resembling that obtained under conditions favoring the development of local blocks on interfiber excitations favoring the development of local blocks on interfiber excitation. Conduction velocity through differentiated and undifferentiated myocardial tissue is reduced, excitability is decreased, and the refractory period is increased. It is proposed that these phenomena are consistent with the hypothermia. This could be due to an increased intracellular accumulation of sodium, presumably as a result of a depression, by low temperatures, of the metabolic mechanisms associated with sodium extrusion. However, no direct experimental evidence is available for the hypothesis.

A64-80163
HUMAN SKIN TEMPERATURE AND NON-EVAPORATIVE HEAT EXCHANGE WITH THE ENVIRONMENT.
N. L. Ramanathan (All-India Inst. of Hygiene and Public Health, Ind. Health Res. Unit. Calcuta, India).
Indian Journal of Medical Research, vol. 51, Nov. 1963, p. 1062–1079. 32 refs.

In 112 experiments involving skin temperature measurements on resting subjects in different environmental conditions (air temperature 23.8° to 34.5° C) it was found that the simple three-point formula of Burton reflects satisfactorily the mean skin temperature (MST) from the seven-point system of Hardy and Dubois. The temperature of the medial thigh was found to be equally useful in this respect. It was concluded that the medial thigh temperature may be taken as the MST under conditions similar to those in this study. This technique affords great convenience in field studies and may be useful in studying temperature changes of the body during exercise. Skin temperature was found to vary linearly with the air temperature within the range of 24° to 34° C, thus showing that the skin temperature rises are one of the adaptive changes in heat exposure. Heat flow from man to the environment was found to reverse its direction at an air temperature of 34.25° C.

A64-80164
THE EFFECT OF WARNING SIGNALS ON REACTION TIME IN YOUTH AND OLD AGE.
George A. Talland (Harvard U., Boston, Mass.)
Journal of Gerontology, vol. 19, Jan. 1964, p. 31–38. 6 refs.
Grant No. M-889.

Eighteen men in the twenties and 18 men aged 77 to 88 years were tested for speed for manual response under instructions of simple and choice reaction time (RT), varying modality, duration of signals, and length of alerting interval. The RT, between-subject and within-subject variances increased significantly with age; errors were few and about the same in youth and in old age. Warning signals speeded up RT in youth but had no reliable effect in old age. Latencies tended to increase with the length of alerting interval except for choice reaction times in older men. Optimal condition for old age was an auditory warning followed by a visual response signal; in youth the reverse produced the fastest response. The younger men confirmed the general rule that responses tend to be faster to auditory than to visual signals; the older men showed the opposite trend. Several hypotheses are examined to account for the failure of warning signals to speed up response in old age.

A64-80165
A SURVEY OF EXPERIMENTAL DATA ON THE EFFECTS OF WHOLE-BODY VIBRATION AND OF THE VISUAL OBJECT UPON VISUAL PERFORMANCE.
J. P. Dennis.
Occupational Psychology, vol. 37, Oct. 1963, p. 277–282. 20 refs.

In this review of the effects of whole-body vibration and of vibration of the visual object upon visual performance certain factors are shown to be significant in determining performance. They may be summarized as: frequency of vibration, angular displacement of subject relative to visual object and vice-versa, level of illumination, angular size of visual task, circularity of motion, overlap of visual material, etc. Considerable differences ahve been shown between the effects of whole-body vibration and those of vibration of the visual object.

A64-80166
BIBLIOGRAPHY OF AVIATION MEDICINE IN JAPAN [WAGAKUNI NI OKERU KOKU IGAKU BUNKEN MOKUROKU].
Tokyo, Japan: Aero-Med. Lab., JASDF, July 1, 1963. 303 p. In Japanese. 2725 refs.

This is a bibliography of the Japanese literature on aerospace medicine (without abstracts). The references are grouped in the following categories: General, Basic Aviation Medicine, Clinical Aviation Medicine, Aviation Psychology, Aptitude Tests, Human Engineering, Accidents, Air Transportation, Space Medicine, and Aerospace Science.

A64-80167
ENERGY COST, FLUID AND ELECTROLYTE BALANCE IN SUBARCTIC SURVIVAL SITUATIONS.
Terence A. Rogers, James A. Setliff, and John C. Klopping (Stanford U., Dept. of Physiol., Stanford, Calif.)
Journal of Applied Physiology, vol. 19, Jan. 1964, p. 1–8. 20 refs.
Contract No. AF 41(657)364.

In two experiments a total of 12 men were subjected to 5 days of starvation under survival conditions in the winter subarctic. They wore flying clothing rated at 3.5 clo. The caloric cost, as calculated from oxygen consumption, was 2,300 kcal/m^2 for the first day and 2,000 kcal/m^2 for subsequent days at ambient temperatures of −30° C. At −10° C the cost of subsequent days fell to 1,500 kcal/m^2. The subjects lost 8% of body weight but regained 5% body weight after 5 days refeeding on a barely maintenance diet. One-third of the original (8%) weight loss was due to an isotonic contraction of extracellular fluid. Changes in heart rate, pulse pressure, and hematocrit consistent with this fluid contraction were observed. Although the water intake did not exceed the 5-day urine volume (5 liters), the subjects did not experience thirst until after return to a warm environment.

A64-80168
ALVEOLAR-ARTERIAL OXYGEN GRADIENT IN ANDEAN NATIVES AT HIGH ALTITUDE.
F. Kreuzer, S. M. Tenney, J. C. Mithoefer, and J. Remmers (Dartmouth Med. School, Hanover, N.H., U. of Nijmegen, Nijmegen, Neth. and Mary Imogene Bassett Hospital, Cooperstown, N.Y.)
Journal of Applied Physiology, vol. 19, Jan. 1964, p. 13–16. 11 refs.
Nat. Inst. Res. Grants No. H-2888(C3); H-2830(C4), H-6446; H-5322(C1).

The A-a DO_2 (alveolar-arterial oxygen tension difference) was determined at three levels of oxygenation in three groups of subjects: (1) normal persons at sea level, (2) normal Andean natives at high altitude, and (3) Andean natives with chronic mountain sickness. The values of A-a DO_2 in the Andean natives were uniformly higher than in normal sea-level residents at all levels of oxygenation. These findings were accentuated in patients with chronic mountain sickness. It is concluded that there is no decrease in diffusion barrier for oxygen, and there may be increased veno-arterial shunting in the lung and wider distribution of ventilation-perfusion ratios in the high-altitude residents than in normal subjects at sea level; and that part, at least, of the condition of chronic mountain sickness is an accentuation of these changes.

A64-80169
PROLONGED EXPOSURE OF YOUNG RATS TO AN OXYGEN ATMOSPHERE AT REDUCED PRESSURE.
John H. Dines and Edwin P. Hiatt (Ohio State U., Dept. of Physiol., Columbus).
Journal of Applied Physiology, vol. 19, Jan. 1964, p. 17–20. 16 refs.
Contract No. Nonr-495-(19).

The effect was studied of exposing 12 young male white rats to an atmosphere almost free of nitrogen but with an alveolar oxygen tension the same as that of the 12 control animals breathing ambient air. This was achieved by keeping the experimental animals in almost pure oxygen at a reduced pressure. Experimental and control animals were in closed chambers with oxygen being supplied from a spirometer while carbon dioxide was absorbed. Humidity and temperature were closely regulated. Provision was made for handling the animals and supplying them with food and water without changing the chamber environment. A successful experiment lasting 24 days was completed, not including observation periods of 6 days before and 8 days after the experiment when both groups were kept in air. No consistent difference was noted in rate of growth, oxygen consumption, food consumption, water intake, hemoglobin concentration, or behavior of the two groups. A decreased rate of urine production by the rats in the experimental group was attributed to an increased evaporative loss of water in the rarefied atmosphere.

A64-80170
CHANGES IN ALVEOLAR AND ARTERIAL GAS TENSIONS AS RELATED TO ALTITUDE AND AGE.
James W. Terman and Jerry L. Newton (Ind. U., Dept. of Anat. and Physiol., Bloomington, Ind.)
Journal of Applied Physiology, vol. 19, Jan. 1964, p. 21–24. 12 refs.
Contract No. FA 2049.

In the summer of 1962, at the White Mountain Station, the early phases of altitude acclimatization were studied in six of the surviving eight members of the 1935 expedition to the Chilean Andes; they were from 58 to 71 years of age. Alveolar and arterial oxygen tension (PO_2) and carbon dioxide tension (PCO_2) were determined for each man a few hours after arrival at 3,093 meters and at 3,800 and 4,343 meters over the next few days. The effects of age were superimposed on the classical responses to high altitude. The arterial and alveolar PCO_2) values showed no significant gradient; the alveolar PCO_2 was found to be lower than 27 years before. For example, their average alveolar PCO_2 at 4,700 meters in 1935 was 27.7mm Hg as opposed to 25.1 mm Hg at 4,343 meters in 1962. The case of one subject was exceptional: his alveolar PCO2 ranged from 21 to 24 mm Hg regardless of altitude for his sojourn of 22 days. In 1935 these six men had a mean alveolar arterial PO_2 gradient of + 3.0 mm Hg at 4,700 meters, while in 1962 the gradient over the three altitudes was 12.4 mm Hg. These findings would likely be explained partially by age changes in the pulmonary ventilation-perfusion ratio.

A64-80171
EFFECTS OF CARBON DIOXIDE INHALATION ON SWEATING.
Robert W. Bullard (Ind. U. Med. Center, Indianapolis; and Ind. U., Bloomington).
Journal of Applied Physiology, vol. 19, Jan. 1964, p. 137–141. 10 refs.
Contract No. DA-49-007-MD-947.

Inhalation of 6% carbon dioxide by male subjects exposed to three different ambient temperatures resulted in increased sweating as measured by resistance hygrometry. The increase, which occurred in all body areas studied, reached approximately 100% over the control levels. All measured body temperatures decreased during or immediately following the carbon dioxide period. During recovery period, a marked depression of sweating occurred that ended as skin temperatures increased.

A64-80172
LEFT BUNDLE BRANCH BLOCK IN FLYING PERSONNEL: A REPORT OF 56 CASES.
Lawrence E. Lamb and Robert L. Johnson (USAF School of Aerospace Med., Brooks AFB, Tex.)
Aerospace Medicine, vol. 35, Feb. 1964, p. 97–104. 6 refs.

Left bundle branch block in flying personnel was found in 56 of 122,043 cases. In 25 cases the abnormality was found on the first electrocardiogram ever recorded in the subject's life; in the remaining 31 cases it was an acquired event occurring after previous relatively normal intraventricular conduction. Over two-thirds of the individuals with known left bundle branch block developed it at age 40 or older. The aeromedical consideration of left bundle branch block is closely tied to the broader question of arteriosclerotic and acquired heart disease. In view of the expanding knowledge on coronary artery disease and the demonstration that individuals with known myocardial infarction can return to many other forms of occupation, the use of such individuals in aeronautical occupations must be considered. Each individual case should be considered on its merits and individuals with good recoveries from demonstrated clinical events of coronary artery disease should perhaps be permitted to engage in restricted flying activities or crew member duties. This would not apply to USAF policy requirements wherein individuals must be qualified to be in primary control of high-performance aircraft or unrestricted flying categories.

A64-80173
THE RADIATION FIELD INSIDE SPACE VEHICLES.
Hermann J. Schaefer (U.S. Naval School of Aviation Med., Pensacola, Fla.)
Aerospace Medicine, vol. 35, Feb. 1964, p. 104–110. 7 refs.

The distribution of air dose of three typical space radiation proton spectra is analyzed computationally for a spherical shell of uniform wall thickness and for a conical vehicle carrying a heavy heat shield at the base. The results indicate that the air dose varies considerably at different radial locations, due to shield geometry. For the ordinary cosmic ray beam, the local air dose is higher in regions where the effective shielding is heavier, contrary to flare-produced and Van-Allen-belt protons, which show no buildup phenomenon. For the conical vehicle, the computational analysis is extended to the dosage distribution within a spherical tissue phantom of 30-cm diameter assumed in two locations – in the nose tip and close to the heat shield. Greatly different tissue doses in the phantom were found at locations at which the same air dose is measured. Accurate determination of radiation exposure of the astronaut requires radiation monitors worn on the body. Additional stationary sensors in the larger vehicles can be used to indicate the direction of the radiation and to facilitate corrective action by attitude control or other means.

A64-80174
OBSERVATION OF THE ELEVATOR ILLUSION DURING SUBGRAVITY PRECEDED BY NEGATIVE ACCELERATIONS.
James A. Roman, Bruce H. Warren (Edwards AFB, Calif., and Brooks AFB, Tex.), and Ashton Graybiel (U.S. Naval School of Aviation Med., Pensacola, Fla.)
Aerospace Medicine, vol. 35, Feb. 1964, p. 121–124. 7 refs.

Apparent displacement of a real target on a visual afterimage during weightlessness preceded by positive or negative acceleration was studied with three observers in five jet flights with parabolic maneuvers. It was possible to identify these displacements as a special case of "elevator illusion," i.e., as due to a change in the magnitude of the resultant of the gravitational forces acting on the observer without change in the angle phi angle between the direction of the resultant gravitational force on the observer and the longitudinal axis of the observer's body. A distinction is made between this type of illusion and the oculogravic illusion.

A64-80175
RCAF EJECTION EXPERIENCE: DECADE 1952-1961.
J. R. Smiley (Roy. Can. Air Force Inst. of Aviation Med., Toronto, Ont., Canada).
Aerospace Medicine, vol. 35, Feb. 1964, p. 125–129.

The Royal Canadian Air Force (RCAF) has had a 76% success with standard ejection systems. The success rose to 94% when the equipment was used above 1,000 feet and at airspeeds under 400 knots. Practice-flying aircrew and trainees have a high frequency of difficulties effecting ejection. Injury rates are significantly increased when the body is not correctly positioned upon firing the ejection seat. Aircrew have high injury rates on landing and are frequently uncertain how to control their descent to a better touchdown. Spinal injuries appear to be high for an RCAF aircrew, probably due to failure to tighten their seat harness. In addition, some factor such as the type and attachment of harness or the man-seat coupling system appears to be operative.

A64-80176
PLASMA VOLUME RESPONSE TO WATER IMMERSION: IMPLICATIONS FOR SPACE FLIGHT.
Michael McCally (Aerospace Med. Res. Labs., Multi-Environment Div., Wright-Patterson AFB, Ohio).
Aerospace Medicine, vol. 35, Feb. 1964, p. 130–132. 18 refs.

Changes in plasma volume of five subjects were measured during 6 hours of complete water immersion and during 6 hours of office activity control by hemoglobin and hematocrit dilution and with radio-iodinated serum albumin (RISA) techniques. The mean plasma volume increased 9% during the first 25 min of immersion and then decreased over the next 4 to 6 hours to approximately 11% less than the zero time value. The repeated injection and sampling of RISA is not a suitable technique for the measurement of acute changes in plasma volume. The mechanisms of the water-immersion diuresis and post-immersion orthostatic intolerance are discussed and inferences made to human exposure to weightlessness.

A64-80177
PATHOLOGY OF LIGHT-AIRCRAFT ACCIDENTS.
William J. Reals, W. Harley Davidson, and Heinz H. Karnitschnig (Armed Forces Inst. of Pathol. and Fed. Aviation Agency, Washington, D.C.)
Aerospace Medicine, vol. 35, Feb. 1964, p. 133–135. 8 refs.

Accidents of light aircraft involving 187 fatalities accessioned at the Air Force Institute of Pathology, from 1944 through 1962, are reviewed. Preexisting disease, environment, and traumatic factors are studied. Visceral trauma is a major factor in deaths in this category of aircraft, as are head injuries and incapacitating fractures. Complete autopsy examination of all victims of air crashes is of utmost importance in the promotion of general aviation safety.

A64-80178
THE ACCELERATION PHOSPHENE.
Paul Tobias and J. P. Meehan (Aerospace Corp., El Segundo, Calif.; and U. of Southern Calif., Kerckoff Labs., Los Angeles, Calif.)
Aerospace Medicine, vol. 35, Feb. 1964, p. 136–139. 9 refs.

With the present knowledge, the acceleration phosphene (flashing lights, spots before the eyes) is thought to be produced when reduction of blood pressure in the choriocapillaris complex permits the interocular pressure to distend the retina, mechanically exciting the first layer of interconnecting neurons. Further, it would appear that increased perfusion of this area is related to the carotid sinus pressor reflex, the phosphene disappearing during this period. Finally, there is indirect evidence of a neural link between cerebral/ocular circulation and the carotid sinus reflex.

A64-80179
A PHYSIOLOGICAL EVALUATION OF THE DIVER'S WET SUIT IN SIMULATED FLIGHT AND EMERGENCY ENVIRONMENTS.
Louis J. SantaMaria, Morris J. Damato, and Meredith H. Radliff (Naval Air Eng. Center, Air Crew Equipment Lab., Philadelphia, Pa.)
Aerospace Medicine, vol. 35, Feb. 1964, p. 144–147. 5 refs.

The results of the physiological responses concerning skin and rectal temperatures of subjects wearing the diver's wet suit during exposure to different levels of environmental conditions are presented. Exposures were of four generic types: (1) two-minute immersion followed by life raft occupancy, (2) a constant immersion state, (3) dry-cold exposure, and (4) exposure to ambient conditions of moderate temperature. Results indicate that usage under only most acceptable laboratory conditions only, may constitute basis for favorable comparison with current exposure suit assemblies in regard to body temperatures and tolerance times. Reduction of water leakage and the introduction of ventilating capabilities might enhance its acceptability as a constant-wear protective assembly for the fixed-wing pilot and aircrewman.

A64-80180
EPILEPSY IN AIRCREW.
Donald R. Bennett (School of Aerospace Med., Neuropsychiat. Dept., San Antonio, Tex.)
Aerospace Medicine, vol. 35, Feb. 1964, p. 153–155. 13 refs.

Six cases representing the various causes of seizure disorders in aircrew seen at the School of Aerospace Medicine are presented. Emphasis is placed on the "potential" epileptic as being a significant aeromedical problem. The value of the electroencephalogram as a routine screening procedure is discussed.

A64-80181
THE FEAR OF FLYING SYNDROME: A RE-APPRAISAL.
John E. Sours, Roy E. Ehrlich, and Philip B. Phillips (U.S. Naval School of Aviation Med., Dept. of Psychiat. and Neurol., Pensacola, Fla.)
Aerospace Medicine, vol. 35, Feb. 1964, p. 156–166. 95 refs.

In a historical review of the fear-of-flying syndrome, the concept of fear in relation to flying is considered from the standpoint of symptomatology, pathogenesis, psychodynamics, and prognosis. Psychiatric evaluation of 449 aviation patients distinguished two groups: manifest (overt) and latent (covert) fear of flying reactions. Of these, the manifest fear of flying reactions—except gross stress reactions—do not respond to short-term psychotherapy. Latent fear of flying reactions often respond to short-term therapy sufficiently to enable the aviator to return to flying. Certain criteria are suggested as prognostic of successful treatment.

A64-80182
TOTAL CHOLESTEROLEMIA AND LIPEMIA IN WORKERS AT ALTITUDE (LA OROYA) [COLESTEROLEMIA Y LIPEMIA TOTALES EN LOS OBREROS DE LA ALTURA (LA OROYA)].
Francisco Kruger Porras.
Universidad Nacional Mayor de San Marcos de Lima, Anales de la Facultad de Medicina, vol. 45, 1962, p. 231–260. 79 refs.

Cholesterol, total lipid, protein, and hemoglobin contents of the blood were determined for 100 laborers living at La Oroya (Peruvian Andes, 3,730 meters above sea level) to study possible effects of altitude acclimatization on these constituents. Nutritional deficiencies forced 72 subjects to be disregarded. The remaining 28 had average cholesterol values of 161 mg./100 milliliters, lipids 573 mg., proteins 7.75 g., and hemoglobin 19.1 g. There was no demonstrable effect of altitude on cholesterol and lipids, while the protein and hemoglobin levels were changed in the manner already established by earlier workers. All values were influenced by nutrition much more than by altitude.

A64-80183
PULMONARY CIRCULATION IN THE NATIVE OF HIGH ALTITUDE [CIRCULACION PULMONAR EN EL NATIVO DE LAS GRANDES ALTURAS].
Natalio Banchero Zavala.
Universidad Nacional Mayor de San Marcos de Lima, Anales de la Facultad de Medicina, vol. 45, 1962, p. 399–355. 57 refs. In Spanish.

There is currently much speculation in bioastronautics on the long-term effects of weightlessness on cardiovascular functions during high g reentry. Certainly, if the carotid sinus reflex shows adaptation to prolonged zero g, and if there is cerebral vasodilatation of a magnitude suggested by this study related to this reflex, then any positive g exposure during reentry maneuvers might have serious consequences. Also, it is possible for a pilot to misinterpret a phosphene sensation during maneuvers at high positive g's as an external object, unless he is familiar with entopic effects.

Respiratory function and pulmonary circulation were studied in 38 adults (age, 17 to 34 years) and 32 children (age, 1 to 14 years), natives and inhabitants of high mountains (above 14,000 ft) in the Peruvian Andes, and compared with data obtained from 25 adults living near sea level. Apart from the common clinical methods (X-ray picture of thorax, electrocardiogram, vectorcardiogram, etc.), right cardiac catheterization was employed. The principal differences observed in the altitude-acclimatized adults, as compared to the lowland adults, were a moderate pulmonary hypertension and moderate increases in pulmonary vascular resistance and in the work of the right heart. The effects of chronic hypoxia are, therefore, not comparable to those of acute hypoxia. Relations between the pulmonary vascular resistance and structural changes in the pulmonary arterioles, vasoconstriction, hypervolemia, and polycythemia are discussed, as well as the possible role of pulmonary hypertension in the high incidence of persistent ductus arteriosus at altitude.

A64-80184
THE DIURNAL RHYTHM OF URINARY ELECTROLYTE EXCRETION. I. OBSERVATIONS IN NORMAL SUBJECTS.
John B. Dossetor (McGill U., School of Med., Montreal, Quebec, Canada), H. M. Gorman (Med. School of W. Va., Dept. of Med., Morgantown), and J. C. Beck (McGill U., School of Med., Montreal, Quebec, Canada).
Metabolism, Clinical and Experimental, vol. 12, Dec. 1963, p. 1083–1099. 51 refs.

The diurnal rhythm of urinary electrolyte excretion was studied in healthy medical students, at recumbency and at full normal activity. Metabolic balance technique was used with 6 hourly meals and collection periods. Full activity caused displacement of the peak of sodium excretion without significant change in potassium excretion. Acid excretion rhythm showed better inverse correlation with sodium than with potassium rhythms, but was not affected by change in phosphate excretion, though was readily influenced by acid loading. Phosphate excretion, under the conditions of these studies, did not show consistent cyclical variation and appeared to be readily influenced by dietary intake.

A64-80185
THE EFFECT OF AGE ON THE CONTROL OF SWAY.
J. H. Sheldon.
Gerontologia Clinica, vol. 5, 1963, p. 129–138. 10 refs.

Postural control was measured in 268 subjects, ages ranging from 6 to 80 years, by a simple method utilizing recording of body sway. The results suggest that postural balance develops during childhood to reach an optimum in early adult life and then deteriorates from the fifties onward.

A64-80186
SLEEP AND WAKEFULNESS.
Nathaniel Kleitman.
Revised and enlarged edition. Chicago and London, Univ. of Chicago Press, 1963, x+ 552 p. 4337 refs. $12.50.

This is the revised and enlarged edition of the book "Sleep and Wakefulness," first published in March 1939. Results of many studies performed since the first edition are enumerated here for the first time, although some others were published previously in scientific journals. The book is divided into the following eight major parts: (1) functional differences between sleep and wakefulness (definition of terms, position of the body—skeletal musculature, nervous system, brain potentials, blood, circulation, respiration, digestion, metabolism, body temperature, and excretion); (2) course of events during the sleep phase (onset of sleep, motility during sleep, dreaming, depth of sleep, duration of sleep, awakening); (3) periodicity (24-hr sleep—wakefulness and body temperature rhythms, 24-hr variation in activity and performance, 24-hr variation in visceral activity, modification of the 24-hr periodicities, meteorological and seasonal influences); (4) interference with sleep and wakefulness (induction of sleep, modification of sleep and wakefulness, deprivation of sleep); (5) spontaneous changes in the sleep-wakefulness rhythm (narcolepsy, cataplexy, and sleep paralysis; encephalitis lethargia, catalepsy and epilepsy; hypersomnias or comas; insomnia or hyposomnia; sleep abnormalities and disturbances); (6) means of influencing sleep and wakefulness (including pharmacology and hygiene asects); (7) states resembling sleep (hibernation and hypnosis); and (8) theories of sleep.

A64-80187
EFFECT OF VARYING INSPIRED O_2 TENSION ON ALVEOLAR-ARTERIAL O_2 TENSION DIFFERENCE IN MAN.
R. B. Cole and J. M. Bishop (Birmingham U., Queen Elizabeth Hosp., Dept. of Med., Birmingham, England).
Journal of Applied Physiology, vol. 18, Nov. 1963, p. 1043–1048. 33 refs.

Alveolar-arterial oxygen tension difference (A-aD) and physiological dead space were measured in 16 normal men and women selected equally from the

age groups 20 to 29 and 50 to 59 years, at mean alveolar oxygen tensions (PAO_2) of 107, 291, and 653 mm Hg. Arterial oxygen tension was measured polarographically and arterial carbon dioxide tension by an interpolation method. Values for A-aD were not related to posture but were significantly greater in the older group. Mean values for A-aD in the younger group were 8.7, 23.5, and 6.1 mm Hg at the three levels of PAO_2, respectively greater in the older group. Mean values for A-aD in the younger group were 8.7, 23.5, and 6.1 mm Hg at the three levels of PAO_2, respectively, and 14.1, 44.5, and 21.3 mm Hg, respectively, among the older group. At the two lower levels of PAO_2 results were in general agreement with those of previous workers, but a significant decrease in A-aD was observed when PAO_2 was raised to 653 mm Hg. It is suggested that this finding may be due either to change in the effective size of anatomical shunt while breathing 99.5% oxygen, or to a significant distribution component of total A-aD at the intermediate alveolar oxygen tension.

A64-80188
A MANUALLY OPERATED PELLET FEEDER FOR PRIMATES IN SPACE FLIGHT.
Marvin E. Grunzke (Holloman AFB, N. Mex.)
Journal of the Experimental Analysis of Behavior, vol. 7, Jan. 1964, p. 44.

A behavioral research food dispenser that is manually operated by primates is described. Its ability to use only 1/100 of the electrical energy as required by other machines is of great advantage in spaceflight. The feeder has been tested with chimpanzees, and the animals easily learn to operate the feeder lever. A diagram of the apparatus is shown.

A64-80189
SELECTIVE EFFECTS OF MONOAURICULAR AUDITORY STIMULATION ON THE EXTRAFOVEAL VISUAL ACUITY [EFFETTI SELETTIVI DELLA STIMOLAZIONE ACUSTICA MONOAURICOLARE SULL'ACUITA VISIVA EXTRAFOVEALE].
Giuseppe Girotti and Giovanni Peri (Cattolica U., Ist. di Psicologia, Milan, Italy).
Archivio di Psicologia Neurologia e Psichiatria, vol. 24, May–Jun. 1963, p. 255–268. 72 refs. In Italian, English summary.

A study was made of the effect of monaural auditory stimulation on peripheral visual acuity. A 2,000 cps sound at 65 db was presented monaurally 1 sec before tachistoscopic presentation of two horizontal or vertical black or white bars separated on a contrasting field by an interval of 2^{o} to 8^{o} of the angle of vision. The degree of visual acuity for each half field of both eyes was determined at 6^{o} from the fovea by the method of constant stimuli. With both black and white fields, auditory stimulation was found to produce a systematic improvement of extrafoveal visual acuity in both eyes in the half field of vision opposite the stimulated ear.

A64-80190
SIZE CONSTANCY: FUNCTIONAL RELATION BETWEEN PERCEIVED SIZE AND DISTANCE IN VISUAL PERCEPTION.
O. P. Tayal (D. S. Degree Aligarh Coll., U. P., India).
Journal of General Psychology, vol. 70, Jan. 1964, p. 121–137. 8 refs.

A hypothesis is advanced toward an understanding of the phenomenon of size constancy stating that whereas distance of a standard visual stimulus varies in one ratio, magnitude of its perceived size varies in another ratio that is a constant power (negative) of the first, under strictly uniform conditions. The theoretical relevancy of the hypothesis, and its validity against reported data are discussed.

A64-80191
THE EFFECTS OF RED AND GREEN SURROUNDINGS ON BEHAVIOR.
Jacob S. Nakshian (Veterans Administration Office, Worcester, Mass.)
Journal of General Psychology, vol. 70, Jan. 1964, p. 143–161. 19 refs.

Three hypotheses concerning the differential effects of red and green "environments" on behavior were tested as to their validity for a normal population. Efficiency of fine psychomotor coordination and accuracy of psychophysical judgments was hypothesized as greater under green than under achromatic environment, and greater under achromatic than under red environment. Red as compared to achromatic surroundings will have an expansive effect, whereas green as compared to achromatic surroundings will have a contractive effect on lateral and midline arm movements. The above hypotheses were not supported by the experimental results except for some effects on a hand tremor task and a motor inhibition task, which appear to share a common factor of measuring inhibitory control over motor expression.

A64-80192
THE EFFECTS OF EXERCISE UPON THE SPACE THRESHOLD OF TACTILE DIFFERENTIATION.
E. A. Milerian and V. G. Tkachenko.
Soviet Psychology and Psychiatry, vol. 1, Summer 1963, p. 3–8 4 refs.

Three series of experiments were carried out using 8 subjects ranging in age from 24 to 30 yr. In the first series of experiments, the technique of minimal changes was used, with the employment of an esthesiometer, to determine in each subject the thresholds of tactile discrimination of 16 skin segments of the right and left arms, and of the scapula. In the second series, the thresholds of tactile space discrimination were measured systematically for 12 days for segment II of the right arm. In the third series, the thresholds were measured on all 16 segments of the subjects' cutaneous analyzers. The results indicate a gradual reduction in the influence of exercise upon the sensitiv of the cutaneous analyzer with remoteness of skin points from the area being exercised. These results are not only in good agreement with the conclusions of researchers of the Pavlovian school, but permit, to some degree, an explanation of the physiological mechanism of this phenomenon. There are some data that permit the hypothesis that changes in the spatial tactile differentiation threshold are based on laws of irradiation and on concentration of processes of excitation in the cortical portion of the cutaneous analyzer with the aid of differential inhibition.

A64-80193
A STUDY ON THE PHYSIOLOGICAL EFFECTS OF HIGHLY OXYGENATED EN VIRONMENT. I.
Hisashi Saiki (Tokyo Jikeikai U., School of Med., Dept. of Physio., Tokyo, Japan).
Japanese Journal of Aerospace Medicine and Psychology, vol. 1, Nov. 1963, p. 33-43. 18 refs. In Japanese, English summary.

The physiological effects of exposing two groups of mice (4 to 5 and 8 weeks old) to pure oxygen under one atmosphere pressure were studied. Survival times for most of the younger group ranged between the fourth and eighth days of exposure; those of the older group were between the first and twelfth days. Mean survival times were greater in the younger group. Dyspnea was observed in half of the survivors immediately upon removal to normal air. All subjects lost body weight from the beginning of exposure and refused food after a few days. Nerve cell edema, hydropic degeneration of oligidendroglia, and slight satellitosis were observed in cerebral tissues. Severe congestion and no glycogen were seen in liver tissue. In the lungs of mice dead from oxygen poisoning, severe congestion and some kind of PAS-positive substances in the alveoli were found. It is suggested that intermittent nonanoxic decompression would be favorable in preventing oxygen poisoning.

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