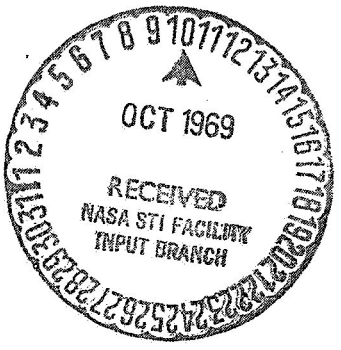
NASA SP-7011 (66)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011(66)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during July, 1969

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

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

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c. LC entries identified by a number in the A69-80000 series.

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

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

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750 Third Avenue, New York, N. Y. 10017

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LC Entries

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

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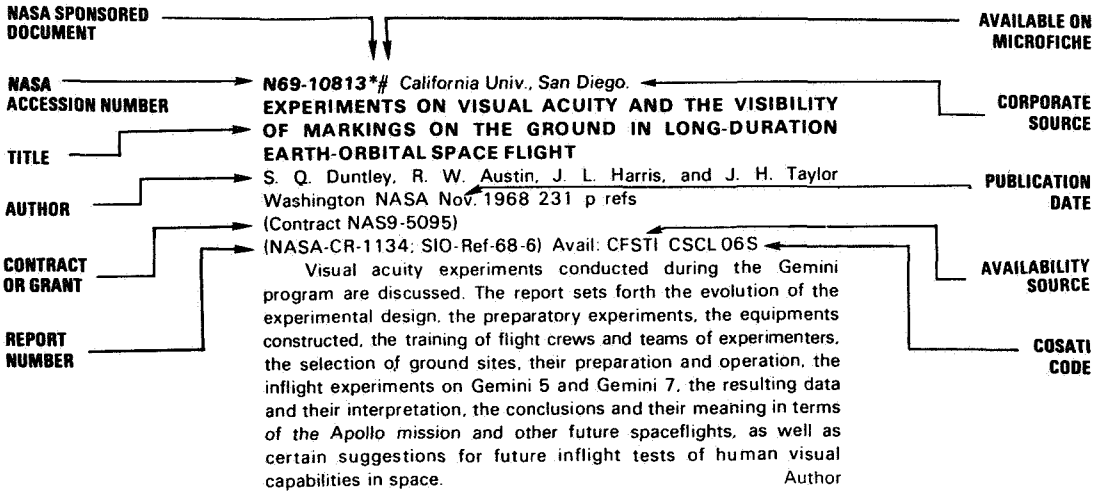
TYPICAL CITATION AND ABSTRACT



AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography AUGUST, 1969

STAR ENTRIES

N69-24752*# National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: A CUMULATIVE INDEX TO THE 1968 ISSUES OF A CONTINUING BIBLIOGRAPHY
Jan. 1969 882 p refs Supersedes SP-7011(47) through SP-7011(58); see N69-20026, N68-20027, N68-22882, N68-25844, N68-28246, N68-32707, N68-35069, N68-38051, N69-11695, N69-14387, N69-16537, N69-19023
(NASA-SP-7011(59); NASA-SP-7011(47); NASA-SP-7011(48); NASA-SP-7011(49); NASA-SP-7012(50); NASA-SP-7011(51); NASA-SP-7011(52); NASA-SP-7011(53); (NASA-SP-7011(54); NASA-SP-7011(55); NASA-SP-7011(56); NASA-SP-7011(57); NASA-SP-7011(58)) Avail: CFSTI CSCL 05B

A cumulative index of documents pertaining to the biological, 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 is presented. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Author

N69-24759*# Oregon State Univ., Corvallis.
SYSTEMATIC DESCRIPTION AND KEY TO ISOLANTS FROM CHILE–ATACAMA DESERT Progress Report
W. B. Bollen and Karen M. Kemper Pasadena, Calif. JPL 31 Mar. 1969 68 p refs Prepared for JPL
(Contracts NAS7-100; JPL-950783)
(NASA-CR-100821) Avail: CFSTI CSCL 06M

Identified are bacterial isolants from the soil of the Chile–Atacama Desert by their viable reactions and by photomicrographs of nonviable cultures. Also classified is a group of unicellular microorganisms with occasional branching or formation of an early unstable mycelium as "soil diphtheroids". G.G.

N69-24762*# Public Health Service, Cincinnati, Ohio. Research and Technology Branch.
ECOLOGY AND THERMAL INACTIVATION OF MICROBES IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS *Quarterly Progress Report, 1 Oct.–31 Dec. 1968*
R. B. Read, Jr. Jan. 1969 17 p
(NASA Order R-36-015-001)
(NASA-CR-100820; QPR-15) Avail: CFSTI CSCL 06M

Bacillus subtilis var. *niger* spores were imbedded in an emulsion of epoxy and various amounts of water in order to observe the effects of epoxy encapsulation on their heat resistance. Heat inactivation experiments at temperatures between 110° to 135°C showed that water located in the epoxy resin influenced the moisture content of the encapsulated spores and significantly increased their dry heat resistance. The length if storage of heated spores at refrigeration temperatures did not effect subsequent assay or recovery. G.G.

N69-24822*# National Aeronautics and Space Administration. Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY. A CONTINUING BIBLIOGRAPHY WITH INDEXES, MARCH 1969
Apr. 1969 170 p refs
(NASA-SP-7011(62)) Avail: CFSTI CSCL 05B

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

N69-24855# Texas Univ., Austin.
EFFECTS OF RADIATIONS ON THE GENETIC SYSTEMS OF ORGANISMS IN RELATION TO THEIR PHYSICAL AND BIOCHEMICAL SYSTEMS Final Report, 1965–1968
Mary L. Alexander 31 May 1968 8 p refs
(Contract AT(40-1)-3014)
(ORO-3014-4) Avail: CFSTI

Studies on the genetic effects of therapeutic X-rays, with an ion density of 80 ion pairs per micron, and betatron X-rays, with an ion density of only 8.5 ion pairs per micron, on germ cells of Drosophila are reported. The combined effects of ethylenimine and X-radiation on the induction of mutations, the effects of dose rate on genetic damage, and the induction of mosaic lethals by ethylenimine, xradiation, and combined treatments with both mutagenic agents were also studied. NSA

N69-24856# Indiana Univ., Bloomington. Dept. of Microbiology.
MICROBIOLOGY OF THERMALLY POLLUTED ENVIRONMENTS Progress Report
Thomas D. Brock and Warren S. Silver 17 Dec. 1968 11 p refs
(COO-1804-1) Avail: CFSTI

Studies on the microbiology of thermally polluted water are reported. Preliminary results are reported on the effects of

temperature on the growth of the thermophilic bacterium *Thermus aquaticus* in water from thermal springs; on the growth of the bacterium *Sphaerotilus natans* in cold water and in water polluted by thermal effluent; and on the growth of the blue–green algae Synechococcus in waters from thermal springs. The ecology of *Cyandium caldarium*, a eucaryotic algae that lives only in warm acid waters, was also studied. NSA

N69-24865*# Sandia Corp., Albuquerque, N. Mex. Planetary Quarantine Dept.
PLANETARY QUARANTINE PROGRAM Quarterly Progress Report, Period Ending 31 Mar. 1969
Mar. 1969 24 p refs
(NASA Order R-09-019-040; NASA Order W-12853; NASA Order H-13245A)
(NASA-CR-100815; QPR-12) Avail: CFSTI CSCL 06M

The current status of the NASA Contamination Control Handbook and the development of the contamination control training course outline are described. A vertical laminar air flow room was constructed for studying the deposition of particles from the air flow in a laminar-flow clean room. The problem of generating a continuous and uniform aerosol has been solved in this facility. Two different aerosols were used in a set of experiments: one contained 10μ aluminum oxide particles tagged with *Bacillus subtilis* var. *niger* spores, the other contained individual 1μ *Bacillus subtilis* var. *niger* spores. Also briefly described are the programming of a reduced version of a lunar quarantine information system and the development of a kinetic sterilization model that is physically based and consistent with all known forms of survival data. K.W.

N69-24874# Lyon Univ. (France). Dept. of Experimental Medicine.
NEUROPHYSIOLOGICAL MECHANISMS OF THE STATES OF SLEEP Final Scientific Report, Oct. 1967–Oct. 1968
Michel Jouvet Jan. 1969 19 p refs
(Grant AF-EOAR-52-67)
(AD-682319; AFOSR-69-0249TR) Avail: CFSTI CSCL 6/16

Research was centered on the problem of cerebral monoaminergic mechanisms of sleep and waking. Work accomplished during this report period covers the Histochemistry, Neurophysiology, and Neuropharmacology aspects of the states of sleep and waking. Author (TAB)

N69-24909# Oak Ridge National Lab., Tenn.
THE OAK RIDGE PROGRAM FOR HIGH-RESOLUTION MICROSCOPY
T. A. Welton, W. W. Harris, and R. E. Worsham May 1968 46 p refs
(Contract W-7405-ENG-26)
(PB-182245; ORNL-TM-2279) Avail: CFSTI CSCL 14B

The program to develop high-resolution electron microscopy for the study of biological macromolecules is described in a collection of six reprints of papers and reports. The principal goal of the program is a transmission microscope capable of 1-A resolution. The development program includes theoretical and experimental studies of (1) a quadrupole-octopole corrector for the primary spherical aberration of the objective lens, (2) a 500-kV power supply regulated to better than 1 ppm, (3) superconducting lenses, (4) a field-emission source, and (5) improved sample preparation techniques. Author (USGRDR)

N69-24911# Utah Univ., Salt Lake City. Radiobiology Div.
RESEARCH IN RADIOBIOLOGY: PROGRESS IN THE INTERNAL IRRADIATION PROGRAM Annual Report
Thomas F. Dougherty 31 Mar. 1968 168 p refs
(Contract AT(11-1)-119)
(COO-119-237) Avail: CFSTI

Research results in radioactive isotope administration and subsequent distribution in dog tissues are presented for the year. Detailed summaries are presented for the following: injection tables; symposium on radio-induced cancer; hematopoitic disorders in beagles injected with ^{90}Sr; distribution of radioactive isotopes in the vertebra, thyroid, blood, bones, and other tissues of the beagle; exchange mechanisms of radioisotopes in metabolic processes; and ^{239}Pu analysis in bone samples. K.R.G.

N69-24913# Sloan-Kettering Inst. for Cancer Research, New York.
BIOLOGICAL EFFECTS OF RADIATION AND RELATED BIOCHEMICAL AND PHYSICAL STUDIES Summary Progress Report, 15 Mar. 1965–30 Sep. 1968
30 Sep. 1968 183 p refs
(Contract AT(30-1)-910)
(NYO-910-75) Avail: CFSTI

Studies on the effects on animal tissue cultures of a wide range of radiation sources and related basic radiobiologic research are presented. Specific topics discussed include: organ scanning; data analysis; metabolic studies; cellular survival mechanisms; radiation absorption; free radical production; and cyclotron facility operation and radionuclide production. K.R.G.

N69-24961# Brobeck (William M.) and Associates, Berkeley, Calif.
PARTICLE ACCELERATOR SAFETY MANUAL
Oct. 1968 129 p refs
(Contract PH-86-67-193)
(PB-182335; MORP-68-12; Rept-169-1-R1) Avail: CFSTI CSCL 20G

The purpose of this manual is to alert the reader to the various hazards and to recommend safe practices for common types of accelerators found in the fields of medicine, industry, and research. Through the use of the manual, persons relatively unfamiliar with particle accelerators should be able to identify a specific machine and review the safety considerations of the installation. Author (USGRDR)

N69-24996# Sperry Gyroscope Co., Great Neck, N. Y.
RESEARCH IN VISUAL PERCEPTION FOR CARRIER LANDING Technical Report, 1964–1968
Theodore Gold and Aaron Hyman Dec. 1968 147 p refs
(Contract Nonr-4081(00))
(AD-682488; SGD-5265-0031) Avail: CFSTI CSCL 5/10

An experimental study was performed to determine the accuracy and consistency with which Navy pilots can estimate position on the glide slope and flight path or aim point during dusk and night carrier landings. The investigation was based on the pilots using only natural cues on the visual environment for landings during a relatively quiet sea state, without the presence of angular deck motion. A visual carrier landing simulator was developed to provide the pilots with a realistic, dynamic, three-dimensional condition of the external visual field during final approach and landing. Six qualified carrier pilots served as test subjects in the glide slope studies, and three of these pilots also participated in the aim point studies. The test data were evaluated by a novel psychometric technique which permitted independent estimates of mean response bias, sensitivity to changes in stimulus, and variability of response. Author (TAB)

N69-25026# Israel Program for Scientific Translations, Ltd., Jerusalem.
STUDIES OF MARINE FAUNA: BIOLOGICAL REPORTS OF THE SOVIET ANTARCTIC EXPEDITION (1955–1958), VOLUME 3 [ISSLEDOVANIYA FAUNY MORE!: REZULTATY BIOLOGICHESKIKH ISSLEDOVANII SOVETSKOI ANTARKTICHESKOI EKSPEDITSII (1955–1958)]
A. P. Andriyashev, ed. and P. V. Ushakov, ed. 1968 328 p refs
Transl. into ENGLISH from Akad. Nauk SSSR, Zool. Inst. (Leningrad), v. 4, no. 12 Published for NSF *Its* IPST Cat. No. 5060
(TT68-50313) Copyright: Avail: CFSTI

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N69-25027# Israel Program for Scientific Translations, Ltd., Jerusalem.

RADIOLARIANS OF ORDERS SPUMELLARIA AND NASSELLARIA OF THE ANTARCTIC REGION

M. G. Petrushevskaya *In its* Studies of Marine Fauna, vol 3 1968 p 2–186 refs (See N69-25026 13-04)

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Samples of antarctic sediments were studied for species composition of radiolarians of the orders Spumellaria and Nasselaria. Shell changes in the course of their formation and growth were analyzed and the most stable features used for species characterization; species were grouped on the basis of distribution in sediments and planktons. A definite similarity was observed between the nasselarian and spumellarian fauna of the Antarctic and that of the northern most regions of the Atlantic and Pacific Oceans and the Arctic basin; the majority of the species encountered differed from those distributed in temperate and polar regions of the Northern Hemisphere. G.G.

N69-25028# Israel Program for Scientific Translations, Ltd., Jerusalem.

TWO NEW SPECIES OF GENUS GYRODACTYLUS NORDMANN (MONOGENOIDEA) FROM THE COASTS OF ANTARCTICA

A. V. Gusev *In its* Studies of Marine Fauna, vol. 3 1968 p 187–189 (See N69-25026 13-04)

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In the absence of any data on southern representatives of family Gyrodactylidae, which are widely distributed in the northern latitudes and in the Arctic, there is particular interest in our find of two species of Gyrodactylus on the gills of several fishes of genus Trematomus (Nototheniidae) off the Antarctic coast in the course of the work of the Soviet Antarctic Expedition from January 1957 to February 1958. In this paper we present a description of these species. Author

N69-25029# Israel Program for Scientific Translations, Ltd., Jerusalem.

DISTRIBUTION AND SIZE VARIABILITY OF SPECIES OF CALANIDAE (COPEPODA) IN THE SOUTHERN HEMISPHERE

K. A. Brodskii *In its* Studies of Marine Fauna, vol. 3 1968 p 190–219 refs (See N69-25026 13-04)

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Data on the variation of body length of calanids as a function of temperature of the water in the Southern Hemisphere were analyzed for different groups of species with different distribution. Calculated were mean length of females 3 to 5° at fixed length and fixed temperature intervals. Species characteristic for the Antarctic Region showed sharp decreases in body length with higher water temperatures. G.G.

N69-25030# Israel Program for Scientific Translations, Ltd., Jerusalem.

FAUNA OF ISOPODA AND TANAIDACEA IN THE COASTAL ZONES OF THE ANTARCTIC AND SUBANTARCTIC WATERS

O. G. Kusakin *In its* Studies of Marine Fauna, vol. 3 1968 p 220–389 refs (See N69-25026 13-04)

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Collected crustatian fauna in coastal zones of Antarctic and subantarctic waters was processed for Isopoda and Tanaidacea found at depths down to 2,000 m. Drawings and descriptions of the various species are given and the places where they were found are indicated. Twenty-one new species are described as completely as possible in supplementary notes and drawings. G.G.

N69-25031# Israel Program for Scientific Translations, Ltd., Jerusalem.

OCCURRENCE OF PARALOMIS SPECTABILIS HANSEN (CRUSTACEA, DECAPODA, ANOMURA) IN THE ANTARCTIC

Ya. A. Birshtein and L. G. Vinogradov *In its* Studies of Marine Fauna, vol. 3 1968 p 390–398 refs (See N69-25026 13-04)

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The extensive collections of fauna made by the Soviet Antarctic expeditions contain several species whose finds essentially augment or even change commonly held concepts of the distribution of several groups in the world ocean. These finds include the discovery of the North Atlantic decapod species of family Lithodidae, Paralomis spectabilis Hansen, near Scott Island in the Pacific sector of the Antarctic. From the zoogeographical viewpoint this find is interesting in many respects: in the first place, P. spectabilis has proved to be the first and so far only bipolar species of family Lithodidae and one of the very few bipolar species of decapods in general; secondly, no representative of family Lithodidae has been found previously at such high latitudes (70°S.lat.); finally, this find compels us to make some corrections in the carefully elaborated hypothesis as to the dispersion routes of family Lithodidae. Author

N69-25032# Israel Program for Scientific Translations, Ltd., Jerusalem.

REVIEW OF THE PLUNDER FISHES OF GENUS POGONOPHRYNE REGAN (HARPAGIFERIDAE) WITH DESCRIPTIONS OF FIVE NEW SPECIES FROM THE EAST ANTARCTIC AND SOUTH ORKNEY ISLANDS

A. P. Andriyashev *In its* Studies of Marine Fauna, vol. 3 1968 p 399–425 refs (See N69-25026 13-04)

Copyright. Avail: CFSTI

New species variation data on genus Pogonophryne are presented together with descriptions of earlier known species. The fishes are described by absolute length, vertebrae counts from X-ray photographs, rays on pectoral fins, temporal row of pores, and the structure and length of their mental barbel. G.G.

N69-25051 Advisory Group for Aerospace Research and Development, Paris (France).

THERMAL PROBLEMS IN AEROSPACE MEDICINE

J. D. Hardy, ed. (Yale Univ.) Oct. 1968 239 p refs In ENGLISH and FRENCH Presented at the AGARD Aerospace Med. Panel Conf. held in Lisbon, Sep. 1964 and in Fuerstenfeldbruck, Ger., Sep. 1965

(AGARDograph-111) Copyright. Avail: Technivision Services, Maidenhead, Engl.

CONTENTS:

N69-25052 Indiana Univ., Bloomington.

CARDIOVASCULAR EFFECTS OF BRIEF INTENSE THERMAL PULSES IN MAN

Raymond H. Murray *In* AGARD Thermal Probl. in Aerospace Med. Oct. 1968 p 3–12 refs (See N69-25051 13-04)

Six clothed human subjects were exposed to brief, intense heat stresses, wall temperatures rising 28°C (50°F)/min to peaks of 150°C (300°F) or 205°C (400°F), with subsequent passive cooling for a total exposure of twenty minutes. Measurements of heart rate, arterial and venous blood pressure, cardiac output, and derived circulatory indices demonstrated severe strain of cardiovascular compensatory mechanisms. It is suggested that fall in effective blood volume is the critical factor affecting circulatory competence. These stresses approached human tolerance limits. Author

N69-25053 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

SKIN TEMPERATURE CHANGES CAUSED BY INTENSE DIFFUSE THERMAL RADIATION

W. C. Kaufman *In* AGARD Thermal Probl. In Aerospace Med. Oct. 1968 p 13-20 refs (See N69-25051 13-04)

Studies performed to determine the effect of intense thermal radiation on cockpits, occupants, and the natural human skin allow prediction of responses of aircrew members to thermal energy that may arise from fires or nuclear detonation. Aircrew members are coincidentally protected by their canopy or windshield and helmet visor, each of which will significantly attenuate thermal energy. These objects may themselves be damaged by thermal radiation. The uninitiated subject will interpret his exposure as painfully hot at a temperature significantly lower than that producing burns. The temperature increase of natural human skin is approximately one half that of ink-blackened skin. Author

N69-25054 Centre d'Essais en Vol, Bretigny-sur-Orge (France).

EFFECTS ON ORGANISM OF EXTREME INCREASE IN RADIANT TEMPERATURE [EFFETS SUR L'ORGANISME D'UNE AUGMENTATION BRUTALE DE LA TEMPERATURE RADIANTE]

J. Colin and Y. Houdas *In* AGARD Thermal Probl. in Aerospace Med. Oct. 1968 p 21–30 refs In FRENCH (See N69-25051 13-04)

Weight changes and cutaneous, rectal, buccal, and tympanic temperatures were continuously registered on human nude subjects before, during, and after an extreme variation of the ambient temperature. Prior to the experiment, the subjects were kept in complete repose in a neutral ambient temperature in order to avoid the influence on the thermoregulatory centers of factors other than the temperature variation. Results showed that sweating, in subjects not adapted to hot climates, takes place after a certain delay, and the role of the central thermoreceptors seems preponderant in this release mechanism. In subjects already adapted to heat, sweating is almost immediate, and the role of the cutaneous thermoreceptors appears to be the most important, the central thermoreceptors intervening in a solely complementary manner. The different experimental modes used, a radiant temperature rise alone or an increase of both convective and radiant temperatures, do not appear to affect the response sequences. Transl. by P.A.B.

N69-25055 John B. Pierce Foundation of Connecticut, New Haven.

SKIN AND SUBCUTANEOUS TEMPERATURE CHANGES DURING EXPOSURE TO INTENSE THERMAL RADIATION

J. A. J. Stolwijk (Yale Univ. Med. School) and J. D. Hardy (Yale Univ. Med. School) *In* AGARD Thermal Probl. in Aerospace Med. Oct. 1968 p 31–45 refs Supported in part by DASA (See N69-25051 13-04)

A method is described by which the energy in the visible and near infrared region can be filtered from the radiation used for skin temperature measurement, and the readings of the skin temperature radiometer can be corrected for the remaining reflected radiation from the source in the 4 to 20μ region. Experimental data are presented for comparison with theory. The way in which

subcutaneous temperature can be estimated from skin temperature data is indicated, utilizing calculations of heat losses and gains for different tissue layers. P.A.B.

N69-25056 National Inst. for Medical Research, London (England).
THERMAL RADIATION
C. R. Underwood, E. J. Ward, and O. G. Edholm *In* AGARD Thermal Probl. in Aerospace Med. Oct. 1968 p 47–55 refs (See N69-25051 13-04)
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The heat exchange of man out-of-doors was studied in the desert of Aden, using globe thermometers. In addition to total radiant exchange, the proportion of the surface area of man exposed to direct solar radiation was investigated. Author

N69-25057 Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.
THERMAL RADIATION IN THE INVESTIGATION OF CUTANEOUS VASOMOTOR AND SUDOMOTOR CONTROL
D. McK. Kerslake *In* AGARD Thermal Probl. in Aerospace Med. Oct. 1968 p 57–69 refs (See N69-25041 13-04)
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Thermal radiation has proved to be a particularly useful form of stimulus for studying the effects of thermal stimulation of one skin region on the blood flow and sweat production of another. Vascomotor reflexes are discussed in terms of experiments utilizing hot and cold water as stimuli and those using thermal radiation, either from household lamps or clinical infrared sources. Data concerning the response of the hand blood flow are graphically presented for various experimental conditions, and the changes in these responses are considered. Studies proving the existence of a mechanism whereby afferent impulses from thermal receptors in one skin region affect sweating from another are described. This proof was greatly facilitated by the use of radiant stimuli. The function of the reflex control mechanism may be to provide anticipatory responses to changing environmental conditions. P.A.B.

N69-25058 Centre d'Essais en Vol, Bretigny-sur-Orge (France).
EXPERIMENTAL STUDY OF HEAT EXCHANGE COEFFICIENTS BY CONVECTION [COEFFICIENTS D' EXCHANGE DE CHALEUR PAR CONVECTION]
J. Colin and Y. Houdas *In* AGARD Thermal Probl. in Aerospace Med. Oct. 1968 p 71–87 refs In FRENCH (See N69-25051 13-04)
Copyright. Avail: Technivision Services, Maidenhead, Engl.

An attempt was made to verify experimentally the coefficients of convective heat exchange previously proposed by different authors. The measurements of heat exchanges of subjects placed in a climatic coffer permitted the value of exchanges by convection to be measured, either directly by artificially suppressing the exchanges by radiation, or by keeping account of these exchanges after experimental determination of the effective radiation surface. Measurements were made of the quantity of heat lost by evaporation, metabolic heat production, and the skin temperatures of the subjects. Experiments were carried out with wall temperatures equal to the least cutaneous temperature, equal to the air temperature and a wind of 1.2 m/sec, and equal to the air temperature and winds of 0.5, 0.3, and 0.2 m/sec. Negative heat convection was investigated in further experiments where the air temperature was inferior to the least skin temperature. The results are compared to previous studies; the formula which responds best to the experimental data is given. Transl. by P.A.B.

N69-25059 Naval Air Development Center, Johnsville, Pa.
THERMAL PROTECTION PRINCIPLES
A. M. Stoll and M. A. Chianta *In* AGARD Thermal Probl. in Aerospace Med. Oct. 1968 p 89–103 refs (See N69-25051 13-04)
Copyright. Avail: Technivision Services, Maidenhead, Engl.

Protection against intense thermal exposures producing burns, as distinguished from protection against heat loss or gain due to longterm environmental heat exchange, is investigated. The formulation of thermal protection principles depends upon an understanding of the biophysical mechanisms of thermal injury in living skin and of the purely physical processes of heat transfer operative in any given thermal exposure. The basic principle is to prevent the establishment of tissue temperatures above 44°C for a significant periods of time. Different methods of protection are designed for differing thermal hazards. Flame contact or convective heating, conduction heating, and high intensity radiation are among the hazards discussed. P.A.B.

N69-25060 John B. Pierce Foundation of Connecticut, New Haven.
RESPONSES OF MAN TO THERMAL TRANSIENTS
J. D. Hardy and J. A. J. Stolwijk *In* AGARD Thermal Probl. in Aerospace Med. Oct. 1968 p 105–127 refs (See N69-25051 13-04)
Copyright. Avail: Technivision Services, Maidenhead, Engl.

Quantitative information for the analysis of human thermoregulation, under the limited condition of a step-function increase in environmental temperature from a neutral to a warm condition, is provided. Three young men, dressed in shorts, were exposed to a series of increasing temperatures between 28° and 48°C, while low air movement was maintained and the relative humidity was kept below the level which would affect evaporative heat loss. During the experiments, continuous recordings were obtained for room ambient temperatures and relative humidity; relative humidity and oxygen depletion in the expiratory air; rectal, tympanic, and skin temperatures; and rate of weight loss. The experimental data are discussed, concerning the heat loss coefficients for radiation and convection, energy balance during thermal transients, body temperature changes, evaporative heat loss, and steady state thermoregulatory adjustments. P.A.B.

N69-25061 Medical Coll. of Virginia, Richmond.
SOME BIOLOGICAL EFFECTS OF LASER RADIATION
W. T. Ham, Jr., R. C. Williams, W. J. Geeraets, H. A. Mueller, R. S. Ruffin et al *In* AGARD Thermal Probl. in Aerospace Med. Oct. 1968 p 131–148 refs Submitted for publication (See N69-25051 13-04)
(Contracts DA-49-193-MD-2241; DA-49-146-XZ-102)
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The biological effects of laser radiation on the mammalian retina are investigated. Retinal lesions produced by lasers are discussed under three separate types of operation: steady state operation, normal pulsed operation, and Q-switched operation. There is a fundamental difference in the physical phenomena and biological consequences accompanying exposure of the retina to high power density beams as compared to moderate power density beams. A radiation dose of approximately 0.07 J/cm^2 produces irreversible damage to the rabbit retina from a Q-switched ruby laser (exposure time 30 ns), whereas it requires approximately 0.85 J/cm^2 to produce irreversible damage from a laser pulse lasting for 200 μs or longer. No definite physical or biological differences between ruby laser pulses and pulsed white light sources of comparable power density were detected for minimal damage to the rabbit retina. Both types of exposure can be explained adequately in terms of thermal injury using a simplified physical model and the classical low of heat conduction. For steady state exposure to a laser beam, the maximum temperature and time taken to attain equilibrium depends primarily on the retinal image size. Author

N69-25062 Naval Air Development Center, Johnsville, Pa.
CUTANEOUS RECEPTOR RESPONSE TO MICROWAVE IRRADIATION
Edwin Hendler *In* AGARD Thermal Probl. in Aerospace Med. Oct. 1968 p 149–161 refs (See N69-25051 13-04)

Two pulsed microwave sources, for 3 and 10 cm exposures, were used in a study of warmth sensation on the forehead. The forehead was exposed through an aperture in a shield which blocked all radiation except that striking a central, circular area. Water filled skin simulants were constructed to facilitate determination of the incident energy absorbed by the tissues. The absorption coefficient for 3 cm microwaves in the skin is calculated as a function of exposure duration. Data are also presented concerning the heat dissipation constant of the simulant, the effectiveness of various wavelengths of electromagnetic energy in producing skin temperature increases, and volumetric heating as a function of irradiance. An experiment is described which utilized automatic cam control of 3 cm microwave stimuli to heat the skin and evoke warmth sensation. Irradiance levels of 3 and 10 cm microwave stimuli producing a threshold sensation of warmth are summarized and compared with far infrared stimuli results. Curves are included which describe the relationship between skin surface temperature increase and exposure time required to produce the threshold sensation, and which indicate the calculated subcutaneous temperature changes. P.A.B.

N69-25063 Air Force Systems Command, Wright-Patterson AFB, Ohio.

SOME EFFECTS OF ACUTE AND CHRONIC MICROWAVE IRRADIATION OF MICE

A. S. Hyde (Ind. Univ.) and J. J. Friedman (Ind. Univ.) *In* AGARD Thermal Probl. in Aerospace Med. Oct. 1968 p 163–175 refs (See N69-25051 13-04)

Exposures to different parameters of 3 and 10 cm microwave radiation are reported, and the effects of such acute, repeated-acute, and chronic irradiation upon body weight and peripheral blood hemograms of mice are discussed. Twenty-seven groups of ten female mice each were acutely irradiated with 3 cm microwaves for nine combinations of instantaneous powers of 0.017, 0.040, and 0.060 watts/cm^2. The animals' thermal response related to the total energy delivered rather than to the average power, instantaneous power, or duration of exposure itself. No significant response difference between the groups of mice was shown with respect to mean hemoglobin concentration, leukocyte concentration, and body weight. Mean differential leukocyte counts did not vary significantly from those of the control groups, nor did the femoral bone marrow smears show a consistent shift. High and low dose non-thermal and thermal acute 3 cm microwave irradiation caused a highly variable response in post-irradiation weight. Repeated acute thermogenic exposures to high dose 3 cm microwaves caused severe weight loss. The cumulative effects of chronic non-thermogenic exposure to low doses of 10 cm microwaves were studied. After 21 days of chronic irradiation, body weight increased 4 to 6% when compared to controls. Author

N69-25064 Paris Univ. (France). Ecole Pratique des Hautes-Etudes.

VISCERAL LESIONS OBSERVED IN MICE AND RATS EXPOSED TO MICROWAVES [LESIONS VISCERALES OBSERVEES CHEZ DES SOURIS ET DES RATS EXPOSES AUX ONDES ULTRA-COURTES]

L. Miro, R. Loubiere, and A. Pfister *In* AGARD Thermal Probl. in Aerospace Med. Oct. 1968 p 177-183 (See N69-25051 13-04) In FRENCH

An attempt was made to modulate the microwave emission so that the thermogenic effect would not elevate the central temperature of the animals more than 1°C, in order that the animals might be studied during prolonged exposure periods. Using emission by pulsed modulation, with a frequency of 3105 ± 15 MHz and a wavelength of 10 cm, three groups of six animals each were exposed for 190,300 and 450 hour durations. The animals were then sacrificed, and autopsies and microscope studies were done. Under these conditions where heat due to electromagnetic energy transformation in the body was eliminated, no effects were shown either on the looks, behavior, or organs of the animals. A particular investigation was then made of possible effects on the reproductive system and on the gonads. Total irradiation of rats and mice by 3000 MHz microwaves, either in a prolonged fashion in which the thermogenic effect was eliminated, or with strong energy densities but short exposure times, did not cause any pathological modifications of the reproductive system. Even when the animals were killed by thermal effects, examinations of the gonads of all the experimental animals remained normal. Transl. by P.A.B.

N69-25065 Naval Air Engineering Center, Philadelphia, Pa.

RETINAL BURN

H. G. Wagner *In* AGARD Thermal Probl. in Aerospace Med. Oct. 1968 p 185–188 refs (See N69-25051 13-04)

Some of the factors involved in creating retinal burn are discussed, both for solar retinitis and for injuries caused by other phenomena, such as the thermonuclear flash and the laser. The action of pupillary constriction in protecting the eye is reviewed, and the fact that this defensive response is limited is emphasized. Although thermal injury is usually confined to the area of the retina associated with the image of the source, there may be variations due to factors influencing the gain or loss of heat locally in the image plane and the ultimate temperature reached by a particular retinal cell. Foveal lesions, choroid damage, and cell death are considered, with particular interest in the loss of visual acuity and in protective devices that may be developed. P.A.B.

N69-25066 Naval Medical Research Inst., Bethesda, Md.

A REVIEW OF CURRENT CONCEPTS AND PRACTICES USED TO CONTROL BODY HEAT LOSS DURING WATER IMMERSION

E. L. Beckman *In* AGARD Thermal Probl. in Aerospace Med. Oct. 1968 p 191–209 refs (See N69-25051 13-04)

The problems of heat loss and thermal balance during voluntary or involuntary immersion are reviewed, and the physical and physiological limitations of thermal balance are defined. Advances in insulation and heat replacement methods are evaluated with reference to their usefulness in maintaining the thermal balance of immersed military personnel. Present developments in protective garments will probably be toward incorporating the unicellular neoprene foamed wetsuit with a supplemental heating system. Future efforts should exploit a water conditioned suit developed for use beneath the unicellular foamed outer garmet. P.A.B.

N69-25067 Centre d'Essais en Vol, Bretigny-sur-Orge (France).

EFFECTS ON MAN OF IMMERSION IN COLD WATER [EFFETS SUR L'HOMME DE L'IMMERSION DANS L'EAU FROIDE]

Y. Houdas and J. Colin *In* AGARD Thermal Probl. in Aerospace Med. Oct. 1968 p 211–216 refs In FRENCH (See N69-25051 13-04)

Studies were made to determine different tolerance times for immersion in cold water as a function of temperature. The influence of dress is investigated on the limits for partial incapacity, permanent incapacity in which the subject becomes incapable of accomplishing gestures necessary to his being located, and death. Experiments were grouped into three areas: those studying (1) nude subjects at 15°; (2) subjects dressed in neoprene suits, at 10° and 5°; and (3) subjects wearing neoprene suits over the normal equipment of a pilot, at 5°. Rectal and ten skin temperatures were measured, and body heat losses were calculated. The value of wearing the neoprene suit over a partial pressurization garment is discussed. P.A.B.

N69-25068 John B. Pierce Foundation of Connecticut, New Haven.

SKIN TEMPERATURE AND CUTANEOUS PAIN DURING WARM WATER IMMERSION

J. D. Hardy (Yale Univ. Med. School), J. A. J. Stolwijk (Yale Univ. Med. School), H. T. Hammel (Yale Univ. Med. School), and D. Murgatroyd (Yale Univ. Med. School) *In* AGARD Thermal Probl. in Aerospace Med. Oct. 1968 p 217–229 refs (See N69-25051 13-04)

(Contract DA-49-146-XZ-124; Grant PHS GM-10289)

A study was undertaken in an attempt to gather further information in regard to the pain stimulated at skin temperatures in the range 36° to 41°C, and to test a proposed hypothesis that heat pain results from subcutaneous thermal gradients. Experiments on four subjects are summarized; reports of pain were obtained for all subjects at 38.7° and for one subject at 36.8°C. From skin temperature measurements, an approximation of the temperature profiles in the subcutaneous layers is made, using the unidirectional heat flow theory for a semi-infinite solid. A conceptual hypothesis is outlined which is quantitatively compatible with a variety of observations on thermally induced pain. Using plausible temperature coefficients for rates of thermal alteration and reconstitution of tissue protein, the theory can make predictions of pain in time and in intensity as a function of the tissue temperature. P.A.B.

N69-25069 Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

SOME ASPECTS OF PERSONAL COOLING IN INADEQUATELY AIR CONDITIONED COCKPITS

J. M. Clifford *In* AGARD Thermal Probl. In Aerospace Med. Oct. 1968 p 231-242 refs (See N69-25051 13-04)

After a brief discussion of the effect of heat on flight personnel performance, various methods of providing thermal comfort are considered. Three ways of personal cooling are investigated: (1) Warm but dry air can be used to maintain thermal equilibrium by cooling by the evaporation of sweat; (2) high mass flows of cool or cold air can be delivered at the skin surface by specialized air ventilated suits, designed to distribute the air in such a way that the trunk of the body is not chilled; and (3) liquid circulated through tubes near the skin may be used as the coolant. It is thought that a personal cooling system comprising both air and water is probably most advantageous. P.A.B.

N69-25163 Johns Hopkins Univ., Baltimore, Md.

DETECTION OF SIGNALS BY TEMPLATE MATCHING

David Henry Friedman (Ph.D. Thesis) 1968 79 p

Avail: Univ. Microfilms: HC $4.20/Microfilm $3.00 Order No. 68-16417

A scheme is proposed for detecting signals in such a way as to allow for uncertainty in the description of the signal of interest while discriminating against noise and interfering signals. The observed input function relative to a given instant is represented approximately as a linear combination of a set of N orthonormal basis functions, thereby being mapped as a vector in a corresponding N-dimensional space. The projected lengths of the observed signal vector in each of the two subspaces are continuously computed. The first corresponds to the output of a K-dimensional matched filter, while the second represents the "mismatch" between the observed and desired signals within the N-dimensional observation space. A condition of high "match" and low "mismatch" is the criterion for detecting the desired signal. Dissert. Abstr.

N69-25174# Oak Ridge Associated Universities, Tenn.

ERGODIC PROPERTIES OF THE TRACER SYSTEM

Per-Erik E. Bergner Aug. 1967 50 p refs Sponsored by AEC (ORAU-103) Avail: CFSTI

The application of elementary stochastic thinking to certain problems is discussed. The present problem is a particular kind of experimental method, which has its major application in biology and medicine, but is also used in other fields of science and technology. The tracer method, is explained by a concerte example. The human body contains a certain amount of potassium. This amount is fairly constant, but there is a rapid turnover of potassium: the potassium is taken in and excreted—the two processes being balanced. Hence, the system is in steady state, or dynamic equilibrium. It is of physiologic interest to study, without disturbing the steady state, the dynamics of this system. By injecting a small amount of a radioactive potassium salt (the isotope ^{42}K) the radioactivity is observed in the different parts of the organism as functions of time. Author

N69-25183*# Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

SYNTHESIS OF BIOLOGICALLY ACTIVE SUBSTANCES IN AN ULTRASONIC-WAVE FIELD [SINTEZ BIOLOGICHESKI AKTUNYKH VESCHCHESTV V POLE UL'TRAZVUKOVYKH VOLN]

I. Ye. El'Piner Washington NASA Apr. 1969 4 p refs Transl. into ENGLISH from Nauka Press (Moscow), 1968 p 49–51

(Contract NASw-1692)

(NASA-TT-F-12190) Avail: CFSTI CSCL 06A

A brief comment is given on a theory of Oparin, according to which organic substances were synthesized in a primordial reducing atmosphere during the early stages of the formation of the Earth. Studies are cited in which amino acids, ammonia, formaldehyde and cyanides were obtained from N, H, CH_4 and CO in an aqueous medium subjected to the effects of ultrasonic waves. Author

N69-25192*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.

THEORETICAL MODEL STUDIES OF WAVE TRANSMISSION IN THE SEMICIRCULAR CANALS

Merlin Dorfman (Ph.D. Thesis) Jan. 1969 102 p refs

(Grant NGR-05-020-223; Contract N00014-67-A-0112-0007)

(NASA-CR-100862; SUDAAR-367) Avail: CFSTI CSCL 06P

In order to study the propagation of pressure waves in the semicircular canals, a single canal is modeled as an elastic toroid located inside a rigid toroidal channel. The elastic toroid is filled with incompressible, inviscid fluid, and similar fluid fills the space between the elastic toroid and the rigid channel. First, the system is studied using the potential flow equations to describe the motion of the fluids, and the membrane equation to describe the behavior of the elastic toroid. The classical Moens–Korteweg equation for pressure wave propagation in a straight circular cylinder is extended to the fluid-filled and immersed elastic toroid inside a rigid toroidal channel. The Moens–Korteweg equations are improved by considering the effects of the mass of the elastic shell and by retaining the shear behavior in the equations of motion. Mode shapes are worked out as functions of the geometric parameters of the toroids. It is found that in-plane motion of the tube axis dominates the flexural modes, changes in the cross-sectional diameter of the tube and motion of the fluid dominate the breathing mode, and axial displacement of the tube wall dominates the extensional mode. Author

N69-25194*# Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

STUDIES OF ASYMMETRIC ADSORBENTS AND CATALYSTS SIMULATING THE ASYMMETRIZING EFFECT OF ENZYMES [OB ISSLEDOVANIYAKH ASIMMETRICHESKIKH ADSORBENTOV I KATALIZATOROV, MODELIRUYUSHCHIKH ASIMMETRIZUYUSHCHEYE DEYSTVIYE FERMENTOV]

Ye. I. Klabunovskiy Washington NASA Apr. 1969 6 p refs

Transl. into ENGLISH from Nauka Press (Moscow), 1968 p 52–55
(Contract NASw-1692)
(NASA-TT-F-12191) Avail: CFSTI CSCL 06A

A brief review is given of recent advances in the synthesis of optical and geometrical isomers by using asymmetric adsorbents and asymmetric catalysts with an asymmetrizing effect similar to that of natural enzymes. Starch, cellulose, optically active polymers and silica gels are considered as asymmetric adsorbents. Optically active metallic catalysts are considered as asymmetric catalysts. The role of asymmetric catalysis in the occurrence of primary optically active isomers of organic compounds in nature is demonstrated. Author

N69-25195*# Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

THE MATCHING OF DIFFUSION PROCESSES AND CHEMICAL REACTIONS, THE EVOLUTION OF OPEN BIOCHEMICAL SYSTEMS [SOPRYAZHENIYE PROTSESSOV DIFFUZII I KHIMICHESKIKH REAKTSIY I EVOLYUTSIYA OTKRYTYKH BIOKHIMICHESKIKH SISTEM]

L. N. Moiseyeva, V. P. Slobodskaya, and A. G. Pasynskiy Washington NASA Apr. 1969 8 p refs Transl. into ENGLISH from Nauka Press (Moscow), 1968 p 56–62
(Contract NASw-1692)
(NASA-TT-F-12192) Avail: CFSTI CSCL 06A

The results of a simulation study of dynamically stable enzymatic coacervates are presented. An enzyme/substrate complex of RNA-RNA-ase is used pH4.5–5.5 as a stabilizing membrane. The coacervate stability is measured by changes in the solution turbidity. The rate of diffusion of the RNA toward the enzyme particles is found to be 300 times that of the enzymatic reaction. Simulated data are given for carbohydrate transport through negatively charged membranes in the course of the phosphorylation of glucose by hexokinase. The experiments are based on the matching of chemical and enzymatic reactions. The results are discussed in terms of a theory concerning the evolutionary development of coacervate systems. Author

N69-25196*# Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

EVOLUTION OF THE PHOTOSYNTHETIC ASSIMILATION OF CARBON [OB EVOLYUTSII FOTOSINTETICHESKOY ASSIMILYATSII UGLERODA]

N. G. Doman Washington NASA Apr. 1969 6 p refs Transl. into ENGLISH from Nauka Press (Moscow), 1968 p 109–113
(Contract NASw-1692)
(NASA-TT-F-12193) Avail: CFSTI CSCL 06A

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

N69-25197*# Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

BIBLIOGRAPHY ON PROBLEMS OF ASTROBIOLOGY [LITERATURA PO PROBLEMAN ASTROBIOLOGII]

G. N. Katterfel'D, ed. and A. K. Suslov, comp. Washington NASA Apr. 1969 54 p refs Transl. into ENGLISH from Russian Rept.
(Contract NASw-1692)
(NASA-TT-F-12201) Avail: CFSTI CSCL 03B

This bibliography contains data on the most important scientific works of astrobotany and astrobiology. All the principal studies by Russian and Soviet scientists and popularizers who have a direct connection with the problems of life on other planets are included. A large amount of the most important foreign sources is also included. Popular articles only of a synoptic nature which do not contain original scientific data are not presented. The overwhelming number of studies is accompanied by detailed annotations. Brief scientific reports, the contents of which can easily be found by their tables of contents, are not given reviews. Author

N69-25201*# General Electric Co., Philadelphia, Pa. Missile and Space Div.

A CLOSED LOOP LIFE SUPPORT SYSTEM FOR DETERMINING METABOLIC GASES PRODUCED BY SMALL ANIMALS

A. E. Binks, N. L. Bonatucci, and R. M. Ross [1968] 21 p refs
(Contract NAS2-1900)
(NASA-CR-73316; RSD-69-59) Avail: CFSTI CSCL 06K

Spacecraft life support systems have to conform to increasingly restrictive design requirements as the length of space missions increase. Limitations on size, weight, and power consumption require that a careful evaluation of all aspects of the system be made. A major component of the life support system is the gas management assembly (GMA). The GMA uses chemical adsorbents to reduce the gas and vapor concentrations within a space capsule to acceptable levels and it is very desirable that the amounts of these adsorbents carried on the flight is at the minimum level possible. During the course of the Biosatellite program a need arose to design a GMA capable of supporting small animals for a period of 21 days. The experiments described here were undertaken to measure the trace contaminant gases and vapors emitted by rats, their liquid diet and their waste products in order to effectively design a trace contaminant control canister for the GMA. The hazards associated with trace contaminants in the atmospheres of spacecraft, space simulators, and submarines were illustrated several times. Author

N69-25203*# Techtran Corp., Glen Burnie, Md.

STUDY OF THE COMPONENTS OF FOSSIL ORGANIC MATTER [ISSLEDOVANIE KOMPSNENTOV ISKOPAYEMOGO ORGANICHESKOGO VESHCHESTVA]

T. V. Drozdova Washington NASA May 1969 10 p refs Transl. into ENGLISH from Publ. "Abiogenez i Nachal'nyye Stadii Evoliyutsii Zhizn" Moscow, Nauka Press, 1968 p 122–129
(Contract NASw-1695)
(NASA-TT-F-12067) Avail: CFSTI CSCL 06C

Various organic components of fossil remains were studied, and their use in establishing the position of an organism in the evolutionary scheme is considered. It is contended that, under natural conditions, the organic remains of organisms are most often subjected to chemical changes leading to the formation of highly condensed carbonaceous matter, which forms the basis of peat, coal, and the organic part of shale. The role of the melanoidin reaction in these condensation processes and a scheme for the possible paths of humic acid formation are outlined. It is shown that one of the characteristic indices of the condensibility of fossil organic matter is a qualitative and quantitative composition of amino acids in the hydroslates. Author

N69-25233*# Techtran Corp., Glen Burnie, Md.

INORGANIC POLYPHOSPHATES IN THE EVOLUTION OF PHOSPHORUS METABOLISM [NEORGANICHESKIYE POLIFOSFATY V EVOLYUTSII FOSFORNOGO OBMENA]

I. S. Kulayev Washington NASA May 1969 8 p refs Transl. into ENGLISH from the book "Abiogenez i Nachal'nyye Stadii Evoliyutsii Zhizn" Moscow, Nauka Press, 1968 p 97-102
(Contract NASw-1695)
(NASA-TT-F-12127) Avail: CFSTI CSCL 06A

It is proposed that inorganic polyphosphates or their esters could have participated in the synthesis of various organic compounds under conditions which prevailed on the primeval earth. Numerous compounds synthesized in model tests, are very similar to

compounds encountered in modern organisms. The possible role of polyphosphates in energy storage is examined in terms of the metabolism of primitive organisms. Author

N69-25236*# California Univ., Berkeley.
BIOLOGY: SPACE RESOURCES FOR TEACHERS
Washington NASA Jan. 1969 233 p refs
(Contracts NSR-05-003-117; NSR-05-003-144)
(NASA-EP-50) Avail: SOD $2.75; CFSTI CSCL 06C

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1. LIFE SUPPORT p 10–55 refs (See N69-25237 13-04)
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N69-25237*# California Univ., Berkeley.
LIFE SUPPORT
In its Biology Jan. 1969 p 10–55 refs (See N69-23236 13-04)
Avail: SOD $2.75; CFSTI CSCL 06P

The subjects of nutrition, gas exchange and waste management, and oxygen consumption are discussed as to basic requirements of men living and working under the extreme environmental conditions found in space. Recommended areas of study and laboratory experiments are included for each topic in order for the student to gain more personal insight into the problems of life support during space missions. A.C.R.

N69-25238*# California Univ., Berkeley.
PHYSIOLOGICAL ASPECTS
In its Biology Jan. 1969 p 58-111 refs (See N69-25236 13-04)
Avail: SOD $2.75; CFSTI CSCL 06Q

Potential physiological and performance effects of temperature stress, weightlessness, acceleration and vibration stress, radiation, and toxicity are discussed, and recommendations are made for various classroom and laboratory experiments in order to further the students' understanding of these factors. In addition, the use of radio biotelemetry in monitoring, recording, and transmitting physiological data from the spacecraft to ground receivers is treated. A.C.R.

N69-25239*# California Univ., Berkeley.
PSYCHOLOGICAL ASPECTS
In its Biology Jan. 1969 p 114–157 refs (See N69-25239 13-04)
Avail: SOD $2.75; CFSTI CSCL 05J

The psychological aspects of manned space flight are considered as related to sensory and perceptual problems, spatial disorientation, effects of isolation and confinement, and circadian rhythmic changes. Classroom and laboratory studies of these problems are recommended. A.C.R.

N69-25240*# California Univ., Berkeley.
EXOBIOLOGY
In its Biology Jan. 1969 p 160–188 refs (See N69-25236 13-04)
Avail: SOD $2.75; CFSTI CSCL 06C

The subject of exobiology is examined in the areas of extraterrestrial biological exploration, decontamination and antiseptic techniques, and the existence of extraterrestrial beings as related to concepts of the chemical evolution of life. Classroom studies, chemical experiments, and simulation methods are suggested for further investigation of this relatively new academic field. A.C.R.

N69-25250*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
PRELIMINARY CLINICAL REPORT OF THE MEDICAL ASPECTS OF APOLLOS 7 AND 8
Charles A. Berry May 1969 25 p
(NASA-TM-X-58027) Avail: CFSTI CSCL 06E

Data are presented in the following areas: cabin atmosphere and temperature, noise and vibrations, radiation, toxicology, acceleration and impact, weightlessness, food, water and waste management, sleep and work/rest cycles, drugs, bioinstrumentation, preventive medicine, and inflight disease. Preflight and postflight physical examination findings are summarized for cardiovascular, hematological, biochemical, immunologic, endocrinology, and microbiology studies. Exercise capacity and bone densitometry were also investigated. P.A.B.

N69-25289*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
ON THE DETERMINATION OF THE ELASTIC PROPERTIES OF BLOOD VESSELS FROM THEIR WAVE TRANSMISSION CHARACTERISTICS
Michael K. Wells (Ph.D. Thesis) Apr. 1969 147 p refs
(Grant NGR-05-020-223)
(NASA-CR-100867; SUDAAR-368; SUDAAR-362) Avail: CFSTI CSCL 06P

Various theoretical and experimental aspects of dispersion and attenuation of waves propagating in blood vessels are investigated. The vessel is taken as perfectly elastic and the fluid inviscid and incompressible. Motions of the wall are considered small and the linearized equations of Flügge for prestressed, thin walled, circular cylindrical shells are used to describe the equilibrium of the blood vessel. Under these conditions three distinct types of waves are possible which at high frequencies are associated essentially with radial, circumferential or axial motions of the vessel respectively. In addition, we consider both axisymmetric and nonaxisymmetric wall displacements. Experimentally, the mechanica behavior of the abdominal venae cavae of anesthetized dogs has been studied by measuring the speed, attenuation and changes in wave form of various types of induced pressure signals. The speed of large amplitude pressure waves normally ranged from about 100 to 700 cm/sec and was found to depend strongly on the signal amplitude, transmural pressure and physiological state of the animal. The propagation of these signals is shown to be affected by reflection interference and pronounced nonlinear phenomena. Author

N69-25298# Rochester Univ., N. Y. Dept. of Radiation Biology and Biophysics.
THE EFFECT OF 2800 MHz MICROWAVES ON THE EYE OF RABBITS AND DOGS
Sol M. Michaelson 25 Oct. 1968 28 p refs Presented at Symp. Radiation Biol. and Biophysics, Rochester, Mich.
(Contract W-7401-eng-49)
(UR-49-1012; CONF-681030-1) Avail: CFSTI

Rabbits were irradiated using a bench-model, Magnetron, continuous-wave microwave generator. Only the left eye was irradiated, the right serving as a control. The eyes were examined at frequent intervals after exposure for three to six month periods. Changes in opacity of the lens and conjunctival reactions after exposure to 220 to 240 mW/cm^2 and 160 to 170 cm^2 for different lengths of time are described. Studies on protein and nucleic acid metabolism failed to reveal any significant differences between the experimental and control lenses. In studies on dogs an Air Force radar search unit (AN/FPS-6) modified for biomedical investigations was used. The eyes were exposed at 350 or 700 mW/cm^2 for different lengths of time. Opacities and striations in the lens, conjunctivitis, dilatation of the pupil, and other changes in the eye are described. Results of studies on effects of radiation on the eye conducted by other workers are discussed. NSA

N69-25317# Washington State Univ., Pullman.
A STUDY OF FACTORS GOVERNING PLANT RADIOSENSITIVITY Research Report, 1 Nov. 1967–31 Oct. 1968
Robert A. Nilan and C. F. Konzak 15 Nov 1968 22 p refs
(Contract AT(45-1)-353)
(RLO-353-32) Avail: CFSTI

Progress is reported on studies on the effects of x-radiation on barley seeds. Results are reported from studies on the effects of radiation energy, temperature, water content, and oxygen content on the radiosensitivity of seeds, using the frequency of chromosome aberrations and the growth of seedlings as criteria. A list is included of 11 publications during the period covered by this report. NSA

N69-25322# School of Aerospace Medicine, Brooks AFB, Tex.
PROCEEDINGS OF THE FIFTEENTH ANNUAL CONFERENCE OF AIR FORCE BEHAVIORAL SCIENTISTS
Richard E. McKenzie, ed. Sep. 1968 258 p refs Conf. on Behavioral Modification held in Wichita Falls, Tex., 31 Jan.–2 Feb. 1968
(AD-682511) Avail: CFSTI CSCL 6/5

Contents: Some comments on behavioral modification; Goals of treatment; Behavior therapy in 1968; Therapists awareness of how group therapy patients perceive them; A community mental health approach in a military setting; A CHAP child guidance clinic in a USAF hospital; Improving the management of children by group behavior therapy of their parents; The definitive care unit: A new approach to an old problem; The efficiency of group psychotherapy with first-term airmen at an Air Force technical training center; Development of a family therapy program at an overseas psychiatric facility; Psychiatric practice and psychopathology in a large Air Force clinic; A human relations training program at a USAF hospital; Determinism versus free will in human behavior; Conceptualization as reflected in social perception behavior: A preliminary report; Diminished male orientation in suicidal basic trainees; LSD and socialization; Therapeutic abortion of military dependents for psychiatric reasons; A discussion of some psychiatric aspects of therapeutic abortion; The Psychiatrist on trial; Military aeromedical evacuation and psychiatric patients; The Rorschach protocols of two cases of traumatic neurosis of war; The Rorschach repressive index as a measure of psychologic functioning and differential use of social work personnel; A study of the use of short forms of the Weschsler-Bellevue intelligence test on a restricted population. TAB

N69-25366# Vanderbilt Univ., Nashville, Tenn.
NEW APPROACH TO SCAN SYSTEM EVALUATION
A. B. Brill, H. Williams, E. Cook, R. E. Johnston, and R. Nash [1968] 9 p Presented at the South Eastern Chapter Soc. of Nucl. Med. Meeting, Atlanta, Oct. 1968
(ORO-2401-22; CONF-682033-1) Avail: CFSTI

The performance of a system for collecting, computer analyzing, and video tape displaying of data from radioisotope scans and applications of statistical decision theory in radioisotope scanning are discussed. The use of three-dimensional phantoms for the ^{99}Tc scanning of a normal brain with superimposed lesions is described to illustrate the procedure. NSA

N69-25367# Rochester Univ., N. Y.
SOVIET VIEWS ON THE BIOLOGIC EFFECTS OF MICROWAVES
Sol. M. Michaelson 17 Jul. 1968 8 p refs
(Contracts AF 30/602)-2248; W-7401-eng-49)
(UR-49-976; CONF-681110-1) Avail: CFSTI

The majority of Soviet investigators stress nonthermal effects at the molecular and cellular level. Effects may occur at low as well as high intensities of irradiation and are characterized by responses that involve reaction of the entire organism to changes at the molecular level. The importance of the difference between the Soviet and Western views is apparent when it is realized that practical consideration of maximum permissible exposure is based on the acceptance or rejection of nonthermal effects of microwaves as being of biologic significance. Soviet investigators suggest that chronic irradiation of animals with low intensity microwaves may induce functional changes in the nervous and cardiovascular systems without a rise in tissue temperature. Higher field intensities produce a thermal effect that can damage brain and testes, cause internal hemorrhage, burns, necrosis of tissues, and produce lenticular opacities. Microwave irradiation results in a more intense flow of afferent impulses and more intense stimulation of hypothalamic-hypophysial activity than does thermal irradiation at equivalent energy levels Author (NSA)

N69-25369*# Avco-Everett Research Lab., Everett, Mass.
SOLAR FLARE RADIATION PROTECTION REQUIREMENTS FOR PASSIVE AND ACTIVE SHIELDS
Francis W. French Mar. 1969 48 p refs Presented at AIAA Aerospace Sci. Meeting, New York, Jan. 1969
(Contract NAS8-21392)
(NASA-CR-98420; RR-331) Avail: CFSTI CSCL 18F

The degree of protection from solar flare radiations required by astronauts on interplanetary flights is investigated if the protection is provided by passive means (bulk shielding), and active means (plasma radiation shielding). Anticipated solar flare radiation environments postulated in several recent studies are examined and found to fall into two general categories. Radiobiological tolerance criteria based on early skin and blood-forming organ responses are discussed. Several approaches to selecting a mission radiation exposure criterion are considered, and example criteria suggested for illustrative purposes. Curves are presented of dose vs shield thickness and plasma radiation shield voltage, with probability of exceeding a given dose as a parameter. These curves are used to obtain requirements for the two types of shielding. Results are compared on several bases. Author

N69-25375*# Naval Medical Research Inst., Bethesda, Md. Dept. of Microbiology.
EFFECTS OF HIGH AND LOW BAROMETRIC PRESSURES ON SUSCEPTIBILITY AND RESISTANCE TO INFECTION Quarterly Status Report, 1 Jan.–31 Mar. 1969
Francis B. Gordon and James D. Gillmore 31 Mar. 1969 13 p
(NASA Order R-21-010-010)
(NASA-CR-100865; A-3061A(AS-1); QSR-15) Avail: CFSTI CSCL 06F

Results of continuing research on infection resistance are reported. The pulmonary infection of mice induced by exposure to an aerosol of the chlamydial mouse pneumonitis agent was reduced in degree by post-challenge exposure to a hyperoxic environment, while a hypoxic environment enhanced the infection. When *Chlamydia psittaci* is injected i.p., the resulting infection is increased in severity when the mice are exposed to hypoxia. A simulated space cabin atmosphere had no effect on the mortality curve, when compared to air-exposed controls. Using exposure of mice to an aerosol of influenza virus, experiments demonstrated a protective effect of hypoxia applied only before the infectious challenge, confirming earlier investigations. Great variation in the number of lung tumors seen in A/HeJ mice following induction with dibenz-anthracene continues to give trouble, and probably contributes to the insignificant differences seen between groups in earlier tests. The status of new chambers for more precise control of parabaric environments is reported. Author

N69-25382 California Univ., San Diego.
A COMPUTER SIMULATION OF THE UNWINDING OF DNA
Eliot Morton Simon (Ph.D. Thesis) 1968 160 p
Avail: Univ. Microfilms: HC $7.40/Microfilm $3.00 Order No. 68-15567

This thesis investigates the use of the computer to simulate the unwinding of DNA. In addition it investigates the use of the computer to solve the Langevin equation in difference form for polymers in general. A theoretical treatment for tensile relaxation is developed and compared with the linear and helical relaxation computer cases. For the unwinding problem, it is concluded that to the approximation used here (free-draining polymer), the unwinding of DNA proceeds via an end unwinding mechanism. The ends are seen to unwind first followed by the more central positions. The inclusion of a simple sticking potential of interaction between the strands slows the relaxation. The relaxation times for the helical case as measured from semi-log plots roughly agree with the tensile linear polymer relaxation. Dissert. Abstr.

N69-25392*# Mayo Association, Rochester, Minn.
STUDIES OF THE EFFECTS OF GRAVITATIONAL AND INERTIAL FORCES ON CARDIOVASCULAR AND RESPIRATORY DYNAMICS Semiannual Status Report
1 Apr. 1969 11 p refs
(Grant NGR-24-003-001)
(NASA-CR-100905) Avail: CFSTI CSCL 06F

The major portion of this report consists of the appended description of a computer-controlled scintiscanning assembly and associated digital computer data processing technics developed for study of the effects of changes in the gravitational-inertial force environment on the regional distribution of blood flow in chimpanzees. In addition, the fabrication of the biplane videometry system has been completed and initial check-out tests have been carried out of the complete assembly, including the computer interface system, using a prototype model video disc recorder. Studies of the effects of plus and minus G_y (i.e., right and left lateral acceleration) in the range from 1 to 6G, on the regional distribution of pulmonary blood flow in chimpanzees, showed a decreased blood flow to superior regions of the upper lung and increased flow to thorax mid-regions. Hydrostatic effects on pulmonary arterial, venous, and pleural pressures were minimal. Author

N69-25409*# McDonnell-Douglas Astronautics Co., Santa Monica, Calif. Advance Biotechnology and Power Dept.
SIXTY-DAY MANNED TEST OF A REGENERATIVE LIFE SUPPORT SYSTEM WITH OXYGEN AND WATER RECOVERY. PART 1: ENGINEERING TEST RESULTS
Dec. 1968 106 p refs
(Contract NASw-1612)
(NASA-CR-98500; DAC-62295) Avail: CFSTI CSCL 06K

The technical engineering test procedures and results are discussed with respect to the operations of atmosphere supply and pressurization, atmosphere purification and control, thermal and humidity control, water and waste management, and system integrations. The operational requirements and procedures include those for crew, safety, emergency, and pass-through operations. Subsystem, preflight, emergency dry run, and five-day checkout procedures are described. Details are given on the results of the 60-day test and the evaluation of the life support systems. The maintenance, monitoring, and repairing of equipment were performed satisfactorily, and no major problems occurred. The space cabin simulator and support facility are also described. N.E.N.

N69-25411*# Techtran Corp., Glen Burnie, Md.
ORGANIZATIONAL PRINCIPLE OF COACERVATE SYSTEMS AND SIMULATION OF PRIMARY FORMS OF METABOLISM IN THEM [O PRINTSIPE ORGANIZATSII KOATSERVATNYKH SISTEM I MODELIROVANII V NIKH PERVICHNYKH FORM OBMENA VESHCHESTV]
A. I. Oparin Washington NASA May 1969 8 p Transl. into ENGLISH of the Publ. "Abiogenez I Nachal'Nyye Stadii Evoliyutsii Zhizn" Moscow, Nauka Press, 1968 p 69–75
(Contract NASw-1695)
(NASA-TT-F-12147) Avail: CFSTI CSCL 06A

The organizational principle and the simulation of enzymatic processes are discussed. It is suggested that the degree of polymerization of the polymers taking part in these enzymatic processes plays the most important role in the self-formation of coacervate droplets. Experimental results indicate that the presence of a synthesizing enzyme in these droplets leads to their growth. It is concluded that the subsequent evolution of primordial life system is preceded by the successive selection of forms which possess more complex and multistage processes. Author

N69-25413*# Department of Health, Education, and Welfare, Phoenix, Ariz. Applied Microbiology and Planetary Quarantine Section.
SERVICES PROVIDED IN SUPPORT OF THE PLANETARY QUARANTINE REQUIREMENTS, JANUARY–MARCH 1969
Martin S. Favero Mar. 1969 25 p
(NASA Order R-137)
(NASA-CR-100888; Rept-25) Avail: CFSTI CSCL 06A

Studies on dry heat resistance of bacterial spores and the possible relationship between heat activation and constituents in the plating medium upon recovery of unheated and heat-injured spores are reported. The effects of medium and moist heat shock upon recovery of bacterial spores are summarized. Production of a standard spore crop of *B. subtilis* var. *niger* is described; a summary of D_{125C} values obtained from several different suspensions is included. The VPI technique for recovering anaerobic microorganisms was evaluated and compared with the NASA standard technique. The level of microbial contamination on the Apollo 9 spacecraft and the percentage of aerobic spores and molds were investigated, including that detected on the CM, instrument unit, Saturn S-4B, and LM-3 interior surfaces and ascent and descent stage exterior surfaces. Data are presented for preliminary sampling of contamination on the surfaces of the Apollo 10 CM and on the Apollo 11 LM-5 ascent stage. The types of aerobic mesophilis microorganisms isolated from the Apollo CM 8 and 9, Apollo 9 LM-3, and Apollo 10 LM-4 are also included. P.A.B.

N69-25422 Johns Hopkins Univ., Baltimore, Md.
REACTION-DIFFUSION COUPLING IN COMPLEX SYSTEMS
Robert Edward Ulanowicz (Ph.D. Thesis) 1968 208 p
Avail. Univ. Microfilms: HC $9.45/Microfilm $3.00 Order No. 68–16491

This study concerns two needs in the theory of mass transport with chemical reaction and its application to physical systems. The first of these needs is for an extension to the heterogeneous realm of the linearized theories of Byers–Brown and Prater and Wei on multicomponent diffusion accompanied by multiple chemical reactions. The two-film model proposed predicts, among other things: (1) non-equilibrium chemical reaction near the interface, despite chemical equilibrium in the bulk phases; (2) non-monotonic behavior in the chemical potentials of certain species over the two phases, resulting in an apparent "accumulation" or dearth of those species near the interface; and (3) a coupling effect between multiple reactions resulting in facilitated transport different from the combined facilitations of the reactions occurring separately. The linearized theory is used to predict some characteristics of the behavior of the simultaneous transport of oxygen and carbon dioxide through hemoglobin solutions. The results indicate that the fluxes of oxygen and carbon dioxide in such systems are highly coupled. The effect of this coupling upon the oxygen flux is described under various changes in pH, hemoglobin concentration, and phase thickness. The model is suggested as a diagnostic tool in studying the transport characteristics and kinetics of abnormal hemoglobins. Dissert. Abstr.

N69-25453# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DETERMINING THE STATISTICAL CHARACTERISTICS OF DISCERNIBLE IMAGES IN THE SELF INSTRUCTION MODE

A. V. Milenkii 4 Oct. 1968 21 p refs Transl. into ENGLISH from *Kibernetika (USSR), no.* 3, 1967 p 56–61
(AD-683575; FTD-MT-24-305-68) Avail: CFSTI CSCL 5/9

The need to employ the learning process (also termed self-learning or learning without a teacher) arises in many important practical cases where a priori information on patterns is insufficiently complete or insufficiently reliable and when, for one reason or another, the customary teaching procedure cannot be organized. In such cases the division of pattern realizations into classes is based on intuitively introduced measures of compactness. A more rigorous approach, however, is that of estimating the statistical characteristics of the recognized patterns with respect to the totality of the incoming realizations and then classifying them in accordance with these estimates on the basis of Bayes decision rules. Such an approach makes it possible to optimize the division and to use many of the findings obtained with the aid of the theory of statistical decisions in a broad class of problems involving limited a priori information. TAB

N69-25462*# National Aeronautics and Space Administration, Washington, D. C.

SPACE BIOSCIENCE

Dale W. Jenkins, ed. and Bruce Berman (George Washington Univ.), ed. *In its* Significant Achievements in Space Sci. 1967 1968 p 41–137 refs Prepared in cooperation with George Washington Univ. (See N69-25460 13-30)
Avail: SOD $2.50; CFSTI CSCL 06A

The findings and expertise of space and planetary biology are utilized to examine the characteristics of the space environment and their effects on biologic organisms, and to search for evidence of extraterrestrial life, study its origin and nature, and formulate basic theories and models of the origin of life. To provide a basis for protection against the hazards of weightlessness and radiation in space, plant and animal experiments are being conducted in space on physiologic changes, metabolic disturbances, biorhythmic derangements, and systemic disruptions. Research concerning chemical evolution, extraterrestrial life, spacecraft sterilization and planetary quarantine, environmental biology, and behavioral biology is discussed. The outstanding achievement in 1967 was the successful flight and recovery of Biosatellite 2 which carried 13 scientific experiments. The preliminary results are presented. Author

N69-25471# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE RECOGNITION PROBLEM

M. M. Bongard 1 Jul. 1968 254 p refs Transl. into ENGLISH of the book "Problema Uznavaniy" Moscow, Izd. Nauka, 1967
(AD-682462; FTD-HT-23-194-68) Avail: CFSTI CSCL 6/4

The book deals with provisional solutions of as yet mathematically unformulated problems encountered in the design of machines that make use of a recognition function. A survey of work that has been done in a variety of approaches to the problem is developed beginning with conditioned-reflex and neuron theory and Rosenblatts Perceptron. Topics include similarity search, receptor-space transformation, recognition vs. simulation, causes of poor system performance, a discover-the-law game, the information-theoretical usefulness concept, and statistical criteria. An analogy is drawn with learning in a child, where instruction is based not on direct modification of the physical system itself, but by indirect stimulation of its receptors. Appendixes deal with hypotheses containing only truth, optimum hypotheses, and nonlogarithmic optimum determining algorithms, and, lastly, present a set of 100 recognition problems for a program. Author (TAB)

N69-25482# Army Biological Labs., Ft. Detrick, Md.

THE EFFECT OF ULTRAVIOLET IRRADIATION ON THE MINERAL AND NITROGEN METABOLISM OF ADOLESCENTS

A. P. Shitskova et al Jul. 1968 11 p Transl. into ENGLISH from Gigiena i Sanit. (Moscow), v. 23, no. 11, 1958 p 37–43
(AD-683012; Trans-276) Avail: CFSTI CSCL 6/5

The feeding of students in a trade school is conducted in accordance with the existing norms, but the content of nutritive substances in the students rations, such as proteins, fats (especially animal) and calcium from the mineral substances, is lower than the physiological norms. A prophylactic irradiation of the youths with ultraviolet rays significantly increase the capability of the organism to utilize the mineral substances and proteins of the food. The retention of calcium in the organism after the ultraviolet irradiation was raised from 34.9 to 62.4%, phosphorus - from 22.2 to 41.9% and nitrogen - from 26.2 to 32.1%. The results which were received enable the raising of a question concerning the increase in products of animal origin and vegetables in the nutrition of students. Author (TAB)

N69-25485# Atomic Energy Centre, Lahore (Pakistan). Health Physics Div.

PAEC'S PERSONNEL MONITORING FILM-BADGE SERVICE AND THE DESIRABILITY OF PROVIDING A SUPPLEMENTARY DOSIMETER

Khalid Faroog Mirza and Walayat Khan Malik Sep. 1968 21 p refs
(PAECL/HP-9) Avail: AEC Depository Libraries

The results obtained during the last eight years of PAEC's personnel monitoring film-badge service are summed up. It is found that, on an average, each worker received a radiation dose of 36.4 milli-roentgen per week. It is also found that approximately 5 out of every 100 film-badges processed indicate over-exposure. A comparison is made of the characteristics of various dosimeters, and it is suggested that a LiF thermoluminescent dosimeter should be accommodated in the film-badge holder in order to improve the quantitative determination of the radiation dose. Author (NSA)

N69-25494# Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.

PILOT RESPONSE TO PERIPHERAL VISION CUES DURING INSTRUMENT FLYING TASKS

A. Howard Hasbrook and Paul. E. Young May 1968 21 p refs
(AM-68-11) Avail: CFSTI

The difficulty experienced by non-professional pilots attempting to fly in foul weather, day or night, is well documented by accident statistics; almost one-third of all fatal accidents in general aviation involve weather flying as an accident causation factor. Unlike contact flying in which peripheral vision cues relative to the outside world are used for control of aircraft attitude, instrument flying requires dependence on central vision for discrete interpretation of instrument readings. In an attempt to more closely associate the visual aspects of instrument flying with that of contact flight, a study was made of human response to peripheral vision cues relating to aircraft roll attitude. Pilots, ranging from 52 to 12,000 flying hours experience, were tested in a multi-engine aircraft simulator. Results of the study suggest that substantial gains can be achieved in instrument flying capability by use of peripheral vision cues as they relate to provision of continuous roll attitude (bank angle) information. Author

N69-25576# California Univ., Livermore. Lawrence Radiation Lab.

HEALTH PHYSICS ASPECTS OF TRITIUM CONTROL AT THE LAWRENCE RADIATION LABORATORY, LIVERMORE

William J. Silver and Melton H. Chew 15 Jan. 1969 23 p Presented at the Health Phys. Soc. Midyear Topical Symp., Los Angeles, 29–31 Jan. 1969 Submitted for publication Sponsored by AEC
(UCRL-71327; CONF-690103-11) Avail: CFSTI

Operational control including handling techniques and environmental monitoring are discussed. Emergency planning is outlined and spill experience is described. NSA

N69-25580# Joint Publications Research Service, Washington, D. C.
CONDITIONED CARDIAC REFLEXES, AND THE FUNCTIONAL AND MORPHOLOGICAL STATE OF CORTICAL NEURONS WHEN EXPOSED TO SUPERHIGH FREQUENCY ELECTROMAGNETIC FIELDS

M. I. Yakovleva et al 29 Apr. 1969 10 p refs Transl. into ENGLISH from Zh. Vysshei Nervnoi Deyatel'nosti im I. P. Pavlova (Moscow), no. 6, 1968 p 973–978
(JPRS-47938) Avail: CFSTI

Five albino rats were subjected to single (30 minutes duration) and multiple exposures (3–4 days in succession) to SHF fields at PPM (output flow density) = 5–15 mw/sq cm. Frontal sections of the somatosensory region were analyzed for cytological findings on the cerebral cortex. It was concluded that single and multiple exposure induces weakening of the excitatory process and reduces the functional mobility of the cells of the cerebral cortex. Most common are edematous changes in nerve cells throughout the cross section of the cortex. The maximum number of altered cells is encountered with multiple exposure with PPM = 15 mw/sq cm. The changes in function and structure of the neurons of the cerebral cortex are found without disturbances in conditioned reflex regulation of cardiac activity in rats. Author

N69-25597# Douglas United Nuclear, Inc., Richland, Wash.
BIOLOGICAL EFFECTS OF IONIZING RADIATION
C. D. Corbit [1968] 21 p refs Presented at the Electromagnetic Spectrum Conf., Richland, Wash.
(Contract AT(45-1)-1857)
(DUN-SA-77; CONF-680930-1) Avail: CFSTI

The relation of dose to direct and indirect effects of γ and x radiation on man is discussed. The characteristics of ionizing radiations, reactions caused by radiation in cells, and factors influencing the radiosensitivity of various tissues are reviewed. Data on the effects of radiation on blood, skin, eyes, gonads, gastrointestinal tract, lungs, nervous system, life span, and tumorigenesis are summarized. Available data on injuries to man following exposure to various doses of radiation are reviewed. It is pointed out that radiation exposure limits established for the protection of the general population should not be applicable to personnel in nuclear industry, since this group does not include persons below 18 yrs or over 70 yrs of age and persons working with radioactive materials are healthier than the general population. NSA

N69-25648*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
AN EXPERIMENTAL STUDY OF THE TRANSMISSION CHARACTERISTICS OF PRESSURE WAVES IN THE AORTA
Michael Benjamin Histand (Ph.D. Thesis) Mar. 1969 106 p refs
(Grant NGR-05-020-223)
(NASA-CR-100861; SUDAAR-369) Avail: CFSTI CSCL 06P

A method was developed to determine the elastic behavior of large blood vessels in terms of their transmission characteristics for small sinusoidal pressure signals. The method utilizes transient signals of the form of finite trains of sine waves that are superimposed on the naturally occurring pressure fluctuations and are generated by an electrically driven impactor or by a pump. Its application to the thoracic aortas of 18 mature mongrel dogs anesthetized with Nembutal indicated that dispersion and attenuation data for frequencies between 40 and 200 cps can be obtained without requiring either Fourier transform computations or resolution of reflection interference. The analysis of small sinusoidal wave trains generated at different instants of the cardiac cycle shows significant variations in wave transmission characteristics due to the effects of pressure and flow. Author

N69-25649*# McDonnell-Douglas Astronautics Co., Santa Monica, Calif. Advance Biotechnology and Power Dept.
SIXTY-DAY MANNED TEST OF A REGENERATIVE LIFE SUPPORT SYSTEM WITH OXYGEN AND WATER RECOVERY. PART 2: AEROSPACE MEDICINE AND MAN-MACHINE TEST RESULTS
Dec. 1968 129 p refs
(Contract NASw-1612)
(NASA-CR-98501; DAC-62296) Avail: CFSTI CSCL 06K

The results of the 60-day test indicated that the life support system successfully met the requirements of the test program. The crew selection program proved to be effective in providing subjects for the test. Medical studies conducted during the test showed no significant changes except a temporary loss of auditory acuity and occasional symptoms of mild dehydration. Behavioral studies indicated that the crew was not subjected to excessive stress because of the confinement or interaction effects. Microbiological studies showed, in general, that none of the bacteriological changes observed could be correlated with significant clinical events, nor were they suggestive of any potential infectious hazard. Evaluation of crew support equipment indicated good acceptance of the water recovery subsystem, the waste management subsystem, personal hygiene equipment, and clothing. Improvements appear to be necessary in food and reduced noise level in preparation for future tests of longer duration. For part 1, see N69-25409. Author

N69-25661*# McDonnell-Douglas Astronautics Co., Santa Monica, Calif. Western Div.
PARAMETRIC STUDY OF MANNED LIFE SUPPORT SYSTEMS. VOLUME 3: COMPUTATIONAL PROCEDURES Final Report, Jul. 1967 – Aug. 1968
R. S. Barker Jan. 1969 96 p
(Contract NAS2-4443)
(NASA-CR-73284; DAC-56714) Avail: CFSTI CSCL 06K

In this volume, the logic for computing the parametric data of the life support system is described as well as the development of a FORTRAN program to mechanize the computations. Sufficient detail is presented to facilitate evaluation of the mathematical models used for subsystems and of the computer program that was developed. The computer program is described in terms of the input data loadsheets, the computational logic, the output data formats, and special program features. Sample problem specifications and plotted and tabulated computer output data are also presented. Sensitivity evaluations and other observations derived from the output are included with a discussion of the sample problem results. The logic diagrams presented here may be used in conjunction with parametric data and subsystem and component details to perform hand calculations. See also abstracts N69-23111 and N69-23112. K.W.

N69-25662*# McDonnell-Douglas Astronautics Co., Santa Monica, Calif. Western Div.
PARAMETRIC STUDY OF MANNED LIFE SUPPORT SYSTEMS. VOLUME 4: PROGRAM MANUAL Final Report, Jul. 1967 – Aug. 1968
S. W. Nicol Jan. 1969 173 p
(Contract NAS2-4443)
(NASA-CR-73285; DAC-56715) Avail: CFSTI CSCL 06K

The FORTRAN computer program developed as a part of the parametric study of life support systems is described. This program, designated H738, was written for use on an IBM 7094. The program was developed to determine the characteristics of life support systems in conjunction with mission analyses or for trade-off studies of life support system functional methods. The characteristics which can be determined include equipment weight, volume, required power, cooling, and heating to satisfy design conditions. Equipment and materials are computed for specified emergency period durations. Spares are determined for portions of life support systems involved in thermal and atmosphere control, waste management, and water supply. Vehicle interaction output data include power, cooling, heating, meteoroid and radiation shielding, and surface area for space radiators. Mission analysis input data include crew size, flight date, vehicle flight profile, mission duration, resupply period, and cabin volumes. Life support system input data include specifications of equipment for accomplishing system functions and basic equipment characteristics such as process efficiency and of life support systems with ecological closure varying from "open", with no recovery of waste materials, to "closed" with full, or nearly full, human re-utilization of waste materials. Parametric data relating equipment characteristics to appropriate independent variables are specified. See also abstracts N69-23111 and N69-23112. K.W.

N69-25729# Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.

WRED: A SITING CODE TO ESTIMATE DOSE PROBABILITY DISTRIBUTION FROM MEASURED METEOROLOGY DATA

R. E. Cooper 15 May 1968 9 p refs Presented at the 13th Ann. Health Phys. Soc. Meeting, Denver, 16-20 Jun. 1968

(DP-MS-68-7; CONF-680607-11) Avail: CFSTI

A reactor-site evaluation method which determines the frequency of occurrence of various simultaneously occurring atmospheric dispersion conditions and calculates the resulting potential off-site dose following an assumed radioactivity release is described. The computer program WRED uses temperature, wind velocity, and wind direction data to determine dispersion properties, determine whole-body gamma and thyroid inhalation doses, classify each dose according to magnitude, distance, and release height, and provide output suitable for dose vs. frequency of occurrence analysis. NSA

N69-25748*# National Academy Sciences—National Research Council, Washington, D. C.

PHYSIOLOGY IN THE SPACE ENVIRONMENT. VOLUME I: CIRCULATION

1968 198 p refs Supported by NASA

(NAS-NRC-PUBL-1485A) Avail: CFSTI/NAS CSCL 06S

Possible effects of prolonged space flight on the human circulatory system were studied with respect to (1) the various parts and functions of the circulatory system and (2) the various stress factors to which the system may be subjected. Proposed was a program of ground-based and in-flight experimentation and tests with emphasis on the development of countermeasures to physiological stress factors. Improved bioinstrumentation and telemetering devices as well as the utilization of biochemical systems analysis techniques were found essential to observe the following: (1) control and regulation of vascular functions; (2) control and regulation of organ circulation; (3) control and regulation of blood volume and cardiac output; and (4) development of tolerance to stress factors in manned space flight. G.G.

N69-25756# Aeronautical Research Council (Gt. Brit.)

THE EFFECTS OF EXTENDED PRACTICE ON PERFORMANCE IN A TRACKING TASK

R. C. Hornby and R. Wilson, (Queens Univ., Belfast) 1969 23 p ref Supersedes ARC-29887; see N68-30589

(ARC-CP-1030; ARC-29887) Copyright. Avail: CFSTI; HMSO 4s 6d

Experimental measurements of human controller performance have been made during extended periods of practice in visual sine-wave tracking tasks. It has been found that, irrespective of task difficulty, RMS error scores decreased to such small magnitudes that differences in scores due to different task variables would have no practical significance. Thus the averaged values of steady scores when tasks are well learnt are meaningless for subject or task difficulty comparisons. It has been shown that the performance scores vary in an exponential manner with the number of task repetitions and it is proposed that an empirical constant related to the rate of decrease of scores be used as a measure of relative task difficulty. Author (TAB)

N69-25757# Atomic Energy Commission Research Establishment, Riso (Denmark). Health Physics Dept.

DOSIMETRY IN RADIOSTERILIZATION OF MEDICAL PRODUCTS

Niels W. Holm (Ph.D. Thesis—Lund Univ.) Sep. 1968 21 p refs

(Riso-185) Avail: CFSTI

The purpose of these investigations was to develop dosimetry systems for radiosterilization of medical products. Some of the work has formed the basis of the dosimetry procedures included in the IAEA's recommended Code of Practice for Radiosterilization of Medical Products. Special efforts were made to develop simple and reliable calorimeters for absolute calibration of secondary dosimetry systems, and the results of the work with the thermos flask calorimeter and the oxalic acid dosimeter are reported. A number of general problems in radiosterilization dosimetry are also discussed. Author (ESRO)

N69-25758# Atomic Energy Commission Research Establishment, Riso (Denmark). Health Physics Dept.

ENVIRONMENTAL RADIOACTIVITY IN THE FAROES IN 1967

A. Aarkrog and J. Lippert Jul. 1968 23 p refs

(Riso-181) Avail: CFSTI

Measurements of fallout radioactivity in the Faroes in 1967 are presented. Sr-90 (and Cs-137 in most instances) was determined in regularly collected samples of precipitation, milk, potatoes, sheep, fish, and drinking water. In addition, analyses of spot samples of grass, soil, sea water, sea plants, birds, vegetables, fodder, bread, and fresh water were carried out. Estimates of the mean contents of Sr-90 and Cs-137 in the human diet in the Faroes in 1967 are given. Author (ESRO)

N69-25759# Atomic Energy Commission Research Establishment Riso (Denmark). Health Physics Dept.

ENVIRONMENTAL RADIOACTIVITY IN GREENLAND IN 1967

A. Aarkrog and J. Lippert Jul. 1968 18 p refs

(Riso-182) Avail: CFSTI

Measurements of fallout radioactivity in Greenland in 1967 are reported. Sr-90 (and Cs-137 in most instances) was determined in samples of precipitation, soil, sea water, vegetation, animals, and drinking water. Estimates of the mean contents of Sr-90 and Cs-137 in the human diet in Greenland in 1967 are given. Author (ESRO)

N69-25780# Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Plant.
DESIGN AND OPERATION OF A LARGE SAND BED FOR AIR FILTRATION
G. H. Sykes and J. A. Harper Jul. 1968 8 p Presented at the Symp. on Operating and Develop. Experience in the Treat. of Airborne Radioactive Wastes, N. Y., 23-30 Aug. 1968
(Contract AT(07-2)-1)
(DPSPU-68-30-5; CONF-680811-13) Avail: CFSTI

The design and operation of large sand filters are discussed. These filters, 100 ft wide, 240 ft long, and 8 ft deep, are used in the exhaust air system of the chemical separation facilities. The filters have satisfactorily filtered exhaust air for 13 years. Filtering efficiency has remained greater than 99% with acceptable increases in differential pressure. Activity has penetrated only to the smallest mesh (30 to 50) sand; about 1000 Ci of gamma activity is established to be in the bed. Filtering efficiency has gradually improved probably because dust accumulation has created a finer filter medium. Air flow has ranged from 100,000 to 130,000 cubic feet per minute throughout the years of operation. Filter differential pressures have increased slightly because of dust accumulation and occasionally because of water inleakage. NSA

N69-25785# Illinois Univ., Urbana. Dept. of Psychology.
MULTIVARIATE ANALYSIS OF SIMULATED PROTOCOLS FOR A MULTI-ELEMENT PATTERN MODEL OF PROBABILITY LEARNING
Lee Gordon Cooper (M.S. Thesis) Jan. 1969 75 p refs
(Contracts Nonr-1834(39); N00014-67-A-0305)
(AD-682989) Avail: CFSTI CSCL 5/10

To investigate the properties of a mathematical model for probability learning, response protocols were simulated to fit the models specifications, and then they were analyzed by the generalized learning curves technique. The results indicated that the generalized learning curves technique could discriminate among groups on a wide variety of bases. It was also found that the use of different event protocols for each subject is undesirable when trying to identify functional relations in the data. A procedure is proposed for the use of generalized learning curves technique in the development and refinement of mathematical models of learning. TAB

N69-25786# Illinois Univ., Urbana. Dept. of Psychology.
A UNIQUE VARIANCE MODEL FOR THREE-MODE FACTOR ANALYSIS
Frank Wesley Snyder Dec. 1968 83 p refs
(Contract N00014-67-A-0305; Grant PHS-MH-06961)
(AD-682988) Avail: CFSTI CSCL 5/10

A model is presented for Three-Mode Factor Analysis that allows for the estimation of the specifics associated with each of two variable modes and the combination variable in addition to a determination of the common-factor matrices of the two variable modes and the interrelating core matrix. The model is designed to facilitate the investigation of the common factor spaces of the variables when the unique contributions of these variables are expected to be reasonably large. A computational routine and the results obtained with the model from applying it to three sets of data are given. The results from applying the model indicate that it is possible to identify and isolate halo effects which do not persist over time and specificity of a variable which is not dependent on situations of administration. Author (TAB)

N69-25788# California Univ., Berkeley. Lawrence Radiation Lab.
QUANTUM REQUIREMENT IN PHOTOSYNTHESIS AND THE EFFECT OF LIGHT QUALITY ON PHOTOSYNTHETIC PRODUCT DISTRIBUTION
Kam-sik Ng (Ph.D. Thesis) Sep. 1968 174 p refs
(Contract W-7405-ENG-48)
(PB-182245; UCRL-18451) Avail: CFSTI CSCL 06A

Among the various hypotheses concerning the photochemical reactions, there are two major ones. They are the photolyt hypothesis proposed by Warburg and the two light reactions hypothesis based on the Hill–Bendall scheme of photoelectron transport. The two hypotheses have different assumptions with regard to the course of primary photochemical reactions. They differ in several aspects of photosynthesis–e.g., the origin of the oxygen evolved, the value of quantum requirement, and the generation of assimilatory power. A portion of the report is devoted to the discussion of these two hypotheses. Experiments are described which were designed to verify the validity of these two hypotheses. A comparison between the results of the various experiments showed inconsistency. USGRDR

N69-25802# Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
ON NONPARAMETRIC METHODS FOR PATTERN RECOGNITION
K. S. Fu and Ernest G. Henrichon, Jr. Aug. 1968 155 p refs
(Grant NSF GK-1970)
(PB-182515; TR-EE-68-19) Avail: CFSTI CSCL 06D

This study is concerned with the development of nonparametric classification techniques for application to pattern recognition. The methods proposed can be considered as special clustering procedures intended for off-line data analyses. The only assumption required is that observations from the same pattern class are independent and identically distributed according to some unknown continuous probability distribution. Examples involving real data in agricultural remote sensing are given to illustrate the application of these procedures. Author (USGRDR)

N69-25829# European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
CLEANING AND DECONTAMINATION OF CLOTHES [REINIGUNG UND DEKONTAMINATION RADIOAKTIV VERSEUCHTER KLEIDUNG]
G. Mosselmans and J. Nienhaus 1968 20 p refs In GERMAN
(EUR-4187d) Avail: AEC Depository Libraries

The development of a process for complete decontamination of cotton-cellulose material is described. The method has been successful in practice for a long time. With complete decontamination the material is not damaged, and problems of waste-water treatment are not caused by the method. Models for fixation of compounds on the textiles are given, which take in account the special cases of radioactive contamination and decontamination. Author (NSA)

N69-25887# Human Engineering Labs., Aberdeen Proving Ground, Md.
PATTERN IDENTIFICATION BY MAN AND MACHINE
[1968] 71 p refs Proc. of a Planning Conf., Fort Worth, Tex., 12–13 Dec. 1968
(AD-682734; TM-17-68) Avail: CFSTI CSCL 6/4

Contents: An overview of machine and human pattern recognition; Graphical data processing; Modeling the pattern recognition environment; Image interpretation research; Pattern recognition studies at the ballistic research laboratories; Applied perceptual problems in aircraft recognition and situation recognition; Pattern recognition research at AFCRL; Psychophysical models for pattern perception. TAB

N69-25906# Texas Univ., Houston. M. D. Anderson Hospital and Tumor Inst.

EFFECTS OF RADIATION AND OTHER AGENTS ON THE MOLECULAR STRUCTURE AND ORGANIZATION OF THE CHROMOSOME

Arthur Cole and Peter M. Corry 5 Nov. 1968 2 p refs Presented at 23rd Ann. Symp. on Fundamental Cancer Res., Houston, Tex., 1968

(Contract AT(40-1)-2832; Grants NIH CA-05099; PHS-FR-00254) (ORO-2832-75; Conf-690302) Avail: CFSTI

The structure and properties of isolated mammalian mitotic chromosomes were studied using phase and interference contrast light microscopy, stereo electron microscopy, and ultracentrifugation sedimentation techniques. Alterations induced by various treatments were observed using agents such as X-radiation, salts, hydrolytic enzymes, pH, mercaptans, and others. Effects of radiation on molecular structure and morphology are described. NSA

N69-25921# California Univ., Livermore. Lawrence Radiation Lab.

DETERMINATION OF THE MAXIMUM PERMISSABLE RADIONUCLIDE CONCENTRATION FOR THE LUNGS [ESSAI DE DETERMINATION DES CONCENTRATIONS MAXIMALES ADMISSIBLES POUR LES POUMONS]

Georges Vacca Oct. 1968 64 p refs Transl. into ENGLISH of French Rept. CEA-R-3382

(UCRL-Trans-10295; CEA-R-3382) Avail: AEC Depository Libraries

A model was designed for the deposition of dust in the lungs and lymph nodes and its clearance in the blood and gastrointestinal tract. The model was used for determination of maximum permissible concentration values. The values for more than 200 radioisotopes are tabulated from data reported by the international commission on radiation protection. NSA

N69-25986# Brookhaven National Lab., Upton, N. Y.

HEAD IRRADIATION AND AGING

T. Samorajski, J. Mark Ordy, Wolfgang Zeman, and Howard J. Curtis 1968 27 p refs Presented at Gerontology Soc. Conf., Denver Sponsored by AEC

(BNL-13065; CONF-681027-1) Avail: CFSTI

Morphological, biochemical, and behavioral effects of deuteron irradiation delivered to the dorsal surface of the brain of 10 female mice at doses of 500 to 50,000 rads are reported. A dose dependent decrease in longevity of the irradiated mice was observed. The histological and histochemical observations at 10 days and at four and 16 months after irradiation indicated a uniform and dose dependent destruction of neurons, gliosis, and a reduction in vascular alkaline phosphatase activity. It was also concluded that irradiation may have some specific effects on neurotransmitters and related substances such as acetylcholinesterase and serotonin in the brain. The significant behavioral effects observed after dueteron irradiation of the brain may be associated ultimately with some of these biochemical changes. These divergent results suggest that radiation injury leading to life shortening may result from more than one cause. Author (NSA)

N69-26002# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

REMOTE REACTIONS OF HEMATOPOIETIC TISSUE TO PROTON AND X-RAY IRRADIATION IN COMBINATION WITH G-FORCES

Ye. I. Zharova et al 29 Feb. 1968 14 p refs Transl. into ENGLISH from Akad. Nauk SSSR. Izv. Ser. Biol. (USSR), no. 2, 1967 p 290–296

(AD-682794; FTD-HT-23-69-68) Avail: CFSTI CSCL 6/18

The remote reactions of hematopoietic tissue to the combined effects of x-rays or protons and acceleration (G-forces) were studied in mice of both sexes, exposed to six different combinations of irradiation and centrifugation as shown in the table. Some of the animals died within two months; the balance were kept under observation for 2 years. Mice displaying hematopoietic disturbances were killed for morphohistological study. Karyological studies (Fords and Foxs methods) were made of bone marrow and spleen cells of 14 mice showing symptoms of leukosis and leukemia at various time intervals after exposure. The results show that protons, like x-rays, are a leukemogenic (blastomogenic) factor. Mice are very sensitive to G-forces; many died shortly after exposure, while the survivors displayed increased susceptibility to infectious disease. These effects were especially pronounced when G-forces were combined with x-rays, and less severe when G-forces were combined with protons. Author (TAB)

N69-26021# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

AN ALGORITHM FOR RECOGNITION SYSTEMS

V. N. Fomin Feb. 1968 10 p refs Transl. into ENGLISH from Vychislitelnaya Tekhn. i Vopr. Programmirovaniya (Moscow), v. 4, no. 4, 1965 p 72–75

(AD-682772; FTD-HT-23-1420-67) Avail: CFSTI CSCL 6/4

Some problems in the design of recognition systems make it necessary to find recurrent decision algorithms for systems of large numbers of linear inequalities. This paper shows how such inequalities may be obtained and presents an algorithm for finding their solutions. Elements x of set X (the image space, which may be considered a closed unitary cube in Euclidean space) are fed to the recognition system input. The algorithm is stated in the form of a theorem and is also applicable to find approximate solutions of equation systems whose coefficient matrix has a determinant close to zero. Author (TAB)

N69-26032# Army Biological Labs., Fort Detrick, Md.

A DEVICE FOR AIR SAMPLING

A. I. Vasilev Jul. 1968 3 p Transl. into ENGLISH from Voenno-Med. Zh. (Moscow), no. 3, 1957 p 81–82

(AD-682559; TRANS-311) Avail: CFSTI CSCL 14/2

In practical work the collection of air samples is difficult, particularly under field conditions, because the apparatus for this purpose is not suitable for field work. The samplers are powered by electric current, where as it is often required to take air samples where there is no electricity. The document covers a device that permits air sampling for bacteriological analysis in any, including field, conditions. Author (TAB)

N69-26033# Army Biological Labs., Fort Detrick, Md.

REGISTRATION OF THE RESPIRATORY MOVEMENTS OF MAN BY MEANS OF A THERMOBATTERY DURING PHYSICAL EXERTION

B. A. Alpatev et al Jul. 1968 3 p Transl. into ENGLISH from Byul. Eksperim. Biol. i Med. (Moscow), v. 48, no. 9, 1959 p 129–130

(AD-682579; TRANS-405) Avail: CFSTI CSCL 6/16

Mans breathing during physical exercise was recorded by means of a thermobattery actuated by the difference in temperature between the exhalation and the atmosphere. Simultaneous respiratory recordings were also made by means of a piezoelectric device. TAB

N69-26040# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

AN EXPERIMENT IN THE AUTOMATIC RECOGNITION OF A SPEAKER

G. S. Ramishvili Jun. 1968 14 p refs Transl. into ENGLISH from Soobshcheniya Akad. Nauk Gruzin. SSR (Tiflis), v. 36, no. 2, 1964 p 279–286 Supersedes AD-625303

(AD-682818; AD-625303; FTD-TT-65-1079) CSCL 6/4

The author describes a method for selecting key words which best display the individual characteristics of a speaker and presents general requirements for such words. Final selection is made on the basis of actual recording and analysis. The speech signal at the output of the analyzer is determined according to frequency, time, and amplitude. For the computer input, the signals are quantized in time and amplitude. Further processing is based essentially on these two quantities. Author (TAB)

N69-26080# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

THE EFFECTS OF COGNITIVE APPRAISAL OF STRESS ON HEART RATE AND TASK PERFORMANCE

Richard I. Thackray and David W. Pearson Sep. 1968 12 p refs

(AM-68-17) Avail: Issuing Activity CSCL 06S

The extent was explored to which individual differences in previously expressed fear of a specific stress condition related to heart rate change and performance impairment under this stressor. Threat of shock was employed as the stressor since it tends to elicit the fear response characteristic of many types of stress situations. Twenty-four high fear of shock and an equal number of low fear of shock subjects were given 15 training trials on a conventional pursuit rotor. Following training one third of the subjects were informed that during subsequent trials shock would be administered if performance fell below training levels, one third were told that shock would be randomly administered, and the remaining third served as a control. No shocks were actually administered. High fear of shock subjects revealed significantly greater heart rate acceleration and performance impairment, but only under the condition in which the subjects were told that receipt of shock would be contingent on prior performance level. Author

N69-26096# Battelle Memorial Inst., Richland, Wash. Pacific Northwest Lab.

THE USAEC DIVISION OF BIOLOGY AND MEDICINE. VOLUME 2: PHYSICAL SCIENCES. PART 2: RADIOLOGICAL SCIENCES Annual Report, 1967

J. M. Nielsen and D. W. Pearce, ed. Oct. 1968 230 p refs

(Contract AT(45-1)-1830)

(BNWL-715-Vol-2-Pt-2) Avail: CFSTI

Abstracted data are presented on the various research projects underway. In the field of radiological chemistry, these include neutron activation analyses of biological tissues, high altitude air filters, and trace elements in deep sea sediments; plutonium and americium content of ashed biological specimens; iron levels in humans, animals, and food; and fission product analysis. Radiation chemistry studies pertained to reactions of organic and inorganic compounds with hydroxyl radicals in aqueous solutions; radioisotope accumulations in river bottom sediments; and quasilinearization method for estimating ozonide radical rate of decay constants. Reports on radiological physics projects covered microdosimetry, calorimeters, Poisson series calculation, neutron dose evaluation in presence of gamma rays, measurement of endothermic processes in muscle equivalent plastic induced by proton irradiation, and hit theory and radiation effects on biological materials. M.G.J.

N69-26158# System Development Corp., Santa Monica, Calif.

OPTIMUM RESPONSE TO ALERTING SIGNALS AND WARNING MESSAGES

Bill D. Miller 14 Mar. 1969 176 p refs

Avail: Issuing Activity

Determination of how people perceive and respond psychologically to alerting signals and warning messages is investigated. The first part describes the goals, methodology, and findings of a study conducted as part of the total plan and presents procedures, using the findings of the study to optimize warning message construction. The remaining two parts of the research plan are research study designs. Author

N69-26187 California Univ., Los Angeles.

COAXIAL BRIDGE METHODS FOR MEASURING THE MICROWAVE DIELECTRIC PROPERTIES OF AQUEOUS SOLUTIONS: APPLICATION IN A STUDY OF THE NATURE OF HEME-HEME INTERACTIONS IN HEMOGLOBIN

Allen Paul Minton (Ph.D. Thesis) 1968 160 p

Avail: Univ. Microfilms: HC $7.40/Microfilm $3.00 Order No. 68-16613

The propagation of electromagnetic waves through matter is discussed from the macroscopic point of view and relationships between relevant dielectric parameters are developed. The theory, apparatus, and measuring techniques of the coaxial bridge methods introduced here are described and their suitability for the proposed measurements as compared to that of previously reported methods is discussed. The phenomenon of subunit interaction in hemoglobin and its relationship to the physiological function is discussed. A general equation describing the equilibrium oxygen binding behavior of hemoglobin in terms of subunit properties and internal energy changes is developed. The Libby hypothesis of subunit interaction, based upon the concept of ligand-dependent London dispersion forces acting between the conjugated pi-electron systems of the hemes, is elaborated. The energetic requirements of the hypothesis are discussed in terms of transition dipole strength, frequency, and the static electronic polarizability of the heme. Dissert. Abstr.

N69-26213# Naval Radiological Defense Lab., San Francisco, Calif.

ASSESSMENT OF RADIATION DAMAGE TO THE HEMATOPOIETIC CELLS OF MICE-DEPENDENCE OF D_0 ON THE SIZE OF ENDOGENOUS SPLEEN NODULES

Earl J. Ainsworth, Rex M. Larsen, and Adam E. McKee 31 Dec. 1968 22 p refs

(AD-683664; USNRDL-TR-69-2) Avail: CFSTI CSCL 6/18

The colony-forming unit (CFU) exhibits many properties of the hematopoietic stem cell, and CFU methodology has been extensively used in many laboratories to assess radiation damage to the hematopoietic system of mice. The radiation responses of CFUs may be measured by either the endogenous or the transplantation method, and with either method, the number of spleen nodules decreases exponentially with increasing radiation exposure. Author (TAB)

N69-26259*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

THE EQUIPOTENTIAL SPACE SUIT DESIGN CONCEPT AND ITS APPLICATION TO A SPACE SUIT ELBOWJOINT

Donald E. Barthlome Washington May 1969 43 p ref

(NASA-TN-D-5221) Avail: CFSTI CSCL 06K

Space-suit design studies indicate that a high operational feasibility exists for a concept involving a nonconstant-volume space-suit elbow joint, a joint-assist mechanism, and a space-suit pressure stabilizer. The space-suit pressure stabilizer serves to limit pressure changes within the joint to ± 0.05 psi (0.035 N/cm^2). The joint-assist mechanism, or joint assist, is a modified constant-force spring mounted on a soft space-suit joint. The cross section of the spring has been altered so that most of the energy required to bend the joint is provided by the joint assist. The joint and stabilizer, both of which exhibit relatively high degrees of elasticity, store most of this energy and return it to the joint assist as the joint and stabilizer return to their initial configurations. Therefore, if friction

is neglected, the joint, joint assist, and stabilizer constitute a system with a total potential energy that remains constant (regardless of the angle of bend) and equal to the initial potential energy given to the assist during installation on the joint. Test results show that the maximum bending moment required by the joint was reduced from 1.40 lbf-ft (1.90 N-m) without the assist to 0.10 lbf-ft (0.14 N-m) with the assist, a reduction of 14 to 1. Author

N69-26275 Cornell Univ., Ithaca, N.Y.
SPARK SOURCE MASS SPECTROGRAPHIC METHOD FOR THE SURVEY ANALYSIS OF TRACE ELEMENTS IN BIOLOGICAL MATERIALS
Charles Andrew Evans, Jr. (Ph.D. Thesis) 1968 110 p
Avail: Univ. Microfilms: HC $5.40/Microfilm $3.00 Order No. 68-15716

A technique is presented which allows time resolution of the ions produced by the radio frequency pulse. Time resolution results are presented for three different matrices, iron, graphite, and 50:50 biological ash:graphite. The biological samples were ashed by a low temperature ashing technique to remove hydrocarbon interferences. Although inorganic interferences resulted from the complex ash matrix, most were easily detected by careful evaluation of the spectrum. To correct for instrumental conditions and matrix effects, each unknown was doped with a mix containing about 60 elements providing the best possible comparative standard. The concentrations, thus calculated, correlated quite well with those of the elements detected by a sensitive emission spectrographic method. In addition, the mass spectrograph detected 21 additional elements and provided excellent detection limits for 20 to 30 more. Dissert. Abstr.

N69-26276*# Aztec School of Languages, Inc., Maynard, Mass.
ACOUSTIC DYNAMICS OF MACHINES
I. I. Artobolevskiy et al Washington NASA Apr. 1969 14 p Transl. into ENGLISH from Vestn. Akad. Nauk SSSR (Moscow), no. 11, Nov. 1968 p 50–59
(Contract NASw-1692)
(NASA-TT-F-12214) Avail: CFSTI CSCL 06F

Methods used in decreasing or eliminating vibrations in mechanisms and machines are reviewed, as are the characteristic strengths of individual units and complexes. It is shown that acoustic dynamics of machines and the effect of noises on man and machine must be studied together. Author

N69-26294# School of Aerospace Medicine, Brooks AFB, Tex.
ESTIMATION OF SERUM PROTEINS BY QUANTITATIVE DENSITOMETRY AFTER GEL ELECTROPHORESIS
Emmanuel L. Mosser and Dale A. Clark Dec. 1968 16 p refs
(AD-683719; SAM-TR-68-133) Avail: CFSTI CSCL 6/1

The problem of obtaining quantitative results from polyacrylamide gels was approached by modifying a commercially available densitometer designed for paper electrophoresis. The light beam was collimated into a thin sheet which passed through the diameter of the cylinder of gel as the latter was advanced continuously. The recorded densitometric trace was integrated manually and the fractional areas of albumin, transferrin, and macroglobulin bands were studied for reproducibility. Replicate analyses of various steps were performed and duplicate runs of five serum samples were made. The standard deviation of the overall procedure for each of the three fractions studied was 5-10% of the measured levels. It was concluded that, used with care, the technique can provide valuable qualitative information as well as quantitative data. Author (TAB)

N69-26301# Michigan Univ., Ann Arbor. Human Performance Center.
HUMAN INFORMATION HANDLING PROCESSES Annual Report, 1 Jun. 1967–31 May 1968
Arthur W. Melton Jun. 1968 46 p
(Contract AF 49(638)-1736; ARPA Order 461)
(AD-683735; AFOSR-69-0486TR; REPT-08773-21-A; MR-4; AR-1) Avail: CFSTI CSCL 5/10

A review is given of research carried out on human performance in information processing and memory. Experimental results and theoretic progress are presented on the following topics: Taxonomy of information handling process; Selective information handling process (which includes selective responding to stimuli, human adaptive capacities in optimizing performance, and decision theoretic interpretations of information processing performance); Information storage and retrieval (which includes modeling of short-term memory); Refinement or resolution of certain critical issues; and Refinement of short-term-memory methods and measures. Author (TAB)

N69-26316*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Space Sciences Div.
ABUNDANCE OF MICROFLORA IN SOILS OF DESERT REGIONS
Roy E. Cameron 15 May 1969 21 p refs
(Contract NAS7-100)
(NASA-CR-101127; JPL-TR-32-1378) Avail: CFSTI CSCL 08G

Surface soils were collected by aseptic techniques from cold, polar, hot volcanic, and high mountain deserts, and were analyzed for physical, chemical, and microbiological properties. Soils showed a wide range of properties but were generally greyish, yellowish, or brownish sands, low in organic matter and cation exchange capacity. There were detectable concentrations of water-soluble ions, and pH values above 7.0, except in volcanic areas. Total microbial abundances ranged from zero (undetectable) to $> 10^8$/gm of soil. Aerobic and microaerophilic bacteria were most abundant, followed by algae and molds. The anaerobic bacteria were generally least abundant or undetectable. Predominant microflora included *Bacillus* spp., soil diphtheroids, *Schizothrix* spp. and other oscillatorioid blue-green algae, *Streptomyces* spp., *Penicillium* spp., and *Aspergillus* spp. Author

N69-26327# Joint Publications Research Service, Washington, D.C.
SPACE BIOLOGY AND MEDICINE, VOLUME 3, NUMBER 1, 1969
14 May 1969 194 p refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, vol. 3, no. 1" Moscow, Meditsina, 1969 p 1–110
(JPRS-48042) Avail: CFSTI

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8. CHANGES IN CALCIUM METABOLISM IN RATS DURING HYPOKINESIA B. B. Yegorov et al p 85–91 refs (See N69-26335 14-04)

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16. BLOOD CIRCULATION IN CEREBRAL AND SURFACE VESSELS OF THE HUMAN HEAD UNDER THE INFLUENCE OF ACCELERATIONS A. S. Barer et al p 157–164 refs (See N69-26343 14-04)

17. GAS CHROMATOGRAPHIC DETERMINATION OF VOLATILE SUBSTANCES CONTAINING OXYGEN IN FLUID BIOLOGICAL MEDIA Yu. V. Pepelyayev et al p 165–174 refs (See N69-26344 14-04)

18. EFFECT OF SIMULTANEOUS EXPOSURE TO HYPOXIC HYPOXIA AND HIGH AMBIENT TEMPERATURE ON HUMAN HEAT EXCHANGE A. N. Azhayev p 175–179 refs (See N69-26345 14-04)

N69-26328# Joint Publications Research Service, Washington, D.C.

SCIENTIFIC WORK ON THE MOTOR REGIME AS AN IMPORTANT BASIS FOR THE PSYCHOPHYSIOLOGICAL TRAINING OF A COSMONAUT

A. V. Korobkov *In its* Space Biol. and Med., Vol. 3, No. 1, 1969 14 May 1969 p 1–10 (See N69-26327 14-04)
Avail: CFSTI

The tolerance of human body functions to space flight factors is ensured by systematic physical training with increased adaptive capabilities of the body. High level physical readiness of astronauts assures rapid and stable performance of complex motor actions, determines favorable psychophysiological responses to extreme factor exposures, and brings a speedy restoration of the initial state of body functions after negative factors cease to operate. G.G.

N69-26329# Joint Publications Research Service, Washington, D.C.

YEAR-LONG MEDICAL AND ENGINEERING EXPERIMENT IN A GROUND LIFE-SUPPORT SYSTEM

A. I. Burnazyan et al *In its* Space Biol. and Med., Vol. 3, No. 1, 1969 14 May 1969 p 11–26 refs (See N69-26327 14-04)
Avail: CFSTI

Reactions of human physiological systems and the entire body to prolonged restrictions in a pressurized cabin were studied in a year long ground life support experiment. Results of clinical–physiological observations on human responses to the pressurized restricted area under specific conditions of water and oxygen cycling showed: (1) reduced pulse and respiration rates; (2) decreased body weight; (3) decreased acidity of gastric juice but increased lipase and enterokinase; (4) considerable changes in intestine autoflora; and (5) adequate mental and physical work capacity. G.G.

N69-26330# Joint Publications Research Service, Washington, D.C.

PROBLEMS IN SPACE PHARMACOLOGY

V. V. Parin et al *In its* Space Biol. and Med., vol. 3, no. 1, 1969 14 May 1969 p 27–47 refs (See N69-26327 14-04)
Avail: CFSTI

Reviewed are the basic principles for organizing a spaceship onboard medical pharmacy depending on the duration, purpose, and nature of the flights. Considered are body reactions to medicines, acceleration, irradiation, anabiosis, sleep-wakefulness cycle, immobilization, weightlessness, vestibular disorders, and physical work. Pharmacological defense methods include the use of vasoconstrictive and antihypoxic substances as well as pharmaceuticals that attenuate local changes in the lungs and prevent the development of atelactasis, edema, or hemorrhages. G.G.

N69-26331# Joint Publications Research Service, Washington, D.C.

CIRCADIAN RHYTHMS AND THEIR IMPORTANCE FOR SPACE BIOLOGY AND MEDICINE

G. K. Mikushkin *In its* Space Biol. and Med., vol. 3, no. 1, 1969 14 May 1969 p 48–60 refs (See N69-26327 14-04)
Avail: CFSTI

Changes in diurnal and circadian rhythms of man during space flight conditions were evaluated and the formation of new rhythms in test subjects was discussed. It was concluded that a stable synchronization of physiological rhythms in man was attainable only if rhythm periods did not exceed the limits from 21–22 to 27–28 hours. Restructuring of primary rhythms to stipulated rhythms occurred over a period of one to two weeks; the greater the difference between the two regimes in phase or frequency, the more rapid was the transition to the new regime. The author concluded that it was most important to establish the individual peculiarities of a man's circadian rhythm before forming a new biological rhythm. G.G.

N69-26332# Joint Publications Research Service, Washington, D.C.

HYPOTHALAMIC NEUROSECRETION AND SUPRARENAL CONDITIONS OF RATS UNDER HIGH-MOUNTAIN CONDITIONS

E. S. Gulyants et al *In its* Space Biol. and Med., vol. 3, no. 1, 1969 14 May 1969 p 61–69 refs (See N69-26327 14-04)
Avail: CFSTI

Experiments were performed with 42 rats to study the response of their hypothalamic neurosecretion system to an altitude environment. Exposure of the animals to this environment caused an enhancement of the secretion-forming process in the hypothalamic-hypophyseal-adrenal system: a year after the exposure the animals developed adaptation which involved compensation-adaptation processes (in the form of a nonphysiological change of phases in the secretion cycle in secretory neurons). New properties of hypothalamic neurosecretion can be found in the first generation of rats born at such an altitude. Author

N69-26333# Joint Publications Research Service, Washington, D.C.

CHANGES IN STRIATED MUSCLE FIBERS OF MICE UNDER RESTRAINED CONDITIONS

V. V. Portugalov et al *In its* Space Biol. and Med., vol. 3, no. 1, 1969 14 May 1969 p 70–79 refs (See N69-26327 14-04)
Avail: CFSTI

The quandriceps muscle of mice kept for 15 days under restrained conditions was investigated by electron microscopy. It was found that the myofibrillar apparatus, mitochondria and sarcoplasm of muscle fibers developed changes which appeared to be reversible. It is assumed that the changes serve as the material substrate underlying the muscular deconditioning and atrophy observed during hypokinesia. Author

N69-26334# Joint Publications Research Service, Washington, D.C.

EFFECT OF LONG-TERM PHYSICAL RESTRICTION OF AN ANIMAL ON SOME BODY FUNCTIONS

A. B. Kogan et al *In its* Space Biol. and Med., vol. 3, no. 1, 1969 14 May 1969 p 80–84 (See N69-26327 14-04)
Avail: CFSTI

Long term immobilization effects in cats manifested themselves in considerable changes of the nervous and cardiac activities. Electrocardiographic tracings exhibited tachycardia of the paroxysmal type with a marked deformation of tet waves of the ventricular complex. Tracometric studies of footprints after restriction showed that the animals had a decrease in walking rate and temporary disruption of locomotion. Electroencephalographic brain waves rhythms showed a considerable reduced mean amplitude of basic activity waves. Also observed was a general slowing of motor indices. G.G.

N69-26335# Joint Publications Research Service, Washington, D.C.

CHANGES IN CALCIUM METABOLISM IN RATS DURING HYPOKINESIA

B. B. Yegorov et al *In its* Space Biol. and Med., vol. 3, no. 1, 1969 14 May 1969 p 85–91 refs (See N69-26327 14-04)
Avail: CFSTI

Calcium metabolism in rats kept for 30 and 60 days under restrained conditions was analyzed using the radioactive isotope ^{45}Ca. The investigations covered the skeletal system of the animals. A significant decrease in ^{45}Ca incorporation into the bone tissue of restrained animals was noted. It reached the maximum value in the epiphyseal parts of the femur bones. The rate of ^{45}Ca elimination from the bone tissue of the test animals was greater than in the controls. Author

N69-26336# Joint Publications Research Service, Washington, D.C.

POSSIBILITY OF USING SWEET POTATOES AS A BASIC SOURCE OF CARBOHYDRATES IN HUMAN NUTRITION DURING SPACEFLIGHTS

V. P. Dadykin et al *In its* Space Biol. and Med., vol. 3, no. 1, 1969 14 May 1969 p 92–99 refs (See N69-26327 14-04)
Avail: CFSTI

The possibility of using sweet potatoes as the main source of carbohydrates for spacecrew members is discussed. The results of comparative testing of ten varieties of this crop in open hydroponic installations and in the soil are presented. The dynamics of tuber formation is determined. The yield appears to be higher in hydroponic installations than in the soil. Three of the tested varieties show better yield, daily increase of the biomass and proportion of tubers and haulm. Author

N69-26337# Joint Publications Research Service, Washington, D.C.

PRODUCTION OF CHLORELLA BIOMASS WITH A HIGHER CONTENT OF SULFUR-CONTAINING AMINO ACIDS AND EVALUATION OF ITS NUTRITIVE VALUE

N. N. Verzilin et al *In its* Space Biol. and Med., vol. 3, no. 1, 1969 14 May 1969 p 100–108 refs (See N69-26327 14-04)
Avail: CFSTI

Strains of Chlorella with a higher cysteine content were obtained using mutant feeders. Their suitability for mass cultivation in pilot plan installations is demonstrated. The biomass of freeze-dried algae was fed to white rats. The biomass of the resulting strains was consumed and assimilated by rats much better than that of standard strains. Author

N69-26338# Joint Publications Research Service, Washington, D.C.

BACTERICIDAL EFFECT OF SILVERED ACTIVATED CHARCOALS AND ION-EXCHANGE RESINS

S. V. Chizhov et al *In its* Space Biol. and Med., vol. 3, no. 1, 1969 14 May 1969 p 109–116 refs (See N69-26327 14-04)
Avail: CFSTI

Various techniques for reducing silver applied to the surface of activated charcoals and ion-exchange resins were investigated. The silvered sorbents produced a significant bactericidal effect on *Bacterium coli.* Author

N69-26339# Joint Publications Research Service, Washington, D.C.

DECOMPRESSION PROBLEMS IN SPACE MEDICINE

I. M. Khazen *In its* Space Biol. and Med., vol. 3, no. 1, 1969 14 May 1969 p 117–130 refs (See N69-26327 14-04)
Avail: CFSTI

The role of the autonomic nervous system in the mechanisms regulating the body functions during rapid decompression was studied in many comparative and physiologic investigations. A tolerance to pressure gradients can be achieved by applying an adequate physiologic stimulation to the regulatory systems which are primarily responsible for determining the muscle tone of the lungs. The experiments were carried out on rats. By comparing the results of experiments based on the application of physical training (swimming) and drugs it is possible to distinguish common features of regulatory mechanisms of the autonomic nervous system. As a result of 1–1 1/2 months of training with a gradually increasing but moderate intensity a complex of related protective mechanisms (reflex, neurohumoral, neuroendocrinal, etc.) develops. At all experimental stages the integrative role of the cerebral cortex in the autonomic-neuroendocrinal interaction can always be detected. Author

N69-26340# Joint Publications Research Service, Washington, D.C.

EFFECT OF HIGH-MOUNTAIN ACCLIMATIZATION OF BODY TOLERANCE TO EXPOSURE TO ENVIRONMENTAL FACTORS

P. I. Yegorov et al *In its* Space Biol. and Med., vol. 3, no. 1, 1969 14 May 1969 p 131–138 refs (See N69-26327 14-04)
Avail: CFSTI

This paper presents data accumulated through observations of 22 lowland and highland residents who spent 45 days in the Tien Shan at elevations of 3300 and 4100 m above sea level. The functional condition of the human body was evaluated on the basis of a comprehensive study of the cardiovascular system, external respiration, optic and vestibular analyzers, as well as a morphologic and biochemical analysis of the blood during exposures of test subjects to accelerations, hypoxia, thermal and physical stresses. It

was concluded that a month-long exposure of human beings to these elevations can increase overall body tolerance. It is recommended that mountain excursions be included in the cosmonaut training programs. Author

N69-26341# Joint Publications Research Service, Washington, D.C.
CHARACTERISTICS OF HUMAN METABOLISM DURING 120-DAY NUTRITION WITH DEHYDRATED DIETS
V. P. Bychkov *In its* Space Biol. and Med., Vol. 3, no. 1, 1969 14 May 1969 p 139–147 refs (See N69-26327 14-04)
Avail: CFSTI

Experiments with six test subjects who were kept for 120 days on dehydrated diets indicated that adaptation developed during the course of the first two or three months. Author

N69-26342# Joint Publications Research Service, Washington, D.C.
EFFECT OF HYPOKINESIA, ACCELERATION AND REDUCED NUTRITION ON THE STATE OF THE BLOOD-COAGULATION SYSTEM IN MAN
O. D. Anashkin *In its* Space Biol. and Med., vol. 3, no. 1, 1969 14 May 1969 p 148–156 refs (See N69-26327 14-04)
Avail: CFSTI

The effect of hypokinesia and reduced nutrition, as well as hypokinesia, accelerations and reduced nutrition on the coagulation system was studied in three series of experiments, each involving six test subjects. With a decrease in nutrition there were no noticeable changes in the blood coagulation system. During the course of a 15-day bedrest all the subjects exhibited a slight decrease in blood coagulation activity. During the combined effect of hypokinesia, accelerations and reduced nutrition, the changes in the coagulation system were most clearly expressed. Author

N69-26343# Joint Publications Research Service, Washington, D.C.
BLOOD CIRCULATION IN CEREBRAL AND SURFACE VESSELS OF THE HUMAN HEAD UNDER THE INFLUENCE OF ACCELERATIONS
A. S. Barer et al *In its* Space Biol. and Med., vol. 3, no. 1, 1969 14 May 1969 p 157–164 refs (See N69-26327 14-04)
Avail: CFSTI

Blood circulation in the cerebral and surface vessels of the human head was investigated by rheoencephalographic and photoplethysmographic techniques upon exposure to accelerations of different magnitude (2 to 18 g) and direction. The level of pulse filling of the brain was found to be dependent on the magnitude of the acceleration component applied in a foot-to-head direction. Circulation in the external carotid artery was shown to change to a greater extent and at lower accelerations than circulation in cerebral vessels. Author

N69-26344# Joint Publications Research Service, Washington, D.C.
GAS CHROMATOGRAPHIC DETERMINATION OF VOLATILE SUBSTANCES CONTAINING OXYGEN IN FLUID BIOLOGICAL MEDIA
Yu. V. Pepelyayev et al *In its* Space Biol. and Med., vol. 3, no. 1, 1969 14 May 1969 p 165–174 refs (See N69-26327 14-04)
Avail: CFSTI

A gas chromatographic method has been developed for quantizing acetaldehyde, propionic aldehyde, acetone, methanol, isopropanel, ethanol and isobutanol in liquid biological media. The method is based on the head-space sampling and flame-ionization detection methods. Separation is performed using polyethylene glycol with a molecular weight of 6000 on teflon at 80°C. The sensitivity of the method for the tested compounds varies from $6 \cdot 10^{-3}$ to $1.2 \cdot 10^{-1}$ mg/liter. The reproducibility falls in the range 7 to 18%. It has been shown that the retention time of lower alcohols is dependent on the presence of water in the analytical column. Introduction of water into the column a certain time before the sample is injected improves the alcohol separation. Author

N69-26345# Joint Publications Research Service, Washington, D.C.
EFFECT OF SIMULTANEOUS EXPOSURE TO HYPOXIC HYPOXIA AND HIGH AMBIENT TEMPERATURE ON HUMAN HEAT EXCHANGE
A. N. Azhayev *In its* Space Biol. and Med., vol. 3, no. 1, 1969 14 May 1969 p 175–179 refs (See N69-26327 14-04)
Avail: CFSTI

Heat transfer experiments were conducted on nude subjects at air and wall temperatures of 45° and 50°, and on subjects clad in cotton suits at air and wall temperatures of 60° and 80°. The utilized pressure chambers contained a rarefied atmosphere of 462 mm Hg with an air movement rate of 0.2 to 0.3 m/sec. Relative humidity ranged from 39 percent at lowest temperatures to 15 percent at the highest temperature level. Results showed that subjects exposed to reduced barometric pressure tolerated the higher temperatures better; air rarefaction decreased the total moisture loss by perspiration. G.G.

N69-26347*# Martin Co., Denver, Colo.
INTEGRATED MANEUVERING AND LIFE SUPPORT SYSTEM SIMULATION Final Report
A. E. Wudell, L. M. Hunt, and D. M. Adams Apr. 1969 126 p refs
(Contract NAS9-9109)
(NASA-CR-99656; MCR-69-184) Avail: CFSTI CSCL 06K

A study effort was made on the comparison, through simulation, of the performance of four configurations on an integrated maneuvering and life support system (IMLSS). Variations in angular and rotational acceleration levels comprised the differences between configurations. Direct control in both attitude and translation was used. Data were collected on the performance of each configuration for one test subject flying a sequence of four space tasks. The tasks included: moving inspection, translating around corner, workshop excursion, and LM-CSM transfer. C.G. shifts and inertia dyadic changes were also investigated. The test subject was suspended in the gimbaled head of the six degree of freedom servo-driven moving base simulator. The simulation technique involves computation of the problem dynamics on a hybrid computer which then determines the commands for the moving base. Signals from the hand controller mockups are used in the hybrid program to introduce the thrust histories. Author

N69-26348# Joint Publications Research Service, Washington, D.C.
CYBERNETICS AND REGULATION THEORY
19 May 1969 20 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 185, no. 1, 1969 p 16–19; 24–27; 58–60
(JPRS-48058) Avail: CFSTI

CONTENTS:

1. GAME VERSION OF THE OPTIMAL HALT PROBLEM Ye. B. Dynkin p 1–7 refs (See N69-26349 14-19)
2. TWO METHODS FOR FINDING THE EQUILIBRIUM POINTS OF CONCAVE n-PLAYER GAMES S. I. Zukhovitskiy et

al p 8–13 refs (See N69-26350 14-19)

3. FUNCTIONAL EQUIVALENCE OF FINITE-STATE AUTOMATA A. A. Letichevskiy p 14–17 refs (See N69-26351 14-08)

N69-26388# School of Aerospace Medicine, Brooks AFB, Tex.
ANTICIPATORY STRESS AND FLIGHT STRESS IN F-102 PILOTS Final Report, May 1966–Feb. 1968
George T. Demos, Henry B. Hale, and Edgar W. Williams Nov. 1968 13 p refs
(AD-683271; SAM-TR-68-128) Avail: CFSTI CSCL 6/19

Pilots of F-102 aircraft were studied during a period of preparation for an unaccustomed flying mission as well as during the actual mission by use of a battery of urinary determinations (norepinephrine, epinephrine, 17-hydroxycorticosteroids, urea, phosphorus, magnesium, potassium, sodium, and creatinine). There were four different test circumstances: (a) pretraining briefings dealing with overwater flying and in-flight refueling; (b) the first refueling training flight; (c) the first leg of the actual mission (California to Hawaii); and (d) the second leg of the mission (Hawaii to Guam). In each circumstance there was evidence of endocrinemetabolic hyperactivity, which suggests nonspecific stress. Only during the training flight was there an increase in 17-OHCS excretion and hypophosphaturia (the latter condition suggesting hyperventilation, a known specific response to flight). The fact that flight effects during the second leg of the transoceanic flight were less numerous than during the first leg suggests that an adaptive change occurred. Author (TAB)

N69-26417*# Aztec School of Languages, Inc., Acton, Mass.
ON THE NUMBER OF VISUAL UNITS IN THE MIDDLE PART OF THE RETINA [UEBER DIE ZAHL DER SEHEINHEITEN IM MITTLEREN THEILE DER NETZHAUT]
Theodor Wertheim Washington NASA May 1969 8 p refs Transl. into ENGLISH from Grafes Arch. Ophthalmol. (Berlin), v. 33, 1887 p 137–146
(Contract NASw-1692)
(NASA-TT-F-12104) Avail: CFSTI CSCL 06P

Psychological studies aimed at testing the hypothesis of Claude du Boise–Reymond according to which the retinal cones are to be regarded as optical units are discussed. Both this and the Boise–Reymond's study proceed from the anatomical investigations in which was postulated a connection between the retinal Zapfen (cones) which are found in the eye and the sensory activity of the retina. Author

N69-26443# Wissenschaftliche Gesellschaft fuer Luft- und Raumfahrt, Brunswick (West Germany).
REPORT ON THE FOURTH MEETING OF THE WGLR SCIENTIFIC COMMITTEE FOR HUMAN ENGINEERING [BERICHT UEBER DIE 4. SITZUNG DES WGLR-FACHAUSSCHUSSES FUER ANTHROPOTECHNIK]
Feb. 1968 74 p refs In GERMAN; ENGLISH summary Conf. held at Munich, 3 Jun. 1966
(DLR-Mitt-68-03) Avail: CFSTI

CONTENTS:

1. THE PROBLEM OF THE REFERENCE SYSTEM AND ITS MEANING FOR TRANSMISSION OF INFORMATION TO THE PILOT G. W. Radl (Technische Univ.) p 6–40 refs (See N69-26444 14-05)

2. PERSONALITY FACTORS AND SPATIAL ORIENTATION G. W. Radl (Technische Univ.) p 41–52 refs (See N69-26445 14-05)

3. METHODS FOR MEASURING THE EYE MOVEMENTS OF PILOTS P. Hammer (Technische Univ.) p 53–75 refs (See N69-26446 14-05)

N69-26444# Technische Univ., Berlin (West Germany). Institut für Flugführung und Luftverkehr.
THE PROBLEM OF THE REFERENCE SYSTEM AND ITS MEANING FOR TRANSMISSION OF INFORMATION TO THE PILOT [DAS PROBLEM DES BEZUGSSYSTEMS UND SEINE BEDEUTUNG FUER DIE INFORMATIONSUEBERTRAGUNG AUF DEN PILOTEN]
G. W. Radl *In* WGLR Rept. on the 4th Meeting of the WGLR Sci. Comm. for Human Eng. Feb. 1968 p 6–40 refs In GERMAN (See N69-26443 14-05)
Avail: CFSTI

The human part of the man-machine system in aircraft guidance is discussed. The perception of signs by the pilot is explained and the different stimuli are analyzed. The layout of onboard indicating instruments and especially the artificial horizon best suitable for transmission of information to the pilot are discussed from both a psychological and a human engineering point of view; some reflections are presented on pilot training and the ability of pilots to change over from one system of reference to another. ESRO

N69-26445# Technische Univ., Berlin (West Germany). Institut für Flugführung und Luftverkehr.
PERSONALITY FACTORS AND SPATIAL ORIENTATION [PERSOENLICHKEITSFAKTOREN BEI DER ORIENTIERUNG IM RAUM]
G. W. Radl *In* WGLR Rept. on the 4th Meeting of the WGLR Sci. Comm. for Human Eng. Feb. 1968 p 41–52 refs In GERMAN (See N69-26443 15-05)
Avail: CFSTI

Personality and psychological aspects of human engineering tests concerning spatial orientation of pilots are presented with the aim to facilitate the diagnosis of spatial orientation capability of personnel. Four personality factors are analyzed which are of importance for spatial orientation. ESRO

N69-26447*# AiResearch Mfg. Co., Los Angeles, Calif.
MAN'S CAPABILITY FOR SELF-LOCOMOTION ON THE MOON. PHASE 2: BUNGEE SIMULATOR EVALUATION
A. Camacho, W. Price, K. Walther, and W. Robertson May 1969 63 p
(Contract NAS1-7053)
(NASA-CR-66768; Rept-69-5103) Avail: CFSTI CSCL 05E

A bungee-cord suspension system used for the simulation of lunar gravity was designed, fabricated and dynamically tested to provide data on the validity of the 1/6-g simulation. Two test subjects walked at 2 and 4 KPH, loped at 6 and 8 KPH and ran at 6 and 8 KPH on a hard surface at 1/6 g in the bungee-cord simulator. Metabolic costs were measured during a preexercise rest period, a 14-min exercise period, and a 6-min post exercise period. Dynamic testing of the simulator during jumping events with constant accelerative force input showed errors of 15.5 percent to 20.2 percent in total time aloft and −21.2 percent to −27.4 percent in maximum height achieved when compared to ideal time and height responses. Metabolic rates were similar to those reported in Phase I of this study. Differences between the bungee-cord simulator and the simulators used during Phase I could not be discriminated. Author

N69-26446# Technische Univ., Berlin (West Germany). Institut für Flugführung und Luftverkehr.

METHODS FOR MEASURING THE EYE MOVEMENTS OF PILOTS [VERFAHREN ZUR MESSUNG DER AUGENBEWEGUNGEN VON PILOTEN]

P. Hammer *In* WGLR Rept. on the 4th Meeting of the WGLR Sci. Comm. for Human Eng. Feb. 1968 p 53–75 refs In GERMAN (See N69-26443 15-05)

Avail: CFSTI

Methods that can be used to measure eye movements of aircraft pilots are listed and discussed. Such measurements serve the purpose of determining the field of vision e.g. in aircraft instrument reading. It is shown that only the photographic recording method using a T.V. or film camera fixed on the head of the pilot gives correct results, because it takes into account head movement as well. All measurements performed with the pilot head held in a fixed position are unrealistic. ESRO

N69-26450# Commissariat à l'Energie Atomique, Fontenay-aux-Roses (France). Centre d'Etudes Nucléaires.

A MATHEMATICAL MODEL FOR GASTROINTESTINAL TRACT DOSIMETRY: APPLICATION TO ADULTS [MODELE MATHEMATIQUE DESTINE A LA DOSIMETRIE DU TRACTUS GASTROINTESTINAL: APPLICATION A L'ADULTE]

Georges Vacca, Jean-Pierre Bazin, and Lucien Karhausen Feb. 1969 67 p refs In FRENCH; ENGLISH summary Prepared jointly with EURATOM

(CEA-R-3707; EUR-4109-f) Avail: CFSTI

A new method is proposed for the computation of the dose delivered to any level of the gastrointestinal tract after ingestion of radioactive substances. The same method is used as that proposed by ICRP. (International Commission of Radiological Protection). The concentration of the radionuclide during the progression of the meal is the central concept of this model. A graph relates the MPC (maximum permissible concentration) with the radioactive halflife of the radionuclide and with any level of the gastrointestinal tract of adults. Soluble and insoluble radionuclides are considered. The case of daughter products is discussed in the appendix. Author (ESRO)

N69-26455*# Aztec School of Languages, Inc., Acton, Mass.

PERCEPTION OF SPACE AND TIME IN OUTER SPACE

A. A. Leonov et al Washington NASA May 1969 111 p refs Transl. into ENGLISH of the book "Vospriyatiye Prostranstva i Vremeni v Kosmose" Moscow, Nauka Press, 1968 p 1–115

(Contract NASw-1692)

(NASA-TT-F-545) Avail: CFSTI CSCL 06S

The characteristic dynamics of spacecraft flight are explained as well as the role of astronauts in the "man-spacecraft" system. The authors describe how the conditions of existence and the psychophysiological mechanisms of perception of space and time outside the earth change during a flight in outer space. The effect of weightlessness, prolonged isolation in a small area, emotional tension, and other factors of space flight on human perception of time are explained. Author

N69-26462# Douglas Aircraft Co., Inc., Huntington Beach, Calif. Advanced Research Labs.

ISOLATION OF AN E. COLI B STRAIN RESISTANT TO SONIC DISINTEGRATION

David Norman and Stephen C. Dreher Nov. 1968 19 p refs *Its* Res. Commun. No. 82

(AD-683560) Avail: Issuing Activity CSCL 6/13

A strain of E. coli Bsg surviving intermittent short bursts of lysing ensonification during mitotic cycling exhibits a profound resistance to a 15-minute continuous sonification exposure. This level of resistance was noticed in the second and succeeding generations of survivors. In contrast, E. coli B survivors from direct exposure to 15-minutes of lysing ensonfication evidence no heritable resistance. Reasons for these differences are discussed. Author (TAB)

N69-26474# Douglas Aircraft Co., Inc., Huntington Beach, Calif. Advanced Research Labs.

MIBT AND BACTERIOPHAGE MULTIPLICATION

David Norman and Margaret de la Cruz Dec. 1968 24 p refs *Its* Res. Commun. No. 85

(AD-683563) Avail: Issuing Activity CSCL 6/15

N-methyl isatin-beta-thiosemicarbazone, a known inhibitor of pox-virus in vitro and in vivo, is without effect upon the virulent bacteriophage T4, T4B, T4Bo1, or the temperate phage lambda grown in E. coli. At concentrations which show striking anti-viral activity against the pox-virus in tissue culture, this compound exhibits no activity in the processes of adsorption, penetration, or replication of the bacteriophage studied. Author (TAB)

N69-26492 University of Southern Calif., Los Angeles.

ON THE ADAPTIVE BEHAVIOR OF THE HUMAN OPERATOR IN RESPONSE TO A SUDDEN CHANGE IN THE CONTROL SITUATION

Anil Vinayak Phatak (Ph.D. Thesis) 1968 122 p

Avail: Univ. Microfilms: HC $6.00/Microfilm $3.00 Order No. 68-17038

The synthesis of a mathematical model is presented which describes the adaptive behavior of a trained human operator in response to sudden changes in plant dynamics and transient disturbances. The operator performs closed loop manual control in a compensatory tracking situation and is trained to adapt to a finite number of alternative transitions in plant dynamics. These plant changes are so chosen as to result in overall system instability unless the operator rapidly modifies his tracking strategy to that required for the new dynamics. The example studied in this investigation is that of an aircraft whose stability augmentation may fail. Based on experimental data for human operator response to various types of failures, the operator adaptive strategy is partitioned into four distinct phases: prefailure steady state control, detection of failure or change in plant dynamics, identification of postfailure plant dynamics and appropriate modification of his control strategy, and postfailure steady state control. Dissert. Abstr.

N69-26499# Consiglio Nazionale delle Ricerche, Rome (Italy). Istituto Nazionale di Ultracustica O. M. Corbino.

EXPERIMENTAL METHOD FOR ESTIMATING AMBIENT ACOUSTICS [METODO SPERIMENTALE PAR LA VALUTAZIONE ACUSTICA DEGLI AMBIENTI]

I. Barducci, F. Bianchi, and G. Ibba Dec. 1967 39 p In ITALIAN

(INUA-4) Avail: CFSTI

An experimental procedure is investigated that considers the determination of the quality of speech perception in ambient reverberations, by means of an analog technique used in telemetry for evaluating the quality of the transmission. The method consists of determining separately that portion of the total acoustic energy that results in the perception signal, and that part which causes the disturbance in hearing. It is concluded that the speech perception level in ambient reverberations can be experimentally separated from white ambient noise disturbances. Charts and tables showing acoustic levels versus distance and versus reverberations are included. Transl. by F.O.S.

N69-26505# Commissariat à l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucléaires.

RADIOPROTECTIVE PROPERTIES OF CERTAIN HETEROCYCLIC NITROGENOUS COMPOUNDS ON THE SERUM PROTEINS OF IRRADIATED MICE [PROPRIETES RADIOPROTECTRICES DE CERTAINS HETEROCYCLES AZOTES SUR LES PROTEINES SERIQUES DE SOURIS IRRADIEES]

Théodore Pierotti, Hamid Roushdy, Michel Polverelli, and Marcel Mazza Feb. 1969 26 p refs In FRENCH; ENGLISH summary
(CEA-R-3679) Avail: CFSTI

The results obtained from this study suggest that: (a) the concentration of total serum proteins in mice is very little changed during all the treatments carried out, while protein fractions showed significant alterations, (b) the concentrations of various serum proteins remain almost constant under normal conditions, (c) intraperitoneal administration of imidazole or benzimidazole at the stated doses induces rapid quantitative changes in the serum which disappear in about 3 days after injection, (d) whole-body X-irradiation at 750 röntgens creates slow but progressive and persisting serious changes in a concentration of serum protein fractions which end by death of the animals 8–10 days after irradiation, (e) whole-body X-irradiation of imidazole or benzimidazole protected animals results in quantitative rapid changes in concentration of serum protein fractions for about four days after which a slow but steady restoration begins. The concentration approaches the normal levels towards the 10th day after irradiation, and imidazole and benzimidazole were proved to be good radioprotectors against the effects of radiation on serum protein fractions. Benzimidazole seems to be more effective than imidazole. Author (ESRO)

N69-26507# Systems Research Labs., Inc., San Antonio, Tex.

FURTHER PHYSIOLOGIC RESEARCH ON HUMAN TUMBLING

John G. Fletcher Brooks AFB, Tex. School of Aerospace Med. Oct. 1969 81 p refs
(Contract AF 41(609)-2897)
(AD-683717; SAM-TR-68-1) Avail: CFSTI CSCL 5/9

Twelve tumbling problems, ranging from impaired performance to water immersion deconditioning, were investigated by using an important training and physiologic research tool--the all-altitude air-bearing research and training simulator (ARTS). It was shown that among healthy persons there is a wide spectrum in tolerance to tumbling. Evidence was obtained that men may be disoriented by tumbling, yet show no symptoms of motion sickness, and vice versa. Other investigations which are described include: complex patterns of rotation and tumbling, respiratory effects, phase shifts at different rpms, subject capability to perform a simulated flying movement during turning, body position effects, and the ability of some subjects to withstand continuous tumbling for at least 1 hour. Author (TAB)

N69-26508# Air Force Systems Command, Lackland AFB, Tex. Air Force Human Resources Lab.

SELECTION OF FOREIGN STUDENTS FOR TRAINING IN THE UNITED STATES AIR FORCE

Cecil J. Mullins, James B. Keeth, and Larry D. Riederich Nov. 1968 26 p refs
(AD-683725; AFHRL-TR-68-111) Avail: CFSTI CSCL 5/9

A group of tests has been used to predict success in pilot and technical training for groups of foreign nationals trained in the United States. In addition to previous flying experience two types of tests were tried: paper-and-pencil and performance tests, hopefully of low cultural loading. For those going into pilot training without previous pilot experience, one performance test, rudder control, gave the highest prediction, with one of the paper-and-pencil tests adding significantly. For technical training, five paper-and-pencil tests showed low but significant prediction. It is noted that three of the paper-and-pencil tests, used alone, are significantly valid for pilot training and can make considerable improvement in pilot trainee selection procedures. Author (TAB)

N69-26510# Michigan Univ., Ann Arbor. Human Performance Center.

PERCEPTUAL RECOGNITION AS A FUNCTION OF MEANINGFULNESS OF STIMULUS MATERIAL

Gerald M. Reicher Feb. 1968 54 p refs
(Contract AF 49(638)-17)
(AD-683730; AFOSR-69-0488TR; REPT-08773-17-T; TR-7) Avail: CFSTI CSCL 5/10

The study was designed to study the level of information processing at which the observed serial nature of information handling is imposed. While earlier models suggest that raw sensory information is handled serially, evidence is obtained to support the notion of parallel processing of this type of information. One or two single letters, four-letter common words, or four-letter non-words were presented tachistoscopically for three different durations. The stimulus display was immediately followed by a masking field along with two single-letter response alternatives. The task for the subject was to choose the letter which had appeared in the original display and to state his confidence about the correctness of his response. On half of the trials subjects were given the two response alternatives before the stimulus display as well as after it. Performance on single words was clearly better than performance on other types of material. Performance on single words, letters, or non-words was better than performance on two of the same type of material. Giving response alternatives both before the stimulus display and after it caused fairly uniform impairment of performance in all conditions. On the basis of these results, an argument was made for a system which processes raw input information in parallel but handles the resultant highly processed chunks serially. Author (TAB)

N69-26516# Michigan Univ., Ann Arbor. Human Performance Center.

PICTORIAL AND VERBAL ENCODING IN SHORT-TERM MEMORY

Barbara Gans Tversky Oct. 1968 88 p refs
(Contract AF49(638)-1736)
(AD-683732; AFOSR-69-0491TR; REPT-08773-28-T; TR-10) Avail: CFSTI CSCL 5/10

What is remembered, and the speed of retrieval and systematic errors in retrieval depend on the coding of stimulus information at the time of storage in memory. The study attempted to manipulate the encoding modality of pictorial and verbal material by manipulating the modality of the expected retrieval test (visual or verbal recognition). The stimuli were schematic faces with well-learned nonsense names, constructed so that pictorial similarity correlated negatively with verbal similarity. It was hypothesized that Ss would perform more accurately or faster when encoding modality was the same as the response (test) modality, irrespective of stimulus modality. In Exp. 1, 8 faces were presented on each trial, one was cued, and S attempted to select that one from a set of 2 or 4 faces of names. The data of 2 Ss supported the hypothesis, the data of 2 Ss showed consistent preference for visual coding. In Exp. 2, a single face or name was presented followed by another one; S responded same if they had the same name, different otherwise. Expectancy of test modality was manipulated by having 79% of the second stimuli as faces or 79% as names. Slower reaction times were obtained for all Ss when the second stimulus was the less frequent modality, and RT was less for different responses when the stimuli differed on more than one attribute in the encoding (second-stimulus) modality, regardless of the modality of the first stimulus, or the particular modality of the second stimulus. Author (TAB)

N69-26518# Flugmedizinisches Institut der Luftwaffe, Fuerstenfeldbruck (West Germany).
DEVELOPMENT, STRUCTURE AND ORGANIZATION OF AIRCRAFT ACCIDENT MEDICINE IN THE BUNDESWEHR [ENTWICKLUNG, AUFBAU UND ORGANIZATION DER FLUGUNFALLMEDIZIN IM RAHMEN DER BUNDESWEHR]
S. Krefft [1968] 27 p refs In GERMAN
Avail: CFSTI

Reviewed is the history of aircraft accident medicine in Germany with emphasis on the Aeromedical Institute of the German Air Force and its accident investigation facilities. Forensic and pathological specialists investigate each aircraft or balloon accident involving injuries of military personnel. Transl. by G.G.

N69-26523 Wisconsin Univ., Madison.
A STUDY OF THE STRUCTURE OF NUCLEOHISTONE AND DNA
Stanley Bram (Ph.D. Thesis) 1968 137 p
Avail: Univ. Microfilms: HC $6.60/Microfilm $3.00 Order No. 68-13621

A study of the basic subunit of the nucleohistone – the 100A fiber – was made employing electron microscopy and small angle x-ray scattering in solution. The nucleohistone (DNH) was prepared from calf thymus. The preparation method represents an improvement in the isolation of DNH and is described in this work. High resolution electron micrographs were taken on sections of embedded pellets of DNH and show the presence of a definite substructure. Nucleohistone was stretched before fixation, and then observed in the electron microscope. It was observed that the diameter decreases from 100 A to a minimum of 25 A at stretch points. Dissert. Abstr.

N69-26576# Ohio State Univ., Columbus.
EVALUATION OF ANGLE OF ATTACK INSTRUMENTATION IN THE TRAINING OF STUDENT PILOTS TO PRIVATE PILOT CERTIFICATE Final Report
Julius H. Gandelman Washington Federal Aviation Admin. Aug. 1968 147 p refs
(Contract FA-67-WA-1810)
(AD-683359; FAA-DS-68-19) Avail: Issuing Activity CSCL 5/9

An evaluation of the effectiveness of angle-of-attack instrumentation in the training of student pilots to private pilot certification was conducted by comparing flight performances and other related measures between a control group and an experimental group. The experimental group differed only in that they would use angle-of-attack information in addition to airspeed. Author (TAB)

N69-26598# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OPTIMAL ALGORITHM FOR THE RECOGNITION OF CERTAIN SEQUENCES OF IMAGES
V. A. Kovaleskii 18 Oct. 1968 20 p refs Transl. into ENGLISH from Kibern. Dok., Akad. Nauk SSR (Moscow), no. 4, 1967 p 75–80
(AD-683536; FTD-HT-23-698-68) Avail: CFSTI CSCL 6/4

The problem of the recognition of pattern sequences is considered with respect to a line of typewritten text; since in conventional typographical text the spaces between letters are particularly difficult to distinguish and a line of text cannot be subdivided into discrete recognizable signs, the problem of recognition of the entire line must be considered. The recognition of an entire line by comparing it with all the possible standard lines of test is an infeasible problem. Nevertheless, the problem of recognition of a line of typewritten text can be formulated and solved on the basis of certain assumptions concerning the properties of the line image. In this connection it is shown an exact solution of the problem of locating the standard line that is most similar (correlates) with the line image that must be recognized, requires a comparatively small volume of calculations and memory capacity. As in the case of any other pattern recognition problem this can be accomplished by first constructing a mathematical model describing all the possible images presented for recognition i.e., in this case all the possible images representing lines of typewritten text. TAB

N69-26685*# Texas Univ., Austin. Applied Research Labs.
APPLIED RESEARCH LABORATORIES Final Report, 1 May 1964–30 Apr. 1968
Lloyd A. Jeffress 12 Dec. 1968 70 p refs
(Order NASA Order R-129; Contracts Nonr-3579(04); NObsr-93124)
(NASA-CR-101170; DRL-TR-68-37) Avail: CFSTI CSCL 06S

A summary of work on visual and auditory signal recognition is presented. The visual studies included: effects of chromatic adaptation on color naming and saturation estimates, ROC curves developed over the course of dark adaptation, and studies of the Bezold–Brücke hue shift. The studies of auditory detection included work on lateralization of sound, on masking level differences (MLDs for tone and narrow-band noise), effect of noise bandwidth on detection of a tonal signal, effect of punishment on performance in a detection task, and a series of studies of electrical and mathematical models of auditory detection. Author

N69-26707# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
A HISTOGRAM DISPLAY SYSTEM (BIO TV) FOR PHYSIOLOGICAL SIGNAL MONITORING Final Report, Oct. 1966–Nov. 1967
Adolf R. Marko Nov. 1968 21 p refs
(AD-683338; AMRL-TR-68-2) Avail: CFSTI CSCL 6/12

A system, BIO-TV, for display of physiological signals on unmodified television sets has been investigated. The study resulted in the development of a prototype converter that accepts four physiological signals and produces a standard video signal. Four vertical graph bars indicate by their lengths, heart rate, respiration rate, body and skin temperature, and are displayed on one or more television screens. Two horizontal limit lines are also displayed that may be set to indicate high and low safety limits of the measurements. The design concept is flexible and may be adapted to a variety of medical monitoring requirements. The main application of this system is as a convenient, quick-look, safety monitor of patients or subjects in medical research experiments. Design considerations, circuit, and construction details are outlined in the report. Author (TAB)

N69-26737# School of Aerospace Medicine, Brooks AFB, Tex.
COMPUTER PROGRAMMING OF AEROSPACE RATIONS Progress Report, Jan. 1967–May 1968
Roy E. Chapin, Mark O. Anway, Paul A. Lozano, and John E. Vanderveen Nov. 1968 18 p refs
(AD-683718; SAM-TR-68-115) Avail: CFSTI CSCL 6/5

Because astronauts onboard space vehicles have not always consumed their food because of its low acceptability and the lesser satisfaction derived from these rations than from a conventional meal, it has become increasingly important to supply aerospace crews with rations that are very palatable as well as nutritionally balanced. A computer program has therefore been developed for this purpose. Foods (44 varieties) are divided into nine groups corresponding to the various courses in a meal. From each group the computer then selects one or two items which, when combined, satisfy the daily nutrient requirements. The computer generates as

many as desired of acceptable rations that fall within the nutrient ranges allowed. The crewmember will then select the final rations to be used in his flight, and the computer will recheck his choices for nutritional adequacy. Author (TAB)

N69-26812# Denver Univ., Colo. Dept. of Psychology.
THE EFFECT OF MULTIPLE RESPONSES AND CERTAINTY ESTIMATES ON THE INTEGRATION OF VISUAL INFORMATION
Joseph Halpern and Z. Joseph Ulehla 26 Feb. 1969 24 p refs
(Contract N00014-67-A-0394)
(AD-683363; TR-1) Avail: CFSTI CSCL 5/10

Integration of information was investigated in two experiments that employed a multiple observation, tilt discrimination task. The integration model of signal detection theory generally overestimated the improvement in discrimination resulting from additional observations. Further, probabilistic multiple responses proved detrimental to discrimination. These results differ from earlier findings using different discrimination tasks. Reasons for the differences were discussed. Author (TAB)

N69-26833# Advisory Group for Aerospace Research and Development, Paris (France).
AEROMEDICAL ASPECTS OF TROOP TRANSPORT AND COMBAT READINESS
Oct. 1968 66 p refs Presented at AGARD–NATO Aerospace Med. Panel Symp., Brussels, 10–11 Oct. 1968
(AGARD-CP-40) Avail: CFSTI

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N69-26834# Royal Air Force, Farnborough (England).
TROOP TRANSPORT OPERATIONS
Geoffrey Howard Dhenin *In* AGARD Aeromed. Aspects of Troop Transport and Combat Readiness Oct. 1968 2 p (See N69-26833 14-04)
Avail: CFSTI

Troop-carrying air operations may be illustrated by reference to RAF air support command, which has long-range passenger aircraft and short-range/medium-range freighter aircraft. On long-range flights, the troops ride in comfort to airline standards; the only medical problems are fatigue, upset to circadian rhythms, and lack of acclimatization to hot climates. On short-range/medium-range flights, the aircraft are uncomfortable. The medical problems are airsickness and fatigue. Helicopters may accumulate toxic concentrations of carbon monoxide in the cabin if guns are fired. Author

N69-26835# Sanitaetsakademie der Bundeswehr, Munich (West Germany).
EXPERIENCE GAINED FROM THE AIR TRANSPORT OF THE MEDICAL UNITS AMF(L) DURING THE PERIOD 1965 THROUGH 1967
W. K. Thierschmann *In* AGARD Aeromed. Aspects of Troop Transport and Combat Readiness Oct. 1968 4 p (See N69-26833 14-04)
Avail: CFSTI

The transport of the medical unit equipment by truck and as palletized load, inclusion of one surgical section on each transport aircraft, last minute changes in aircraft availability, relative airlift priorities of the holding station and the mobile field hospital, and troop feeding, briefing, immunization, and acclimatization are discussed. The number of cases in which aeromedical evacuation was affected is listed. The details are supplied on schedule of flights, on transported loads, and on number and types of aircraft used for the air movement of the medical units in the past, along with future requirements. It is noted that medical care for air force combat elements participating in an exercise can be provided by the medical unit only if the operational airfields in the deployment area are not too far removed from the holding station, that is, the AMF(L) deployment airfield. P.A.B.

N69-26836# Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome (Italy).
RESULTS OF A MEDICAL ENQUIRY ON AIR TRANSPORT OF ITALIAN PARATROOPS
Paolo Rota (Ital. Air Force) *IN* AGARD Aeromed. Aspects of Troop Transport and Combat Readiness Oct. 1968 6 p (See N69-26833 14-04)
Avail: CFSTI

An investigation on Italian paratroops was carried out by filling in individual questionnaires on medical conditions and operating efficiency during a military parachuting mission (flight, parachuting, and ground tasks). From the results, statistically evaluated, some considerations were formulated on the operative efficiency in the different phases of the mission, with respect to previous health status, living habits, weather conditions, and flight experience. Author

N69-26837# Air Force Systems Command, Wright-Patterson AFB, Ohio. Aerospace Medical Research Labs.
BIOLOGICAL RHYTHMS
C. H. Kratochvil *In* AGARD Aeromed. Aspects of Troop Transport and Combat Readiness Oct. 1968 10 p refs (See N69-26833 14-04)
Avail: CFSTI

The pertinent literature with regard to circadian rhythms is reviewed, and research areas are identified where further effort is required. The problems which specifically relate to the problem of troop transport, and the closely related problem of aeromedical evacuation, are emphasized. The nature of circadian rhythms, the effect of east–west flight vs. west–east flight upon readjustment to the new time zone, the altered response to stress brought about by a shift in time zones, and the methodology of analysis in such

studies are discussed. It is pointed out that researchers in the field of sleep studies should work more closely with investigators of circadian rhythms. P.A.B.

N69-26838# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

THE PHYSIOLOGICAL BASIS OF ARTIFICIAL ACCLIMATIZATION TECHNIQUES

J. R. Allan *IN* AGARD Aeromed. Aspects of Troop Transport and Combat Readiness Oct. 1968 2 p refs (See N69-26833 14-04)
Avail: CFSTI

The value of heat acclimatization for military service in hot countries is repeatedly demonstrated. The underlying physiological changes which characterise the process are now well understood, and methods for their induction by laboratory procedures are described. The absence of acclimatization training from the training schedules of reserve forces based in temperate climates arises from the lack of a truly practical method, but experimental results available do not justify the abandoment of interest in achieving this end. Author

N69-26839# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

THE PREVENTION OF MOTION SICKNESS DURING TROOP TRANSPORT

J. J. Brand *IN* AGARD Aeromed. Aspects of Troop Transport and Combat Readiness Oct. 1968 2 p refs (See N69-26833 14-04) refs
Avail: CFSTI

When troops are transported for operational purposes by sea or air, symptoms of motion sickness may be expected to occur in a significantly large proportion of them, and this may well impair operational efficiency. Such symptoms may be minimized by the use of effective anti-motion sickness drugs, but medication of this nature can be potentially hazardous if it is not well controlled. Various prophylactic regimes are discussed. Author

N69-26840# Military Airlift Command, Washington, D.C. Office of the Command Surgeon.

MEDICAL ASPECTS OF COMBAT FORCE AIRLIFT DEPLOYMENTS

Ferdinand Barnum *IN* AGARD Aeromed. Aspects of Troop Transport and Combat Readiness Oct. 1968 10 p refs (See N69-26833 14-04)
Avail: CFST'

Items covered in predeployment briefing of troops are mentioned. Post deployment comments of the division surgeon involved in the airlift of approximately 10,000 troops are included. The fact that the airlift itself did not, in his opinion, have a detrimental effect upon the troops is important. Reporting that which happened when a rapid decompression occurred at 34,600 feet above sea level in a C-141 carrying 96 troops is emphasized. One troop required hospitalization. All others proceeded on to destination after a delay of approximately 40 hours. Author

N69-26841# Army Research Inst. of Environmental Medicine, Natick, Mass. Military Ergonomics Lab.

ASSESSMENT OF THERMAL COMFORT IN FLIGHT AND ITS EFFECTS ON PERFORMANCE

Ralph F. Goldman *IN* AGARD Aeromed. Aspects of Troop Transport and Combat Readiness Oct. 1968 14 p refs (See N69-26833 14-04)
Avail: CFSTI

The thermal environmental factors that affect man, i.e., ambient air temperature, humidity or vapor pressure, air motion, and the mean radiant temperature, are reviewed briefly. A number of suggested indices pressure, to integrate these four factors into a single number representative of the combined effect on a man are considered. The effective temperature index (E.T.) is suggested as appropriate for expressing comfortable environments as well as those in which psychological performance can be impaired; an E.T. of 86°F (30°C) can be used as the threshold for impaired psychomotor performance. The WBGT (wet bulb globe temperature) index, or its non-radiant equivalent the WD index, is recommended for characterizing physiologically stressful environments. The relationship between clothing, level of work, and physiological intolerance at a given WBGT is presented. Some effects of exceeding psychologically and/or physiologically acceptable thresholds are presented in terms of degradation of performance while in such environments. The after effects of having men exposed to such environments during troop transport are considered; residual dehydration is singled out as the most probable cause of subsequent problems. Author

N69-26842# Army Medical Research and Nutrition Lab., Denver, Colo.

MILITARY-MEDICAL ASPECTS OF HIGH ALTITUDE

Richard P. Carson *IN* AGARD Aeromed. Aspects of Troop Transport and Combat Readiness Oct. 1968 6 p refs (See N69-26833 14-04)
Avail: CFSTI

The marked effects of high terrestrial elevations on the body are accentuated by the rapidity of exposure made possible by our present military air transport capabilities. Until some degree of acclimatization is reached toward the end of the first week of exposure, a majority of troops can be expected to manifest symptoms of acute mountain sickness or high altitude pulmonary edema. Combat effectiveness is also reduced by the decremental effect of high altitude on physical and mental performance. These problems are discussed in terms of clinical manifestations, possible pathophysiologic mechanisms, prophylaxis and therapy, and specific performance decrements. The data presented were obtained from studies on healthy volunteers rapidly transported from sea level to the summit of Pikes Peak, Colorado (14,100 ft.). Author

N69-26879# Comitato Nazionale per l' Energia Nucleare, La Spezia (Italy). Laboratorio per lo Studio della Contaminazione Radioattiva del Mare.

STUDIES ON THE RADIOACTIVE CONTAMINATION OF THE SEA Annual Report, 1967

M. Bernhard 1969 72 p refs
(EUR-4244.e; CNEN-RT/BIO-(68)-60) Avail: CFSTI

The Fifth Annual Report of the CNEN-EURATOM is presented. The program calls for studies of the factors which influence the intake, accumulation and loss of radioisotopes by marine organisms. The program is divided into two parts: a), a survey of environmental elements and factors in a sampling area, and b) experiments on the influence of environmental factors on the intake, accumulation and loss of radioisotopes by marine organisms in relation to the data obtained in the survey. The task of carrying out this program has been divided between six groups: CHEMISTRY, BOTANY, ZOOPLANKTON, MICROBIOLOGY, FISHERIES, BIOLOGY and SPECIAL DEVELOPMENTS. An account is given of the results obtained by these groups in 1967. Author

N69-26880# Joint Publications Research Service, Washington, D.C.

EFFECT OF TETRODOTOXIN ON ELECTRIC ACTIVITY AND CONTRACTIONS OF MYOCARDIAL CELLS

R. S. Orlov et al 19 May 1969 8 p refs Transl. into ENGLISH

from Dokl. Akad. Nauk SSSR (Moscow), v. 185, no. 1, 1969 p 221–224
(JPRS-48059) Avail: CFSTI

A study was made of the influence of the frequency and number of preceding excitation waves on the transmembrane action potential (t.a.p.) parameters and contractions of myocardial cells under the action of tetrodotoxin (TTX). Isolated perfused frog ventricles were the object of investigation. Glass microelectrodes filled with a 2.5 M solution of KCl were used to record intracellular activity. Contractions were recorded by means of a tensometric amplifier. The TTX was applied in concentrations of 2.5×10^{-8}, 5×10^{-8}, and 10^{-7} g/ml. Results show that TTX decreases the rate of depolarization, the amplitude and duration of the t.a.p., as well as the amplitude and duration of contractions in frog ventricle myocardial fibers. This effect of TTX is apparently due to the suppression of sodium permeability, the same as in skeletal muscle, and mainly affects the transient sodium current, which is significantly reduced, whereas the late potassium current remains unchanged. K.R.G.

N69-27032# Michigan Univ., Ann Arbor. Human Performance Center.

THE EFFECTS OF SIMILARITY ON VERY-SHORT-TERM MEMORY UNDER CONDITIONS OF MAXIMAL INFORMATION PROCESSING DEMANDS

Elizabeth Ligon May 1968 104 p refs
(Contract AF 49(638)-1736)
(AD-683731; AFOSR-69-0489TR; REPT-08773-19-T; TR-8) Avail: CFSTI CSCL 5/10

Two experiments were conducted to assess the role of similarity in very-short-term memory under conditions of stimulus presentation which assured perception but permitted little or no rehearsal of the to-be-recalled items. Sequences of 12 alphanumeric items were presented on a Bina-Vue screen at a rate of 3/sec. to the subject who read aloud each item as he perceived it. The presentation of each sequence was followed by a recall test which presented one item from the sequence as a probe stimulus and required recall of the item or items which had immediately succeeded the probe in the sequence. Within a sequence both the number of items similar to the to-be-recalled unit (TBRU) and the proximity of these items to the TBRU were systematically varied. Striking effects of similarity on performance were obtained in both experiments. Performance decreased as a function of the number and proximity of prior and subsequent items similar to the TBRU. The results offer general support for associative type models of short-term memory and argue against models which assume that retention from short-term memory, primary memory, or a buffer-like store is invariant with respect to the similarity between the surrounding items and the item to be retrieved. Author (TAB)

N69-27033# Pittsburgh Univ., Pa. Dept. of Pharmacology.

PERCEPTUAL SPACE OF ORGANISMS AND AUTOMATA Final Report, 1 Oct. 1966–31 Dec. 1968

Gerhard Werner, Barry L. Whitsel, and Hershel Sacks 31 Dec. 1968 27 p refs
(Contract DADA17-67-C-7032)
(AD-683606; FR-8) Avail: CFSTI CSCL 6/16

A detailed study of the organization of the neural pathways transmitting tactile and kinesthetic signals from the body periphery to the somatic sensory area I in the cerebral cortex of primates identified certain patterns of receptive fields in the body periphery, and of neurons in the cerebral cortex, which have the attributes of open sets of elements and form topologies. The mapping between the body periphery and its cortical image is shown to be a homeomorphism. In addition, the cortical map has properties which characterize it as a non-orientable surface. The continuity of the mapping from cortex to body periphery and the topology of the latter insure the existence of a lifting function capable of generating the cortical image that corresponds to a peripheral stimulus configuration. The implication is that the tactile-kinesthetic body representation in the cerebral cortex possesses properties which are not inherent in the raw data originating from the peripheral sense organs themselves; and that continuity and three-dimensionality of the space of haptic perception is a consequence of the characteristics of the neural mapping process which links body periphery and central sensory representation. The operational principles that underlie certain sensory representations in organisms suggest ways of designing automata with comparable environmental sensing capabilities. Author (TAB)

N69-27042# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

FATAL INJURIES RESULTING FROM EXTREME WATER IMPACT

Richard G. Snyder and Clyde C. Snow Sep. 1968 10 p refs
(AM-68-19) Avail: Issuing Activity

Increased overwater flight has resulted in an increase in both military ejections and civil crash landings in water, 78 general aviation water accidents occurring in 1965. The objective of this study was to determine mechanisms of gross trauma in non-penetrating fatal water impact. The method involved analysis of necropsy data on 169 fatal jumps from the Golden Gate Bridge. The most common mechanism of injury was crushing of the thoracic cage with resultant bilateral rib fractures and penetration of the vital organs (85.2 percent). Lung lacerations, ruptured livers, brain injury, and drowning were most frequent. In 17 cases, no skeletal fractures were found. Eight individuals, apparently relatively uninjured by the impact subsequently drowned. These data reinforce previous work indicating human tolerance in water impact close to 116 ft/sec (33.53 m/sec) velocity, and body orientation is critical. Author

N69-27090# Commissariat à l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucléaires.

FUNCTIONAL EXPLORATION OF THE THYROID GLAND OF RATS ON THE THIRD DAY AFTER A SPINAL SECTION AT HIGH LEVEL [EXPLORATION FONCTIONNELLE DE LA THYROIDE CHEZ LE RAT AU TROISIEME JOUR APRES SECTION MEDULLAIRE HAUTE]

Claudine Agnius-Delord, Sylvain Caine, Maurice Tanche, and Renaud Rinaldi Feb. 1969 22 p refs In FRENCH; ENGLISH summary
(CEA-R-3738) Avail: CFSTI

Studies have been carried out on the influence of a spinal section at high level on the thyroid fixation, this latter being measured after an injection of iodine–131 carried out 72 h after the section with animals having two different diets, the one with iodine, the other without iodine. In this case, and for all animals, the results show an increase of thyroid fixation with regard to the control animals. However this increase is not significant; only the difference between the rates of fixation for the injections carried out 15 min and 24 h after section and these measured 48 h and 72 h after section is significant. The hormonal discharge always decreased significantly with regard to the controls, as was found for the animals treated 15 min, 24 h and 48 h after section. The thyroid fixation and the hormonal discharge of rats subjected to a simple laminectomy at level where the spinal sections have also been studied. The results did not show significant differences between the control animals and the animals subjected to such an operation. Author (ESRO)

N69-27139# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE BIOGRAPHY OF THE INTELLECT
B. F. Sergeev 16 Feb. 1968 42 p Transl. into ENGLISH of the Publ. "Biografiya Intellekta" Moscow, Izd. Znaniye, 1967 p 1–37
(AD-683945; FTD-HT-23-81-68) Avail: CFSTI CSCL 5/10

The document skims through the development of intelligent life on earth, discusses conditioned-reflex activity in some detail, with emphasis on temporary connections and the second signal system (human speech), and generally traces the development of the central nervous system. Author (TAB)

N69-27149*# Hayes International Corp., Huntsville, Ala.
SPACECRAFT STERILIZATION TRAINING MANUAL
Elizabeth A. Quinn Jan. 1969 127 p refs
(Contract NAS8-20083)
(NASA-CR-61253) Avail: CFSTI CSCL 06M

Sterilization training programs for shop personnel were initiated at Marshall Space Flight Center in order to train these personnel to make a greater contribution to spacecraft sterilization at the fabrication and assembly levels. This manual covers the material presented in these training courses. The manual is designed to provide a basic understanding of the microbiological implications in spacecraft sterilization and to present applicable scientific information in layman's terms. A glossary, review questions, and laboratory exercises are included. Author

N69-27161# Aeronautical Research Council (Gt. Brit.)
A METHOD OF MEASURING THE IMPEDANCE OF THE HUMAN RESPIRATORY SYSTEM AT MODERATE FREQUENCIES
K. R. Maslen and G. F. Rowlands 1969 56 p refs Supersedes RAE-TR-66296; ARC-30004
(ARC-CP-1031; RAE-TR-66296; ARC-30004) Copyright. Avail: CFSTI; HMSO 10s 6d

The stability of aircrew breathing equipment depends not only on the stability of the oxygen regulator, but also on the impedance of the system it feeds, which includes the user's respiratory system. A method of measuring the human respiratory impedance, in the range 5–90 c/s, by comparing oscillating pressures at two points in an external reference system, is described; and results are given for nose and mouth, heavy and light, breathing. The effect of altitude, and of increased external resistance to breathing are briefly discussed. The importance of correct representation of man's impedance in dynamic testing of oxygen equipment is illustrated by reference to the characteristics of a present-day simulator and system, and an improved type of simulator is suggested. Author

N69-27165# Joint Publications Research Service, Washington, D.C.
CHANGES OF INDICES OF EXTERNAL RESPIRATION, GAS EXCHANGE AND ENERGY EXPENDITURE OF A HUMAN SUBJECT DURING WEIGHTLESSNESS
I. I. Kas'yan et al 28 Mar. 1969 17 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 1, 1969 p 20–29
(JPRS-47735) Avail: CFSTI

In three series of experiments the indices of external respiration, gas exchange and energy expenditure were investigated with special small-dimension spiroanemometers under conditions of weightlessness and hypodynamia. The study showed that the intensity of gas exchange and the level of energy expenditure of subjects during brief weightlessness considerably exceeded the indices obtained in a horizontal flight. During hypodynamia a 30–40 percent reduction in the level of metabolic processes was observed in the subjects, while the reduction was 5–10 percent when measured physical work was performed. Author

N69-27186# Army Biological Labs., Fort Detrick, Md.
BIOLOGY AND FLIGHTS TO OUTER SPACE
N. N. Zhukov-Verezhnikov Jul. 1968 12 p Transl. into ENGLISH from Nauka i Zhizn (USSR), v. 29, no. 9, 1962 p 15–20
(AD-678922; Trans-1103) Avail: CFSTI CSCL 6/3

The article deals with the following topics: Biological conditions of flights to the nearest planets; Planet microorganisms and the prevention of their penetration to the earth; Biological conditions for distant space flights at speeds approaching that of light; and the possibility of biological verification of the relativity theory. TAB

N69-27208# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SYSTEM FOR THE AUTOMATIC MAINTENANCE OF A COMPLEX OF VITALLY IMPORTANT INDICES OF THE INTERNAL MEDIUM
A. N. Medelyanovskii 23 Feb. 1968 17 p Transl. into ENGLISH from Med. Tekhn. (USSR), no. 2, 1967 p 9–18
(AD-683173; FTD-MT-24-374-67) Avail: CFSTI CSCL 6/12

Development is reported of an automatic system capable of fairly long-term support of the vital activity of an organism deprived of various major organs or systems simultaneously. Prosthetic versions of various major organs currently exist (artificial lungs, artificial kidneys, artificial heart, and the like). The authors proposed to combine such major organ prostheses into a bioregulated system capable of sustaining vital activity. This entailed the creation of a complex control system, biologically regulated (i.e. responsive to changes in the vital indices of the organism itself), which would maintain various interdependent indices (blood pressure, blood levels of oxygen, carbon dioxide, and various essential or toxic substances) within preset, biologically optimum ranges. The work was done at the Central Institute of Hematology and Blood Transfusion and the All-Union Scientific Research Institute of Medical Instrumentation in Moscow, under the general supervision of Academician V. V. Parin. The system developed consisted of an isomorphic model of the natural regulatory system of the body, possessing receptors (natural or artificial sensors) and effectors (major organ prostheses) combined into a complex feedback network. Author (TAB)

N69-27226# Federal Aviation Administration, Washington, D.C.
THE MAN IN THE MAINTENANCE RELIABILITY SYSTEM
Dec. 1968 299 p refs Presented at 4th Ann. FAA Maintenance Symp., Oklahoma City, 3–5 Dec. 1968
(AD-683759) Avail: CFSTI CSCL 5/9

This publication is a compilation of papers presented on aviation maintenance personnel. The papers indicate what is being done to keep the man in the maintenance reliability system current in his vocation and also forecast future trends and needs. Author (TAB)

N69-27261# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SLEEP AND THE TRANSITION STATES OF MAN UNDER CONDITIONS OF SPACE FLIGHT
T. N. Krupina et al 1 Aug. 1968 9 p Transl. into ENGLISH from Vestn. Akad. Nauk SSR (Moscow), no. 4, 1968 p 104–106
(AD-683102; FTD-HT-23-579-68) Avail: CFSTI CSCL 6/19

The problem of sleep is discussed with regard to the maintaining of good working capacity in space flight. An All-Union Symposium on this subject was held at the Academy of Sciences which dealt with the mechanism of sleep and ways of controlling it. Author (TAB)

N69-27266*# Garrett Corp., Los Angeles, Calif.
A STUDY OF ASTRONAUTS' EXTRAVEHICULAR WORK CAPABILITIES IN WEIGHTLESS CONDITIONS
E. C. Wortz, W. Schreck, W. Robertson, G. Lamb, and L. Browne Washington NASA May 1969 247 p
(Contract NAS1-7571)
(NASA-CR-1334) Avail: CFSTI CSCL 05E

Exploratory experiments were conducted on methods of erection and assembly of large modules, transportation of cargo modules, and crew rescue during weightless simulation by neutral buoyancy techniques. A formal experiment was conducted on four typical restraint systems during the performance of various tasks with varying work envelopes. Data were collected on energy expenditures, reactive loads, and performance times. Conclusions are drawn about various aspects of extravehicular activity work and the efficacy of restraint systems. Author

N69-27301 Hahn-Meitner-Institut fur Kernforschung, Berlin (West Germany). Sektor Kernchemie.
NUCLEAR CHEMISTRY COMPENDIUM. PART 4: PRINCIPLES OF RADIATION PROTECTION AND DOSIMETRY [KERNCHEMISCHES KOMPENDIUM. TEIL 4: GRUNDLAGEN DES STRAHLENSCHUTZES UND DER DOSIMETRIE]
K. E. Zimen, H. W. Levi, P. Moeller, and J. Hacke Dec. 1968 96 p refs In GERMAN
(HMI-B-78-Pt-4; B-C 43) Copyright. Avail: Issuing Activity

A detailed review is presented of the following: (1) interaction of radiation with matter, including determination of the radiation field and the interactions of charged particles, X-rays, gamma rays, and neutrons; (2) concepts and units of dosimetry, including energy doses, the Bragg-Gray principle, ion doses at radiation equilibrium, and dose equivalence; (3) radiation tolerance of humans and maximum permissible concentration of radioactive materials; (4) calculation and measurement of alpha, beta, gamma, and neutron radiation; (5) shielding and shielding calculations; and (6) incorporation and estimation of radionuclides in the human body. A selected bibliography is included. Transl. by K.W.

N69-27316# School of Aerospace Medicine, Brooks AFB, Tex.
FIFTY YEARS OF AEROSPACE MEDICINE: ITS EVOLUTION SINCE THE FOUNDING OF THE UNITED STATES AIR FORCE SCHOOL OF AEROSPACE MEDICINE IN JANUARY 1918
Green Peyton 1968 273 p refs *Its* AFSC Historical Publ. Ser. No. 67–180
(AD-682521) Avail: CFSTI CSCL 5/4

A history of aerospace medicine in the United States is presented covering the period from 1918 to 1968. TAB

N69-27438# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
AEROSOL BEHAVIOR IN HIGH PRESSURE ENVIRONMENTS Final Report, 1 Mar. 1968–28 Feb. 1969
Robert A. Gussman Feb. 1969 161 p refs
(Contract N00014-68-C-0271)
(AD-683794; BBN-1770) Avail: CFSTI CSCL 6/11

The purpose of this study was to elucidate hazards to personnel arising from aerosols in high pressure helium-oxygen atmospheres utilized in deep submergence vessels. Aerosol properties of sedimentation, diffusion, agglomeration, electrification, and the slip correction factor have been extrapolated to pressures of 500 psia. The effects of the atmosphere upon aerosol filtration, electrostatic deposition, condensation and evaporation have been considered. Experiments have been performed to verify the possibility of maintaining a corona discharge in the given atmosphere for both positive and negative applied potentials. The deposition patterns of aerosols within the lung have been considered via the application of a deposition model to a range of particle sizes and pressures. The possibility of significantly increased respiratory deposition is evident. Author (TAB)

N69-27455# Lockheed Missiles and Space Co., Palo Alto, Calif.
DYNAMIC AND STATIC PROBLEMS OF THE THEORY OF DEFORMABLE SHELLS OF THE BLOOD VESSEL SYSTEM
A. S. Vol'mir et al 1969 11 p refs Transl. into ENGLISH from Prikl. Mekh. (USSR), v. 5, no. 1, 1969 p 3–10 Presented at 3d All-Union Congr. on Theoret. and Appl. Mech., Moscow, 27 Jan.–1 Feb. 1968
Avail: National Translations Center, John Crerar Library, Chicago, Ill. 60616

Mathematical analyses on the biophysics of blood circulation, including space biology aspects, are briefly reviewed. Specific investigations discussed are: (1) Korotkov sounds in arterial pressure measurement; (2) pulse wave propagation in arteries; (3) artery behavior under nonstationary dynamic loading; and (4) equilibrium modes of erythrocyte shells. E. C.

N69-27456# Federal Aviation Administration, Oklahoma City, Okla. Office of Aerospace Medicine.
A COMPARISON OF EFFECTS OF PERIPHERAL VISION CUES ON PILOT PERFORMANCE DURING INSTRUMENT FLIGHT IN DISSIMILAR AIRCRAFT SIMULATORS
A. Howard Hasbrook Sep. 1968 6 p refs
(AM-68-22) Avail: CFSTI

Pilot response to peripheral vision cues relating to aircraft bank angle was studied during instrument flight in two simulators representing (1) a conventional, medium weight, piston engine airliner, and (2) a heavy, jet engine, sweptwing transport. There was no statistically significant difference found between pilot performance in the dissimilar type aircraft, suggesting that peripheral vision cues may be equally useful regardless of differences in size, weight and flight characteristics of fixed wing aircraft. Author

N69-27487*# Hazelton Labs., Falls Church, Va.
USE OF THE ENZYME HEXOKINASE FOR THE REDUCTION OF INHERENT LIGHT LEVELS
Emmett W. Chappelle inventor (to NASA) Issued 8 Apr. 1969 (Filed 27 Jul. 1966) 4 p Cl. 195-68
(NASA-Case-XGS-5533; US-Patent-3,437,560; US-Patent-Appl-SN-568346) Avail: US Patent Office CSCL 06A

A method is described of minimizing the inherent light activity of residual adenosinetriphosphate (ATP) in luciferase compositions to make such compositions more suitable for life detection studies, such as determinations of sterile conditions, life presence on planets, etc. The light stabilization technique is practiced by the addition of controlled amounts of both hexokinase and glucose to any luciferase compositions and allowing sufficient time to elapse to insure the complete binding of all of the residual ATP to the glucose to give glucose–6–phosphate and adenosine diphosphate (ADP). The hexokinase is trans-phosphorylase which catalyzes this reaction which involved the transfer of the terminal phosphate of the ATP to the glucose. So that the resultant luciferase composition be still light reactive, it is essential that the hexokinase be in high state of purity before addition, particularly with regard to other enzymes such myokinase, 3–phosphoglycerickinase and pyruvate kinase. NASA

N69-27577*# Aztec School of Languages, Inc., Acton, Mass.
ELECTROMEDICAL APPARATUS: PRINCIPLES OF OPERATION, INSTALLATION, AND USE
N. M. Liventsev Washington NASA May 1969 430 p Transl. into

ENGLISH of the book "Elektromeditsinskaya Apparatura; Printsip Deystviya, Ustroystvo, Ekspluatatsiya" Moscow, Meditsina Press, 1964

(Contract NASw-1692)
(NASA-TT-F-523) Avail: CFSTI CSCL 06B

This expanded and updated edition covers the following: (1) phototherapeutic appartus, including the use of optical radiation, lamps for infrared and photothermal radiation, and lamps for ultraviolet radiation; (2) electrocardiographs powered by battery and line voltage, and low-frequency amplifiers; (3) dc and low-frequency electrotherapeutic apparatus; (4) electrotherapeutic apparatus using high-frequency currents; (5) apparatus for ultrasonic therapy; and (6) organization and operation of electrical phototherapeutic departments. K.W.

IAA ENTRIES

A69-2[illegible]65 *
HUMAN [illegible]TOLERANCE TO BACTERIA AS FOOD.
Carol I. W[illegible]slien, Doris Howes Calloway, and Sheldon Margen (California, University, Dept. of Nutritional Sciences, Berkeley, Calif.).
Nature, vol. 221, Jan. 4, 1969, p. 84, 85. 6 refs.
NIH-supported research; Grant No. NGR-05-003-228.

Discussion of an experiment in which several lots of bacterial cells were fed to animals and to human, adult male volunteers. Hydrogenomonas eutropha, a hydrogen-fixing bacterium, could provide nourishment during space travel. The protein is of high biological value and is well tolerated in rat diets. The bacterial cells were fed first to albino mice and did not produce any adverse effects. When the bacterial cells were also fed to four human volunteers, they produced abdominal discomfort and other adverse effects such as bowel movements, headache, and weakness. G.R.

A69-27266 *
HUMAN ECOLOGY IN SPACE FLIGHT III; PROCEEDINGS OF THE THIRD INTERNATIONAL INTERDISCIPLINARY CONFERENCE, PRINCETON, N.J., OCTOBER 10-13, 1965.
Conference sponsored by the U.S. Navy and NASA.
Edited by D. H. Calloway (California, University, Dept. of Nutritional Sciences, Berkeley, Calif.).
New York, New York Academy of Sciences; Gordon and Breach, Science Publishers, Inc., 1968. 243 p.
$12.75.

The implications of space living conditions on human ecology are discussed, together with experiments which should be performed to ascertain the possibility of prolonged space travel. Special attention is given to the food supply, taking into consideration the macro- and micronutrients, appetite, satiety, and food acceptance. The effect of intestinal microflora on the human metabolic processes is discussed, as well as the results of experiments with animals living in an artificial germ-free environment. Chemical systems of the atmosphere regeneration and food synthesis are reexamined, as well as bioregenerative systems. The book is intended for biologists, physiologists, and nutritional scientists concerned with manned space vehicles. Z.W.

A69-27356 #
SPACE BIOLOGY AND MEDICINE [KOSMICHESKAIA BIOLOGIIA I MEDITSINA].
O. G. Gazenko.
IN: ADVANCES OF THE USSR IN THE STUDY OF OUTER SPACE: FIRST SPACE DECADE 1957-1967 [USPEKHI SSSR V ISSLEDOVANII KOSMICHESKOGO PROSTRANSTVA: PERVOE KOSMICHESKOE DESIATILETIE 1957-1967]. [A69-27346 13-30]
Edited by L. V. Gessen.
Moscow, Izdatel'stvo Nauka, 1968, p. 321-370. 72 refs. In Russian.

Outline of space biology and medicine as new branches of science promoted by advances in Soviet science and technology. Soviet efforts in ecological physiology, the ecology of closed systems, exobiology, and medical problems of manned space flights are reviewed. A listing of Soviet biological experiments on rockets and spacecraft is given. Medical tests performed on Soviet cosmonauts are discussed. V.Z.

A69-27800 #
THE ADAPTIVE EFFECT OF HYDROCORTISONE DURING HYPOXIA [K ADAPTIVNOMU EFFEKTU GIDROKORTIZONA PRI GIPOKSII].
L. D. Fedorova (Akademiia Nauk SSSR, Institut Fiziologii, Moscow, USSR).
Akademiia Nauk SSSR, Doklady, vol. 185, Mar. 1, 1969, p. 233-235. 10 refs. In Russian.

Investigation of the effect of injections of hydrocortisone doses of 0.2, 1.0, and 5 mg per 100 g of body weight on the functional state of the cortical and subcortical structures of rats exposed to an atmosphere of 8, 10, or 12% oxygen for 30, 60, 120, and 180 min. The responses of the rats to acoustic signals were recorded by electrodes inserted in the auditory zone of the cortex and in the posterior lamina quadrigemina. The protective effect of 1.0 and 5.0-mg doses of hydrocortisone in all experiments is indicated. V.Z.

A69-27905
LUNAR PSYCHOLOGY.
Richard L. Gregory (Edinburgh, University, Dept. of Machine Intelligence and Perception and Bionics Research Laboratory, Edinburgh, Scotland).
Science Journal, vol. 5, May 1969, p. 78-81.

Investigation of psychological problems which lunar astronauts will face. Experiments are discussed in which small groups of men were kept together in complete isolation from the outside world for a long time. Problems arising out of the low lunar gravity, extreme light conditions, and the need for protective spacesuits for the astronauts are also considered. G.R.

A69-27909 *
LUNAR MEDICINE.
Charles A. Berry (NASA, Manned Spacecraft Center, Houston, Tex.).
Science Journal, vol. 5, May 1969, p. 103-107.

Analysis of medical problems connected with space travel and the exploration of the moon. Man, adapted to living in an earth environment, is exposed to entirely different conditions in a space vehicle and on the lunar surface. Medical findings obtained from previous space missions are evaluated, and measures are described which are designed to ensure that astronauts will be able to meet the demands of the exploration programs contemplated. G.R.

A69-28090 *#
SIMULATION OF THE STRESS ENVIRONMENT OF A ROCKET-BORNE ANIMAL CENTRIFUGE.
W. C. Cloyd, K. O. Lange (Kentucky, University, Wenner-Gren Aeronautical Research Laboratory, Lexington, Ky.), and A. B. Broderson.
IN: THE FUTURE OF BIO-ENGINEERING IN OUR DAILY LIVES; INSTITUTE OF ENVIRONMENTAL SCIENCES, ANNUAL TECHNICAL MEETING AND EQUIPMENT EXPOSITION, 15TH, SYMPOSIUM ON BIO-ENGINEERING, ANAHEIM, CALIF., APRIL 23, 1969, LECTURES.
Edited by K. R. Jackman.
Mt. Prospect, Ill., Institute of Environmental Sciences, 1969, p. H-1 to H-8. 22 refs.
Grant No. NGL-18-001-003.

Description of gravity preference experiments using Sprague Dawley rats in ground-based centrifuge facilities where the rats were subjected to simulation of the acceleration, spin, vibration, and noise profiles of the Aerobee 150A rocket. The rats were exposed during 25-sec periods of weightlessness to the artificial gravity field below 1 g anticipated in the rocket experiments. The adequacy of the simulation and conditioning procedures is confirmed by the results of the experiment, which are reported in detail. Diagrams show (1) the locomotion behavior of 20 rats during training, (2) standard deviation of position after 5 min of testing, (3) the locomotion of 20 rats in the gravity field after administration of launch simulation, and (4) the locomotion response in the rotating spiral gravity-field centrifuge after launch simulation. B.H.

A69-28091 #
RESEARCH ON VIBRATION NUISANCE - THE NEED FOR A RATIONAL APPROACH.
J. C. Guignard (Southampton, University, Institute of Sound and Vibration Research, Human Factors Unit, Southampton, England).
IN: THE FUTURE OF BIO-ENGINEERING IN OUR DAILY LIVES; INSTITUTE OF ENVIRONMENTAL SCIENCES, ANNUAL TECHNICAL MEETING AND EQUIPMENT EXPOSITION, 15TH, SYMPOSIUM ON BIO-ENGINEERING, ANAHEIM, CALIF., APRIL 23, 1969, LECTURES.
Edited by K. R. Jackman.
Mt. Prospect, Ill., Institute of Environmental Sciences, 1969, p. J-1 to J-9. 38 refs.

Review of numerous laboratory and field investigations into the effects of exposure to vibration in humans. The quality and practical value of these efforts are examined, and conflicting views and findings are discussed. It is found that confusion exists in relation to the aims and criteria of experimentation, and that there is a lack of standardization in research techniques, particularly in the province of subjective rating and performance measurements. Inadequate control or reporting of the physical conditions is also found to exist in many of the experiments. Some remedies are suggested, including the adoption of clearer criteria of experimentation and the improvement of interdisciplinary communication between research workers in this field. B.H.

A69-28150
HEAT TRANSFER IN BIOENGINEERING.
J. C. Chato (Illinois, University, Urbana, Ill.).
IN: ADVANCED HEAT TRANSFER. [A69-28138 13-33]
Edited by B. T. Chao.
Urbana, University of Illinois Press, 1969, p. 395-414. 68 refs.

Exploration of several aspects of heat transfer problems related to biology, as seen primarily from the engineering standpoint. Instrumentation and equipment, internal heat transfer, external heat transfer, and miscellaneous heat transfer problems are considered. A listing of thermal conductivity and diffusivity data on biological materials is given in the appendix. P. v. T.

A69-28256
TRAINING FOR VIGILANCE - COMBINED CUEING AND KNOWLEDGE OF RESULTS.
Earl L. Wiener and Dennis A. Attwood (Miami, University, Dept. of Industrial Engineering, Coral Gables, Fla.).
Journal of Applied Psychology, vol. 52, no. 6, 1968, p. 474-479. 18 refs.
PHS Grant No. UI-00014.

To test transfer of training in a visual monitoring task, 44 subjects were given a 48-min training session in one of four conditions forming a 2 x 2 factorial design. The four training conditions were knowledge of results (KR), cueing (also known as prompting), KR and cueing, and a control group receiving neither training aid. Seven days later all subjects performed the same task with no training aids. Results showed that the KR-trained groups detected significantly more signals during transfer, but the cueing groups showed no significant differences. The group trained with the combination of KR and cueing did no better than the KR-only group. With respect to commissive errors (false alarms), there was no significant difference due to KR treatments, but the groups receiving cueing during training made significantly fewer during transfer. All four groups showed a decline in detection performance over time periods in the transfer session. (Author)

A69-28257 *
PHOTOREACTIVATION OF MANGANESE CATALYST IN PHOTOSYNTHETIC OXYGEN EVOLUTION.
G. M. Cheniae and I. F. Martin (Martin Marietta Corp., Aerospace Group, Research Institute for Advanced Studies, Baltimore, Md.).
Plant Physiology, vol. 44, Mar. 1969, p. 351-360. 38 refs.
AEC Contract No. AT (30-1)-3706; Contract No. NASw-1592.

Description of the general influence of light on the restoration of O_2 evolution in Mn-deficient Anacystis nidulans cells. Measurements of the stoichiometry for the amount of Mn needed for full restoration are described. The blue-green alga Anacystis nidulans was chosen because its pigment composition allows easier color separation of the two photoacts, and the reactivation is more rapid than in the green alga Scenedesmus. M.M.

A69-28298 *#
DEVELOPMENT OF METEOROID PROTECTION FOR EXTRAVEHICULAR-ACTIVITY SPACE SUITS.
William E. McAllum (NASA, Manned Spacecraft Center, Space Physics Div., Meteoroid Sciences Branch, Houston, Tex.).
American Institute of Aeronautics and Astronautics, Hypervelocity Impact Conference, Cincinnati, Ohio, Apr. 30-May 2, 1969, Paper 69-366. 10 p. 8 refs.
Members, $1.00; nonmembers, $1.50.

The space suit used during extravehicular activities requires meteoroid protection during the space exposure to prevent perforation of the pressure bladder. The development of protective coverlayers for the Gemini and lunar-surface EVA suits is described. The meteoroid mass, which must be absorbed in the coverlayer to satisfy the mission exposure time and the reliability requirements, was simulated by a hypervelocity glass projectile of equal penetrating energy. Textiles or "soft goods" that were compatible with suit fabrication techniques were impacted with the laboratory projectile to determine response to impact and resistance to penetration. An effective projectile breakup was achieved with nylon cloth; therefore, the bumper concept that was developed previously for metallic sheets was applied to the suit protection. Two configurations were developed, one of which used nylon felt and the other used neoprene as the primary energy absorber. (Author)

A69-28313
THE EFFECT OF PROLONGED VISUAL DEPRIVATION ON VARIOUS CUTANEOUS AND AUDITORY MEASURES.
J. Phelps and John P. Zubek (Manitoba, University, Winnipeg, Manitoba, Canada).
Psychonomic Science, vol. 14, no. 4, 1969, p. 194, 195. 9 refs.
Research supported by the Defence Research Board and the National Research Council.

Subjects who were placed in darkness for a week but otherwise were exposed to a normal and varied sensory environment showed a significant increase in absolute pressure sensitivity of the finger, forearm, neck, and leg, but not of the palm, relative to a group of controls. Measures of tactual and auditory localization, on the other hand, showed no significant changes after visual deprivation. These results provide some experimental support for Schultz's (1965) sensoristatic theory. (Author)

A69-28334 #
THE EFFECT OF IONIZING RADIATION ON HAEMOLYTIC PLAQUES FORMING SPLEEN CELLS UPON USING CERTAIN CHEMICAL RADIOPROTECTORS.
T. Soumerska (Institute of Radiology and Radiation Hygiene, Sofia, Bulgaria).
Bolgarskaia Akademiia Nauk, Doklady, vol. 22, no. 1, 1969, p. 105-108. 12 refs.

Application of a method devised by Jerne et al. (1963) to the investigation of the influence of ionizing radiation on antibody genesis. The effect of sublethal doses of ionizing radiation on the immunocompetent cells is studied using chemical radiation protectors. The dynamics of the antibody genesis was examined from the third to the eighth days after antigen stimulus in male mice. Irradiation was carried out with gamma rays (Co^{60}). The radiation protectors used were β-mercaptoethylamine (150 mg/kg) and 5-hydroxy-triptamine (50 mg/kg). M.G.

A69-28467
POSSIBLE CONTAMINATION OF EARTH BY LUNAR OR MARTIAN LIFE.
M. Alexander (Cornell University, Laboratory of Soil Microbiology, Ithaca, N.Y.).
Nature, vol. 222, May 3, 1969, p. 432, 433. 25 refs.

Consideration of the return of extraterrestrial material as a hazard to man and other species. The question of whether some nonterrestrial biota would survive or establish themselves on earth is considered, and it is noted that existing techniques for assessing ecological disturbances are so imprecise that the decline of some species could remain undetected until the change became pronounced. It is concluded that while the quest for life in space and the study of the physical and chemical properties of other celestial bodies is important, the absence of adequate biological information and techniques makes such investigations extremely hazardous at the present time. B.H.

A69-28482 *
INTERRELATIONSHIP OF PHYSICAL FACTORS AFFECTING SODIUM REABSORPTION IN THE DOG.
Terrance M. Daugharty, Louis J. Belleau, Joseph A. Martino, and Laurence E. Earley (Boston City Hospital, Second and Fourth Medical Services, Thorndike Memorial Hospital; Harvard University, Harvard Medical School, Dept. of Medicine, Boston, Mass.).
American Journal of Physiology, vol. 215, Dec. 1968, p. 1442-1447. 12 refs.
NIH Grant No. AM-5401-06; Grants No. NsG-595; No. NGR-22-007-019.

Examination of the interrelationships between, and the tubular sites affected by, physical factors known to increase sodium excretion. Changes in sodium excretion, glomerular filtration, urine flow, and free-water clearance during unilateral renal vasodilatation, systemic infusion of pressor agents, and infusion of concentrated albumin were observed in dogs undergoing water diuresis. It is suggested that primary changes in capillary uptake will change both proximal and distal tubular sodium reabsorption. F.R.L.

A69-28486 *
ORGANOSILICON COMPOUNDS. IV - SYNTHESIS OF ORGANOSILICON SUBSTITUTED BUNTE SALTS AND MERCAPTOETHYLAMINES.
Shelby F. Thames (Southern Mississippi, University, Hattiesburg, Miss.) and Laroy H. Edwards.
Journal of Heterocyclic Chemistry, vol. 5, Feb. 1968, p. 115-117. 10 refs.
Contract No. DA-49-193-MD-2910; Grant No. NGT-25-005-001.

Consideration of organosilicon-containing derivatives of 2-aminoethanethiols and 2-aminoethanethiosulfuric acids as possible radiation-protective agents. A number of organosilicon-containing Bunte salts and tetraalkylsilicon-substituted mercaptoethylamines were prepared for evaluation. F.R.L.

A69-28532 #
HYPOTHERMIA INDUCED BY HYPOXIA IN THE RAT.
Ryohei Yurugi, Michihiko Iizuka, and Teruko Akiyama (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 9, Sept. 1968, p. 100-107. 5 refs.
In Japanese with abstract in English.

Description of an experiment in which Wistar strain adult male rats were exposed to simulated altitudes under various conditions and the chilling rate in their body temperature was observed, to obtain fundamental information concerning the problem of hypoxia inducing hypothermia. When the rats were exposed to various simulated altitudes, ranging from sea level up to 10,000 m under constant ambient temperature, their colonic temperature was decreased in proportion to the increase of the altitude level. When the ambient thermal conditions, ranging from 15 to 35°C, were changed, and the animals were exposed to a constant altitude of 8000 m, the chilling rate was more dominant at a lower ambient temperature. These hypothermic phenomena were also observed when the rats inhaled a hypoxic gas mixture. Animals to which adrenocortical or medullar hormone preparations were administered before exposure showed the same changes as the normal control animals. However, adrenalectomized rats or drugged rats pretreated by cutting their autonomic nerve showed slightly greater chilling than the control animals during altitude exposure. P.v.T.

A69-28533 #
VISUAL DISCRIMINATION THROUGH SCRATCHED CANOPY.
Akiko Ogawara, Hiroshi Kansaku, and Kiyokazu Yokoi (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 9, Sept. 1968, p. 130-137.
In Japanese with abstract in English.

Results of visual discrimination tests through scratched canopies, performed by measuring the reading time of the letter index of the Japanese Kana syllabary. Visual discrimination was considerably disturbed only through a grade +3 scratched canopy which had more than ten long scratches of about 10 μ in width (vertically, horizontally, and obliquely) in any 0.5 mm^2. The answers to a questionnaire submitted to pilots concerning their visual discrimination through a canopy showed that they had experienced troubles through widespread, long-shallow, and long-deep scratches, especially in enemy detection. These conditions might be caused by grade +3 scratched canopies. P.v.T.

A69-28587
ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, FRENCH CONFERENCE ON ENVIRONMENTAL STUDIES, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS [ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, JOURNEES FRANÇAISES DE L'ENVIRONNEMENT, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS].
Paris, Association pour le Développement des Sciences et Techniques de l'Environnement, 1969. 646 p. In French.

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FRENCH RESEARCH ON TURBOJET NOISE [RECHERCHES FRANÇAISES SUR LE BRUIT DES TURBOREACTEURS]. R. Hoch and J. C. Thevenin (Société Nationale d'Etude et de Construction de Moteurs d'Aviation, Villaroche, Seine-et-Marne, France), p. 31-68. 11 refs. [See A69-28589 13-28]

PHYSIOPATHOLOGICAL REACTIONS OF THE HUMAN BEING EXPOSED TO INFRASOUNDS APPLIED VIA THE AURICULAR CANAL [REACTIONS PHYSIOPATHOLOGIQUES DE L'ETRE HUMAIN - EXPOSE A DES INFRA-SONS APPLIQUES PAR VOIE AURICULAIRE]. P. Grognot (Centre d'Enseignement et de Recherches de Médecine Aéronautique, Paris, France), p. 83-91. [See A69-28590 13-05]

RESISTANCE OF THE HUMAN BODY TO HIGH ACCELERATIONS OF SHORT DURATION [RESISTANCE DU CORPS HUMAIN AUX ACCELERATIONS ELEVEES ET DE COURTE DUREE]. Seris, Auffret, and Guibaud (Centre d'Essais en Vol, Brétigny-sur-Orge, Essonne, France), p. 97-103. 10 refs. [See A69-28591 13-05]

EFFECT OF PROLONGED ITERATIVE ACCELERATIONS AND DECELERATIONS ON THE VESTIBULAR APPARATUS [EFFET DES ACCELERATIONS ET DECELERATIONS ITERATIVES PROLONGEES SUR L'APPAREIL VESTIBULAIRE]. M. Burgeat, D. Loth, P. Fontelle, and C. Burgeat-Menguy (Hôpital Lariboisière, Paris, France), p. 105-113. [See A69-28592 13-04]

PHYSIOLOGICAL EFFECTS OF VARIATIONS OF BODY POSITION AND THEIR CONSEQUENCES TO MOTOR ACTIVITY [EFFETS PHYSIOLOGIQUES DES VARIATIONS DE POSITION DU CORPS ET LEURS CONSEQUENCES SUR L'ACTIVITE MOTRICE]. J. Rozier (Bordeaux, Université, Bordeaux, France), p. 115-135. 120 refs. [See A69-28593 13-04]

COMBINATION OF THERMAL FACTORS FROM THE POINT OF VIEW OF TESTING [CONJUGAISON DES FACTEURS THERMIQUES DU POINT DE VUE DE L'ESSAI]. R. Lemaire (Caen, Université, Caen, France) and J. M. Chaput (Société d'Etudes et d'Application de Vide Optique et Mécanique, Argenteuil, Val d'Oise, France), p. 221-230. [See A69-28594 13-05]

THE PHYSIOLOGICAL EFFECTS OF INTERMITTENT LIGHT [LES EFFETS PHYSIOLOGIQUES DE LA LUMIERE INTERMITTENTE]. G. Perdriel (Val-de-Grâce, HIA, Paris, France), p. 251-258. [See A69-28595 13-04]

BIOLOGICAL ACTION OF LOW MAGNETIC FIELD ENVIRONMENTS [ACTION BIOLOGIQUE DES AMBIANCES A FAIBLE CHAMP MAGNETIQUE]. L. Miro (Compagnie Générale d'Electricité de Paris, Marcoussis, Essonne, France), p. 259-266. 9 refs. [See A69-28596 13-04]

THE ELECTROMAGNETIC ENVIRONMENT - BIOLOGICAL EFFECTS AND POSSIBLE DANGER OF RADAR ANTENNA RADIATION [L'ENVIRONNEMENT ELECTRO-MAGNETIQUE - EFFETS BIOLOGIQUES ET DANGER EVENTUEL DU RAYONNEMENT DES AERIENS-RADAR]. R. Joly (Centre d'Etudes et de Recherches de Biophysiologie Appliquée à la Marine, Toulon Naval, Var, France), p. 267-278. 7 refs. [See A69-28597 13-05]

PROBLEMS OF VENTILATION MECHANICS UNDER HIGH-PRESSURE CONDITIONS [PROBLEMES DE MECANIQUE VENTILATOIRE EN HYPERBARIE]. J. Corriol (Aix Marseille, Université, Marseille, France), p. 397-409. [See A69-28598 13-05]

METHOD OF STRAIN ANALYSIS ON AN INSULATING SPECIMEN IN THE PRESENCE OF A THERMAL GRADIENT BY MEANS OF A STRAIN GAUGE [METHODE D'ANALYSE DES DEFORMEES SUR SPECIMEN ISOLANT EN PRESENCE D'UN GRADIENT THERMIQUE, AU MOYEN DE JAUGE D'EXTENSOMETRIE]. D. Bonnet and J. Fromentin (Commissariat à l'Energie Atomique, Le Barp, France), p. 449-479. [See A69-28599 13-14]

SHOCK SPECTRA - EXAMPLES OF PRACTICAL APPLICATIONS [LES SPECTRES DE CHOC - EXEMPLES D'APPLICATIONS PRATIQUES]. J. Munoz (Commissariat à l'Energie Atomique, Le Barp, France), p. 481-519. 12 refs. [See A69-28600 13-32]

DAMPING OF HIGH-RIGIDITY STRUCTURES [AMORTISSEMENT DES STRUCTURES DE RAIDEUR ELEVEE]. Costa, Monsel (Commissariat à l'Energie Atomique, Paris, France), Loupere, and Gilly (SEEEE, Boulogne-Billancourt, Hauts-de-Seine, France), p. 521-554. [See A69-28601 13-32]

INTRODUCTION TO THE STUDY OF THE EQUIVALENCE (FROM THE POINT OF VIEW OF RISKS OF RUPTURE) OF SINUSOIDAL AND RANDOM TESTS [INTRODUCTION A L'ETUDE DE L'EQUIVALENCE (AU POINT DE VUE DES RISQUES DE RUPTURE) DES ESSAIS ALEATOIRES ET SINUSOIDAUX]. J. Gilly (SEEEE, Boulogne-Billancourt, Hauts-de-Seine, France), p. 555-565. [See A69-28602 13-32]

ANALYSIS OF RANDOM SIGNALS AND REAL-TIME ANALYSIS SYSTEMS [ANALYSE DES SIGNAUX ALEATOIRES ET SYSTEMES D'ANALYSE EN TEMPS REEL]. R. Dart (Comptoirs IMEX-FRANCE, S. A., Montreuil, Seine-St-Denis, France), p. 567-617. [See A69-28603 13-14]

METHODS OF TESTING NONMAGNETIC ENVIRONMENTS [MOYENS D'ESSAIS DES AMBIANCES AMAGNETIQUES]. J. Pelen (Compagnie des Compteurs, S. A., Montrouge, Hauts-de-Seine, France), p. 619-629. 9 refs. [See A69-28604 13-11]

A69-28588

CRITERIA FOR ESTIMATING THE ANNOYANCE DUE TO NOISE AROUND AIRPORTS [CRITERES D'APPRECIATION DE LA GENE DUE AU BRUIT AUTOUR DES AEROPORTS].

M. Pianko (Service Technique de l'Aéronautique, France) and M. Lienard (ONERA, Division Acoustique, Châtillon-sous-Bagneux, Hauts-de-Seine, France).

IN: ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, FRENCH CONFERENCE ON ENVIRONMENTAL STUDIES, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS [ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, JOURNEES FRANÇAISES DE L'ENVIRONNEMENT, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS]. [A69-28587 13-05]
Paris, Association pour le Développement des Sciences et Techniques de l'Environnement, 1969, p. 13-29. 13 refs. In French.

Discussion of methods of defining and measuring the annoyance caused by noise in the vicinity of airports. In addition to scales using dB and phones, giving a subject intensity, or "sonic," American studies have adopted the PNdB (perceived noise dB), which is slightly different from the phone of Stevens, to define the specific annoyance of a continuous noise. In the case of a developing noise of short duration, such as the passage of an aircraft, this noise is characterized by the maximum value of the level in PNdB, corrected by two terms taking account of the noise duration and possible pure frequencies in the spectrum; this leads to the EPNdB. Evaluation criteria are proposed for the overall noise during a sufficiently long time (a day), taking account of the level of each noise and the number of repetitions occurring during this time. French, British, American, and German methods are discussed. F. R. L.

A69-28590

PHYSIOPATHOLOGICAL REACTIONS OF THE HUMAN BEING EXPOSED TO INFRASOUNDS APPLIED VIA THE AURICULAR CANAL [REACTIONS PHYSIOPATHOLOGIQUES DE L'ETRE HUMAIN - EXPOSE A DES INFRA-SONS APPLIQUES PAR VOIE AURICULAIRE].

P. Grognot (Centre d'Enseignement et de Recherches de Médecine Aéronautique, Paris, France).

IN: ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, FRENCH CONFERENCE ON ENVIRONMENTAL STUDIES, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS [ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, JOURNEES FRANÇAISES DE L'ENVIRONNEMENT, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS]. [A69-28587 13-05]
Paris, Association pour le Développement des Sciences et Techniques de l'Environnement, 1969, p. 83-91. In French.

Results of a study undertaken in order to judge the effects of infrasonic vibrations applied via the auricular canal on the neurovegetative equilibrium of 37 human volunteers. A generator produced infrasonic vibrations at 3 to 9 Hz, with an intensity of 90 ± 2 dB. The exposure time was 30 to 40 min. Cardiac and circulatory hemodynamic troubles were observed, similar to those detected in animals, as well as troubles in the respiratory mechanism, and variations of certain biological constants. The levels of vitamin C, cholesterol, and glucose in the blood were lowered during exposure. These findings make it possible to classify exposure to infrasounds as stress. F. R. L.

A69-28591

RESISTANCE OF THE HUMAN BODY TO HIGH ACCELERATIONS OF SHORT DURATION [RESISTANCE DU CORPS HUMAIN AUX ACCELERATIONS ELEVEES ET DE COURTE DUREE].

Seris, Auffret, and Guibaud (Centre d'Essais en Vol, Brétigny-sur-Orge, Essonne, France).

IN: ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, FRENCH CONFERENCE ON ENVIRONMENTAL STUDIES, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS [ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, JOURNEES FRANÇAISES DE L'ENVIRONNEMENT, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS]. [A69-28587 13-05]
Paris, Association pour le Développement des Sciences et Techniques de l'Environnement, 1969, p. 97-103. 10 refs. In French.

Discussion of the effects on the human body of high accelerations of short duration - e.g., during ejection from an aircraft, which may involve accelerations of the order of 15 g for 0.2 sec. Under these conditions there is no modification of the circulatory balance, because the blood does not have time to accumulate in the lower parts of the body. The subject retains full consciousness. However, there may be damage to the bones, such as lesions of the spinal column, extending to fracture of one or more vertebrae. This damage can occur due to complex accelerations at the moment of ejection, or if the subject is badly positioned in the seat. Attempts are being made to improve safety by prolonging the combustion of the rocket. The acceleration would be some 15 g during about 0.8 sec. Experiments being conducted with a centrifuge are described.
F.R.L.

A69-28592
EFFECT OF PROLONGED ITERATIVE ACCELERATIONS AND DECELERATIONS ON THE VESTIBULAR APPARATUS [EFFET DES ACCELERATIONS ET DECELERATIONS ITERATIVES PROLONGEES SUR L'APPAREIL VESTIBULAIRE].
M. Burgeat, D. Loth, P. Fontelle, and C. Burgeat-Menguy (Hôpital Lariboisière, Centre de Biophysique Sensorielle, Paris, France).
IN: ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, FRENCH CONFERENCE ON ENVIRONMENTAL STUDIES, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS [ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, JOURNEES FRANÇAISES DE L'ENVIRONNEMENT, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS]. [A69-28587 13-05]
Paris, Association pour le Développement des Sciences et Techniques de l'Environnement, 1969, p. 105-113. In French.

Study of the influence of kinetic forces on certain equilibrium functions. The rotary stimulations which were applied act essentially on the semicircular canals of the internal ear. An attempt was made to record rhythmic movements of the eyeballs (nystagmus), a type of biological response to stimulation of the semicircular canals. Tests were conducted on guinea pigs by centrifugation and by repeated rotations around a vertical axis passing through the center of the cranium. For the first case, no injurious effects were found; in the second case, the perturbations of the nystagmus seemed to indicate danger if the labyrinth were exposed to prolonged and repeated stimulations.
F.R.L.

A69-28593
PHYSIOLOGICAL EFFECTS OF VARIATIONS OF BODY POSITION AND THEIR CONSEQUENCES TO MOTOR ACTIVITY [EFFETS PHYSIOLOGIQUES DES VARIATIONS DE POSITION DU CORPS ET LEURS CONSEQUENCES SUR L'ACTIVITE MOTRICE].
Jacques Rozier (Bordeaux, Université, Laboratoire de Physiologie, Bordeaux, France).
IN: ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, FRENCH CONFERENCE ON ENVIRONMENTAL STUDIES, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS [ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, JOURNEES FRANÇAISES DE L'ENVIRONNEMENT, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS]. [A69-28587 13-05]
Paris, Association pour le Développement des Sciences et Techniques de l'Environnement, 1969, p. 115-135. 120 refs. In French.

Review of the role of posture in determining the physiological effects of acceleration on motor activity. The motor response follows an orientation of the head and body toward the source of stimulation. Body orientation attitudes result from a permanent tonic muscular activity which is regulated by the semicircular canals and the ocular muscles. The diminution of the oxygen partial pressure in the arterial blood is one of the most serious effects of acceleration. Cardiovascular modifications related to simple postural changes (lying to standing) are considered. Study of various experimental results indicates that the earth's gravity is a permanent stimulus, which is modulated in the course of movements, but is also one of the constants necessary for the stability of the liquid compartments of the organism and, as a result, for hemostasis.
F.R.L.

A69-28594
COMBINATION OF THERMAL FACTORS FROM THE POINT OF VIEW OF TESTING [CONJUGAISON DES FACTEURS THERMIQUES DU POINT DE VUE DE L'ESSAI].
R. Lemaire (Caen, Université, Faculté de Médecine, Caen, France) and J. M. Chaput (Société d'Etudes et d'Application de Vide Optique et Mécanique, Département SAPRATIN-ENVIRONNEMENT, Argenteuil, Val d'Oise, France).
IN: ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, FRENCH CONFERENCE ON ENVIRONMENTAL STUDIES, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS [ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, JOURNEES FRANÇAISES DE L'ENVIRONNEMENT, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS]. [A69-28587 13-05]
Paris, Association pour le Développement des Sciences et Techniques de l'Environnement, 1969, p. 221-230. In French.

Proposal of a method for developing climatic environments for physiological studies, following a brief review of the evolution of test methods proposed to study the physiological behavior of living beings, particularly with reference to the energy exchange between man and his environment. The three principal factors considered are the ambient temperature, the radiated heat, and the velocity and movement of the air. A certain number of climatic chambers currently in use make possible the combination of these different factors. It is shown that the different processes of thermal exchange have very important influences on the physiological behavior of individuals.
F.R.L.

A69-28595
THE PHYSIOLOGICAL EFFECTS OF INTERMITTENT LIGHT [LES EFFETS PHYSIOLOGIQUES DE LA LUMIERE INTERMITTENTE].
G. Perdriel (Val-de-Grâce, HIA, Paris, France).
IN: ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, FRENCH CONFERENCE ON ENVIRONMENTAL STUDIES, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS [ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, JOURNEES FRANÇAISES DE L'ENVIRONNEMENT, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS]. [A69-28587 13-05]
Paris, Association pour le Développement des Sciences et Techniques de l'Environnement, 1969, p. 251-258. In French.

Discussion of intermittent light stimulation, which occurs up to the critical frequency threshold of subjective fusion. The physiological effects involve certain visual functions (acuity, visual field) as well as the electric cortical activity. In practice, true actinic epileptic symptoms can appear in the course of helicopter flights at times of high sunshine intensity, and along roads lined with trees when the vehicle reaches a certain speed.
F.R.L.

A69-28596
BIOLOGICAL ACTION OF LOW MAGNETIC FIELD ENVIRONMENTS [ACTION BIOLOGIQUE DES AMBIANCES A FAIBLE CHAMP MAGNETIQUE].
L. Miro (Compagnie Générale d'Electricité de Paris, Centre de Recherches, Laboratoires de Marcoussis, Marcoussis, Essonne, France).
IN: ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, FRENCH CONFERENCE ON ENVIRONMENTAL STUDIES, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS [ASSOCIATION POUR LE DEVELOPPEMENT

DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, JOURNEES FRANÇAISES DE L'ENVIRONNEMENT, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS]. [A69-28587 13-05] Paris, Association pour le Développement des Sciences et Techniques de l'Environnement, 1969, p. 259-266. 9 refs. In French.

Discussion of the biological effects of low magnetic fields, one of which could be an increase in irradiation by cosmic rays in the absence of the protective geomagnetic field, while another might be the direct action of the low magnetic field environment itself. Tests are cited (physiological, visual, and psychological) which indicate no differences between experimental and control subjects, whether animal, plant, or human. Only the critical threshold of fusion was significantly disturbed. F. R. L.

A69-28597

THE ELECTROMAGNETIC ENVIRONMENT - BIOLOGICAL EFFECTS AND POSSIBLE DANGER OF RADAR ANTENNA RADIATION [L'ENVIRONNEMENT ELECTRO-MAGNETIQUE - EFFETS BIOLOGIQUES ET DANGER EVENTUEL DU RAYONNEMENT DES AERIENS-RADAR].

R. Joly (Centre d'Etudes et de Recherches de Biophysiologie Appliquée à la Marine, Toulon Naval, Var, France).

IN: ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, FRENCH CONFERENCE ON ENVIRONMENTAL STUDIES, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS [ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, JOURNEES FRANÇAISES DE L'ENVIRONNEMENT, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS]. [A69-28587 13-05] Paris, Association pour le Développement des Sciences et Techniques de l'Environnement, 1969, p. 267-278. 7 refs. In French.

Discussion of results of numerous American, Russian, and French studies, which show that radar antenna radiations have an effect on man and biological material. These effects are related to an appreciable absorption of the radiated energy and depend on the emission characteristics (wavelength, peak power, mean power, etc.). It is therefore desirable to keep personnel informed of the hazard and protect them against it, since its magnitude is constantly increasing. F. R. L.

A69-28598

PROBLEMS OF VENTILATION MECHANICS UNDER HIGH-PRESSURE CONDITIONS [PROBLEMES DE MECANIQUE VENTILATOIRE EN HYPERBARIE].

J. Corriol (Aix Marseille, Université, Laboratoire de Physiologie, Marseille, France).

IN: ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, FRENCH CONFERENCE ON ENVIRONMENTAL STUDIES, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS [ASSOCIATION POUR LE DEVELOPPEMENT DES SCIENCES ET TECHNIQUES DE L'ENVIRONNEMENT, JOURNEES FRANÇAISES DE L'ENVIRONNEMENT, ECOLE NATIONALE SUPERIEURE DE L'AERONAUTIQUE, PARIS, FRANCE, MARCH 31-APRIL 1, 1969, PROCEEDINGS]. [A69-28587 13-05] Paris, Association pour le Développement des Sciences et Techniques de l'Environnement, 1969, p. 397-409. In French.

Discussion of the mechanics of lung ventilation under conditions of deep diving. The factors affecting respiration in a hyperbaric environment during deep diving are examined. Special attention is given to the biological necessity of equal-pressure respiration and to respiratory constraints. Z. W.

A69-28611 #

PROBLEMS OF THE SCIENTIFIC DEVELOPMENT OF A MOTOR ACTIVITY PROGRAM AS AN IMPORTANT BASIS FOR THE PSYCHOPHYSIOLOGICAL TRAINING OF AN ASTRONAUT [ZADACHI NAUCHNOI RAZRABOTKI DVIGATEL'NOGO REZHIMA KAK VAZHNOI OSNOVY PSIKHOFIZIOLOGICHESKOI PODGOTOVKI KOSMONAVTA].

A. V. Korobkov.

Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 3-9. In Russian.

Survey of the physical training requirements in preparing astronauts for the environmental rigors and novel work tasks expected during space flights. Numerous works available in the literature concerned with this problem are reviewed, and an attempt is made to define a systematic training program. The optimal level of physical preparedness is described, and distinctions are made between preflight training and sustained in-flight physical training. T. M.

A69-28612 #

A YEAR-LONG MEDICAL-TECHNOLOGICAL EXPERIMENT IN A GROUND-BASED LIFE-SUPPORT SYSTEM FACILITY [GODOVOI MEDIKO-TEKHNICHESKII EKSPERIMENT V NAZEMNOM KOMPLEKSE SISTEM ZHIZNEOBESPECHENIIA].

A. I. Burnazian, V. V. Parii, Iu. G. Nefedov, B. A. Adamovich, S. B. Maksimov, B. L. Gol'dshvend, N. M. Samsonov, and G. N. Kirikov.

Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 9-19. 6 refs. In Russian.

Description of the facilities, program, and results of a year-long experiment involving the sustained confinement of three human subjects (physician, biologist, and technician) in a closed life-support system. The purpose of the program was to determine the possibility of long-term (one year) habitation of humans isolated in a limited space and sustained by regenerated water and oxygen, and by dehydrated food. The mutual effects of the humans and the systems were studied along with changes occurring in the living environment. Methods of medical control and testing were evaluated, and engineering data were obtained relative to the design of life-support systems. T. M.

A69-28613 #

PROBLEMS OF SPACE PHARMACOLOGY [PROBLEMY KOSMICHESKOI FARMAKOLOGII].

V. V. Parin, V. M. Vinogradov, and A. N. Razumeev.

Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 20-32. 25 refs. In Russian.

Survey of problems facing the field of pharmacology in view of future manned long-term space flights, and description of some available medicines for treatment of specific flight-induced effects. Pharmacological media and medical procedures are described which can be used (1) during preflight training of astronauts, (2) to counteract the effects of takeoff and landing, and (3) during long-term free flight in space. T. M.

A69-28614 #

CIRCADIAN RHYTHMS AND THEIR SIGNIFICANCE FOR SPACE BIOLOGY AND MEDICINE [TSIRKADNYE RITMY I IKH ZNACHENIE DLIA KOSMICHESKOI BIOLOGII I MEDITSINY].

G. K. Mikushkin.

Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 32-39. 44 refs. In Russian.

Description of the characteristic features of circadian rhythms in plants, animals, and humans, and survey of the possible problems resulting from them during space flights. The role of diurnal rhythms in the physiological processes of living organisms is evaluated in terms of the effects which result when they are disturbed. Results of previous studies available in the literature are reviewed. It is suggested that the individual's ability to adapt to changes in the circadian rhythm should be used as a criterion for selecting astronaut candidates. T. M.

A69-28615 #

HYPOTHALAMIC NEUROSECRETION AND THE STATE OF ADRENAL GLANDS IN RATS UNDER HIGH-ALTITUDE CONDITIONS [GIPOTALAMICHESKAIA NEIROSEKRETSIIA I SOSTOIANIE NADPOCHECHNIKOV KRYS V USLOVIIAKH VYSOKOGOR'IA].

E. S. Gul'iants and V. I. Gonikman.

Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 40-45. 16 refs. In Russian.

Results of an experimental study of hypothalamic neurosecretion and of adrenal glands in 42 male rats subjected for different lengths

of time (one week; one, two, and six months; and one year) to high-altitude conditions. The test environment was equivalent to 3,500 m above sea level; the atmospheric pressure was 480 mm Hg, and oxygen partial pressure was 15.5 vol %. Specific effects induced by each period of exposure to the high-altitude environment are described. Changes in the diameters of neurons in the supraoptical nucleus hypothalamicus are tabulated. T. M.

A69-28616 #
CHANGES IN THE TRANSVERSOSTRIATED MUSCLE FIBERS OF MICE WITH RESTRICTED MOTOR ACTIVITY [IZMENENIIA POPERECHNOPOLOSATOGO MYSHECHNOGO VOLOKNA PRI OGRANICHENII DVIGATEL'NOI AKTIVNOSTI *MYSHEI*].
V. V. Portugalov and K. D. Rokhlenko.
Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 45-52. 26 refs. In Russian.

Electron microscopic study of the submicroscopic structures of the musculus quadricepts femoris in a group of 5 mice subjected to 15-day hypokinesis in small containers. The changes in the myofibrillar apparatus, mitochondria, and sarcoplasm of the muscle fibers, developed by the mice, are discussed. More conspicuous among these changes were the excessive development and multiplication of mitochondria which had unusual shapes and showed other morphological deviations. These changes are interpreted as a reaction of the organism to the myatrophic effects of hypokinesia and are believed to be reversible. V. Z.

A69-28617 #
EFFECT OF PROLONGED FIXATION ON CERTAIN FUNCTIONS OF AN ANIMAL ORGANISM [VLIIANIE DLITEL'NOI FIKSATSII ZHIVOTNOGO NA NEKOTORYE FUNKTSII EGO ORGANIZMA].
A. B. Kogan.
Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 52-54. In Russian.

Discussion of the electroencephalograms of a group of three cats kept immobilized in special stands for a period of up to 30 days. The depression of the α-rhythm in response to the sound of a syren was found to be reduced in all the cats during and after the test period. Also sharply decreased were the visual alimentary motor reflexes of the cats. A study of the footprints of the cats on a special track after the experiment indicated a disturbed coordination of locomotor activity. It is concluded that prolonged fixation could cause considerable changes in the cardiac and nervous activities of animals. V. Z.

A69-28618 #
CHANGES IN THE CALCIUM METABOLISM OF RATS UNDER CONDITIONS OF HYPOKINESIS [IZMENENIE KAL'TSIEVOGO OBMENA U KRYS V USLOVIIAKH GIPOKINEZII].
B. B. Egorov, V. I. Lobachik, and L. N. Kleimenova.
Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 55-58. 7 refs. In Russian.

Study of the migration of the Ca^{45} tracer in the organisms of a total of 250 white male rats kept for periods of 30 or 60 days in special cages restricting their motion in all directions. The tracer was injected intraperitoneally in the form of $CaCl_2$ after these periods. Its contents in the epiphysis and diaphysis femuris of the rats were determined 0.5, 1, 3, 6, 12 hr and 1, 2, 5, and 10 days after the injection. In all experimental rats, the migration of Ca^{45} into the bone tissues was substantially lower than in control rats. V. Z.

A69-28619 #
POSSIBILITY OF USING SWEET POTATOES AS THE BASIC SOURCE OF CARBOHYDRATES IN THE DIET OF MAN DURING A SPACE FLIGHT [O VOZMOZHNOSTI ISPOL'ZOVANIIA BATATA V KACHESTVE OSNOVNOGO ISTOCHNIKA UGLEVODOV V PITANII CHELOVEKA VO VREMIA KOSMICHESKOGO POLETA].
V. P. Dadykin and T. I. Nikishanova.
Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 59-63. 11 refs. In Russian.

Study of the productivity and nutritive value of sweet potatoes (Ipomoea batatis) as a possible source of carbohydrates in the life-support systems of manned space flights. Satisfactory tuber mass yields were obtained when stalks of ten species of sweet potatoes were grown under open hydroponic conditions on tuff-gravel substrates with nutrient solutions of N, P, K, Ca, Mg, and S in natural light. It is noted, however, that the quality of tubers grown under hydroponic conditions was inferior to that of tubers obtained in field experiments, in terms of dry mass and carbohydrate content. Further experiments in improving the yield and quality of hydroponic sweet potato tubers are urged. V. Z.

A69-28620 #
OBTAINING A CHLORELLA BIOMASS WITH AN ENHANCED CONTENT OF SULPHUR-CONTAINING AMINO ACIDS AND ITS NUTRITIVE VALUE [POLUCHENIE BIOMASSY KHLORELLY S POVYSHENNYM SODERZHANIEM SERUSODERZHASHCHIKH AMINOKISLOT I EE PISHCHEVAIA TSENNOST'].
N. N. Verzilin, V. V. Pinevich, E. V. Kozlova, I. E. Kamchalova, K. V. Kvitko, I. A. Abakumova, and Iu. I. Kondrat'ev.
Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 63-67. 7 refs. In Russian.

Description of pilot experiments in growing several Chlorella seaweed hybrid strains containing substantially larger amounts of methionine and cysteine than the original parent species. The biomass yields and nutritive properties, and the methionine and cycteine contents in several generations of these strains are studied. Positive results were obtained with rats for the nutritive values of the biomass of these strains. It is concluded that later generations of Chlorella hybrid strains partially retain the higher methionine and cysteine contents of their parent species and can be effectively grown in the production of nutrient biomass on a large scale. V. Z.

A69-28621 #
BACTERICIDAL EFFECT OF SILVER-COATED ACTIVATED CARBONS AND ION-EXCHANGE RESINS [O BAKTERITSIDNOM DEISTVII POSEREBRENNYKH AKTIVIROVANNYKH UGLEI I IONOOBMENNYKH SMOL].
S. V. Chizhov, V. V. Shaidorova, Iu. G. Gel'tser, and V. V. Krasnoshchekov.
Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 68-71. 13 refs. In Russian.

Investigation of the bactericidal action of activated carbons (AG-5, SKT-2, and AR-3) and ion-exchange resins as a function of the silver-coating technique employed. The most effective technique, is found to be the reduction of Ag^+ ions at the surface of the activated carbons with the aid of formaldehyde and potassium sodium tartrate solutions. V. P.

A69-28622 #
DECOMPRESSION PROBLEMS IN SPACE MEDICINE [PROBLEMY DEKOMPRESSII V KOSMICHESKOI MEDITSINE].
I. M. Khazen.
Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 72-79. 52 refs. In Russian.

Discussion of comparative and physiological investigations performed with various test animals with the aim of studying the part played by the autonomic nervous system in the mechanisms which control the body functions after exposure to rapid decompression. Typical changes in the lungs, which were essentially a morphological expression of acute hemodynamic changes in the pulmonary circulation, were eliminated by means of atropine and histamine. An extremely negative effect was produced by adrenalin. It is found that tolerance to pressure gradients can be increased by physical training. Swimming was found to stimulate the regulatory systems which control the muscular tone of the lungs. Four to six weeks training at a gradually increasing but moderate schedule helped to develop reflex, neurohumoral, neuroendocrine and similar protective mechanisms. Approaches to further studies of the regulatory mechanisms and compensatory functions of organisms exposed to rapid decompression are indicated. V. P.

A69-28623 #
INFLUENCE OF HIGH-ALTITUDE MOUNTAIN ACCLIMATIZATION ON THE TOLERANCE OF THE ORGANISM TO ENVIRONMENTAL EFFECTS [VLIIANIE VYSOKOGORNOI AKKLIMATIZATSII NA USTOICHIVOST' ORGANIZMA K VOZDEISTVIIU FAKTOROV VNESHNEI SREDY].
P. I. Egorov, N. A. Agadzhanian, M. M. Korotaev, V. P. Baranova, T. V. Benevolenskaia, O. I. Boikova, V. K. Vasil'ev, A. F. Zavadovskii, M. P. Kuz'min, M. B. Reutova, N. I. Tsyganova, and I. Ia. Iakovleva.
Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 80-84. 6 refs. In Russian.

Investigation of the functional condition of human subjects during a three-month stay at altitudes between 3300 and 4100 m above sea level, dealing in particular with the cardiovascular system, the external respiration, morphological and chemical analysis of the blood, and optical and vestibular analysors. During the stay, the test subjects were subjected to accelerations, hypoxia, and physical and thermal stresses. It was found that a month-long exposure to these conditions had the effect of increasing the total resistance of the organism. Inclusion of mountain excursions into space training programs is suggested. V.P.

A69-28624 #
CHARACTERISTICS OF THE METABOLISM OF HUMANS SUSTAINED ON DEHYDRATED-FOOD DIETS FOR 120 DAYS [OSOBENNOSTI OBMENA VESHCHESTV U CHELOVEKA PRI PITANII RATSIONOM IZ OBEZVOZHENNYKH PRODUKTOV V TECHENIE 120 SUTOK].
V. P. Bychkov.
Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 84-89. 14 refs. In Russian.

Discussion of an experimental investigation in which six test subjects were kept for 120 days on a 3105-cal diet consisting of dehydrated products, but whose normal way of life was not influenced otherwise. It was found that the changes observed in the metabolism during the first two months gradually returned to normal and complete adaptation set in after three or four months. V.P.

A69-28625 #
INFLUENCE OF HYPOKINESIA, OVERLOADS, AND NUTRITION DEFICIENCY ON THE HUMAN BLOOD COAGULATION SYSTEM [VLIIANIE GIPOKINEZII, PEREGRUZOK I PONIZHENNOGO PITANIIA NA SOSTOIANIE SVERTYVAIUSHCHEI SISTEMY KROVI CHELOVEKA].
O. D. Anashkin.
Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 89-94. 22 refs. In Russian.

Investigation of the influence of hypokinesia plus nutrition deficiency and of hypokinesia in combination with nutrition deficiency and accelerations on the functioning of the human blood coagulation system. It is found that hypokinesia and nutrition deficiency (2700 kcal/day) have practically no effect on the coagulation system, while in combination with accelerations, the changes produced in the coagulation system can lead to hypocoagulation. V.P.

A69-28626 #
BLOOD CIRCULATION IN THE CEREBRAL AND SURFACE VESSELS OF THE HUMAN HEAD UNDER THE ACTION OF ACCELERATIONS [KROVOOBRASHCHENIE V TSEREBRAL'NYKH I POVERKHNOSTNYKH SOSUDAKH GOLOVY CHELOVEKA PRI DEISTVII USKORENII].
A. S. Barer and V. B. Zubavin.
Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 95-98. 15 refs. In Russian.

Investigation of the blood circulation in the cerebral and surface vessels of the human head during exposure to accelerations ranging from 2 to 18 g, by rheoencephalographic and photoplethysmographic techniques. It is shown that hyperemia of the brain depends primarily on the acceleration component in the pelvis to head direction. V.P.

A69-28627 #
GAS CHROMATOGRAPHIC DETERMINATION OF VOLATILE OXYGEN-CONTAINING COMPOUNDS IN LIQUID BIOLOGICAL MEDIA [GAZOKHROMATOGRAFICHESKOE OPREDELENIE LETUCHIKH KISLORODSODERZHASHCHIKH VESHCHESTV V ZHIDKIKH BIOLOGICHESKIKH SREDAKH].
Iu. V. Pepeliaev, L. N. Stepanov, and A. P. Tereshchenko.
Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 99-104. In Russian.

Development of a gas chromatographic method for the quantitative analysis of acetaldehyde, propionic aldehyde, acetone, methanol, isopropanol, ethanol, propanol, and isobutanol in liquid biological media. The method is based on sampling the gas-vapor phase at the surface of the liquid. The optimum conditions for this sampling, the introduction of the samples into a chromatograph, and chromatographic separation are determined. V.P.

A69-28628 #
INFLUENCE OF THE COMBINED EFFECT OF HYPOXIC HYPOXIA AND HIGH AMBIENT TEMPERATURE ON HUMAN HEAT EXCHANGE [VLIIANIE ODNOVREMENNOGO VOZDEISTVIIA GIPOKSICHESKOI GIPOKSII I VYSOKOI TEMPERATURY OKRUZHAIUSHCHEI SREDY NA TEPLOOBMEN CHELOVEKA].
A. N. Azhaev.
Kosmicheskaia Biologiia i Meditsina, vol. 3, Jan.-Feb. 1969, p. 104-106. 5 refs. In Russian.

Experimental investigation showing that at high ambient temperatures rarefied air has the effect of relieving the strain on human beings by increasing the heat release by evaporation. An increased heat release by evaporation leads to lesser overheating, thereby keeping the thermogenesis at a lower level. It appears that hypoxia also tends to reduce the thermogenesis. V.P.

A69-28636 #
SELECTION AND PHYSICAL TRAINING OF ASTRONAUTS [SELEKCJA I TRENING FIZYCZNY KOSMONAUTÓW].
Henryk Sulajnis.
Astronautyka, vol. 12, no. 1, 1969, p. 23-30. In Polish.

Description of the methods of selection and training of astronauts in the U.S. and the Soviet Union. Topics discussed include methods of selection, gymnastics, parachute training, and training in simulators of acceleration, weightlessness, and prolonged inactivity. Z.W.

A69-28660 #
ON ESTIMATING NOISINESS OF AIRCRAFT SOUNDS.
Robert W. Young (U.S. Naval Undersea Research and Development Center, San Diego, Calif.) and Arnold Peterson (General Radio Co., West Concord, Mass.).
Acoustical Society of America, Journal, vol. 45, Apr. 1969, p. 834-838. 17 refs.

Results of previous judgment tests on the noisiness of aircraft sounds have been analyzed collectively to find the relative precision with which the judgments are explained by calculated perceived noise level, calculated loudness level, and sound levels A, B, C, and D. For consistency, all levels have been recalculated, in accordance with current rules, from published noise spectra. Application of standard statistical procedures to the available data indicates that differences among the first three levels and the sixth, in their correlation with judged noisiness, are not statistically significant; only the B and C levels are clearly inferior as predictors of noisiness. A new weighting derived simply from two cascaded RC circuits, with corner frequencies at 2 and 8 kHz, leads to levels of better precision than any of the others, but adoption of this new weighting is not proposed without further study. Since sound level A predicted the judged noisiness of the aircraft sounds as precisely as did calculated loudness level or perceived noise level, this readily measured sound level may well be applied to the rating of aircraft noise along with other noises in the community. (Author)

A69-28745
CONTROL PROCESSES IN THE RESPIRATORY SYSTEM.
N. V. Zavalishin and L. A. Tenenbaum.
(Avtomatika i Telemekhanika, Sept. 1968, p. 106-122.)
Automation and Remote Control, Sept. 1968, p. 1456-1470. 5 refs.
Translation.
[For abstract see issue 01, page 19, Accession no. A69-10209]

A69-28870 *
CIRCADIAN RHYTHM OF OPTIC NERVE IMPULSES RECORDED IN DARKNESS FROM ISOLATED EYE OF APLYSIA.
Jon W. Jacklet (New York, State University, Dept. of Biological Sciences, Albany, N.Y.).
Science, vol. 164, May 2, 1969, p. 562, 563. 10 refs.
NIH Grant No. NB 07071-02; Grant No. NGR-05-002-031.
The isolated eye of the sea hare Aplysia californica shows a circadian rhythm of optic nerve impulses when kept in total darkness. Peak activity on the first day of isolation occurs during the projected "dawn" of the light-dark cycle to which the whole animal had previously been entrained. Eyes from animals previously exposed to constant light show a free-running rhythm. This simple photoreceptor provides a quantized output with an ideal control (the other eye) for studies on rhythms. (Author)

A69-28871 *
FISSIONING IN PLANARIANS - CONTROL BY THE BRAIN.
J. B. Best, A. B. Goodman, and A. Pigon (Colorado State University, Dept. of Physiology and Biophysics, Fort Collins, Colo.).
Science, vol. 164, May 2, 1969, p. 565, 566. 10 refs.
PHS Grant No. MH 07603; Grant No. NsG-625.
Reduced population densities lead to increased rates of fissioning in planarians whereas higher population densities suppress fissioning. This effect is not primarily due to mucus deposition or substances secreted into the water. Experiments are presented which show a system of population feedback control. In the presence of other planarians, the brain exerts an influence (probably neurohormonal) to suppress fissioning. This influence becomes attenuated with axial distance from the brain. (Author)

A69-28872
DDT RESIDUES ABSORBED FROM ORGANIC DETRITUS BY FIDDLER CRABS.
W. E. Odum (Miami, University, Institute of Marine Sciences, Miami, Fla.), G. M. Woodwell (Brookhaven National Laboratory, Biology Dept., Upton, N.Y.), and C. F. Wurster (New York, State University, Dept. of Biological Sciences, Stony Brook, N.Y.).
Science, vol. 164, May 2, 1969, p. 576, 577. 15 refs.
AEC-sponsored research.
DDT and its metabolites accumulate in organic plant detritus within estuaries and may persist there for many years. The residues appear to be most abundantly associated with particulates having diameters from 250 to 1000 μ. Detritus particles of this size are ingested by many organisms, and associated DDT residues may enter diverse food chains. Fiddler crabs Uca pugnax were fed natural detritus containing DDT residues (10 parts per million) during an 11-day experiment and showed grossly modified behavior associated with a threefold increase in concentration of DDT residues in the muscle of the large claw. (Author)

A69-28915 #
QUANTITATIVE LAWS OF THE POSTIRRADIATION RECOVERY OF YEAST CELLS AFTER EXPOSURE TO HEAVY HIGH-ENERGY C^{12} IONS [KOLICHESTVENNYE ZAKONOMERNOSTI POSTRADIATSIONNOGO VOSSTANOVLENIIA DROZHZHEVYKH KLETOK PRI DEISTVII VYSOKOENERGETICHNYKH TIAZHELYKH IONOV C_{12}].
V. N. Benevolenskii, Iu. G. Grigor'ev, E. I. Kudriashov, A. M. Marennyi, V. I. Popov, and N. I. Ryzhov (Institut Mediko-Biologicheskikh Problem, Moscow, USSR).
Akademiia Nauk SSSR, Doklady, vol. 185, Mar. 11, 1969, p. 452-455. 9 refs. In Russian.
Study of the radiation damage in diploid Saccharomyces vini cells after exposure to 400-rad/sec doses of radiation from high-energy C^{12} ions produced by a U-300 multicharge ion accelerator. The ten-day-old yeast cells were cultured on a molasses-agar substrate, and the radiation damage was evaluated by observation of the survival rates in irradiated cells kept successively in distilled water at 30°C and in a nutrient medium for 24 hr at 30°C. The dynamics of the postirradiation recovery of the cells is discussed. V. Z.

A69-28916 #
OXYGEN SATURATION OF OUTGOING RENAL BLOOD UNDER NORMAL AND HYPOXIC CONDITIONS [KISLORODNOE NASYSHCHENIE KROVI, OTTEKAIUSHCHEI OT POCHKI, V NORMAL'NYKH I GIPOKSICHESKIKH USLOVIIAKH].
V. I. Voitkevich (Akademiia Nauk SSSR, Institut Fiziologii, Moscow, USSR).
Akademiia Nauk SSSR, Doklady, vol. 185, Mar. 11, 1969, p. 472-474. 9 refs. In Russian.
Study of the oxygen content in the outflowing and inflowing renal blood of a group of 18 dogs kept for 4 hr in a normal atmosphere, and in nitrogen with 6.5 and 10% O_2 at atmospheric pressure. High oxygen saturation levels in both types of blood are noted under these experimental conditions. The effectiveness of a "chronic" implanted cannula technique used in the study is assessed positively. V. Z.

A69-29097
BIOLOGICAL EXPERIMENTS IN SPACE.
Richard S. Young.
Space Science Reviews, vol. 8, Dec. 1968, p. 665-689. 29 refs.
Effects of weightlessness, increased gravitational fields, and radiation on biological systems at the organismal, cellular and subcellular levels. Biosatellite experiments are reported in detail. Studies of the hazards of space flight from the point of view of manned flight are also reported. B. H.

A69-29151
SONIC BOOM - RESULTS OF LABORATORY AND FIELD STUDIES.
Karl D. Kryter (Stanford Research Institute, Menlo Park, Calif.).
IN: NOISE AS A PUBLIC HEALTH HAZARD; AMERICAN SPEECH AND HEARING ASSOCIATION, CONFERENCE, WASHINGTON, D. C., JUNE 13, 14, 1968, PROCEEDINGS. [A69-29149 14-34]
Edited by W. D. Ward and J. E. Fricke.
Washington, D. C., American Speech and Hearing Association (ASHA Reports, No. 4), 1969, p. 208-227. 33 refs.
Acoustical, psychological, sociological, and political aspects of sonic boom. The nature of the boom as an auditory stimulus is discussed, and a field study of human reaction to sonic booms and aircraft noise is presented. Laboratory, field, and "real-life" experiments on the effects of sonic booms are reviewed, and the implications of this research for the operation of the SST over populated areas are considered. The estimated median boom intensities of possible overland SST operations of Boeing and Concorde are tabulated. B. H.

A69-29152 *
LABORATORY STUDIES ON THE EFFECTS OF DURATION AND SPECTRAL COMPLEXITY ON SUBJECTIVE RATINGS OF NOISE.
Karl S. Pearsons (Bolt, Beranek and Newman, Inc., Van Nuys, Calif.).
IN: NOISE AS A PUBLIC HEALTH HAZARD; AMERICAN SPEECH AND HEARING ASSOCIATION, CONFERENCE, WASHINGTON, D. C., JUNE 13, 14, 1968, PROCEEDINGS. [A69-29149 14-34]

Edited by W. D. Ward and J. E. Fricke.
Washington, D. C., American Speech and Hearing Association (ASHA Reports, No. 4), 1969, p. 228-237. 9 refs.
NASA-FAA-supported research.

Tests to investigate the magnitude of duration effect (Kryter and Pearsons, 1963, 1964). Pairs of sounds with different durations were presented to groups of subjects, who were asked which pair was more disturbing. By varying the levels of the sound, the tradeoff between duration and level was determined. The range of duration tested initially was from 1.5 to 12 sec. The sound stimuli for the test included two broadband spectra, a 1/3-octave band of noise and a helicopter recording. The results indicated a 4.5-dB-per doubling tradeoff. Additional tests for time ranges extended to 64 sec were conducted, using a 1000 Hz pure tone, a 1000 Hz 1/3-octave band of noise, and a broadband noise. B. H.

A69-29290
FUNCTION OF THE BIRD RESPIRATOR AT HIGH ALTITUDE.
Robert R. Kirby, Anthony J. DiGiovanni (USAF, Wilford Hall Hospital, Lackland AFB, Tex.), Richard W. Bancroft, and Robert G. McIver (USAF, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 40, May 1969, p. 463-469. 6 refs.

Utilizing a lung analog and six anesthetized dogs, the function of the Bird Mark VIII respirator was studied at simulated altitudes up to 34,000 ft. Tidal volume, respirator rate, minute ventilation, Pa_{O_2} Pa_{CO_2}, and pHa were measured and found to be acceptable under the conditions studied. It is concluded that in the event of a rapid decompression a patient who is totally dependent on this respirator for his ventilation will be supported adequately until a lower altitude can be reached. Recommendations regarding procedures to be carried out in the event of a high-altitude decompression are discussed. (Author)

A69-29291
EFFECT OF SODIUM FLUORIDE AND AMOX (NF_3O) ON GROWTH AND THYROID FUNCTION IN THE RAT.
Ethard W. Van Stee (USAF, Aerospace Medical Research Laboratories, Toxic Hazards Div., Wright-Patterson AFB, Ohio).
Aerospace Medicine, vol. 40, May 1969, p. 470-475. 19 refs.

Intact and thyroidectomized growing rats were treated daily for 60 days with thyroxine, potassium iodide, sodium fluoride, or NF_3O, an oxidizing substance. Results indicated that treatment with NaF or NF_3O at doses which were molar equivalents with respect to fluoride to a thyrotoxic dose of iodide had no effect on thyroid function measured by growth rate, ^{131}I-uptake, and adrenal weight. A sparing effect of thyroid on NF_3O toxicity was suggested. (Author)

A69-29292
RAPID DECOMPRESSION AND RECOMPRESSION IN THE STAPEDECTOMIZED CAT.
J. C. Garlington and G. T. Singleton (Florida, University, School of Medicine, Gainesville, Fla.).
Aerospace Medicine, vol. 40, May 1969, p. 475-478. 11 refs.
NIH Grants No. NB-2B-5385-04; No. NB-03451-04.

The effects of sudden decompression and recompression on the normal and the stapedectomized cat ear were observed. The normal ear tolerated the decompression-recompression cycle without damage. Stapedectomy reconstructions utilizing wire-fat and wire-gelfoam withstood the decompression-recompression cycle without damage. Stapedectomy reconstructions utilizing polyethylene struts on gelfoam were accompanied by a marked fibrous tissue response in the middle ear. Because of this fibrous fixation, it cannot be determined how the nonattached polyethylene strut would respond to a decompression-recompression cycle. (Author)

A69-29293
HEART RATE AND RESPIRATORY RESPONSE CORRELATIONS IN SURFACE AND UNDERWATER WORK.
Gershon Weltman and Glen H. Egstrom (California, University, Biotechnology Laboratory and Performance Physiology Laboratory, Los Angeles, Calif.).
Aerospace Medicine, vol. 40, May 1969, p. 479-483. 11 refs.
Contract No. N 00014-67-A-011-0007.

An exercise test battery composed of surface bicycling, surface and underwater weight lifting, surface and underwater block moving, and underwater pipe structure assembly was administered to two seven-man groups of divers. High rank-correlations were observed between levels of heart rate and inspiratory minute volume exhibited in various surface tests and the levels of these variables exhibited in strenuous underwater activity. A high degree of concordance was also observed among heart rate, inspiratory minute volume, and respiratory rate over the range of surface and underwater tests. Using the heart rate and respiratory volume measures, it was possible to order, with respect to imposed work load, tasks of known and unknown physical requirements. The main implications were that it is feasible to estimate underwater work capacity through surface tests and that basic physiological measurements, particularly heart rate, taken during diving operations can permit reasonable estimations of imposed work load. (Author)

A69-29294
PERSONALITY CHARACTERISTICS OF JET PILOTS AS MEASURED BY THE EDWARDS PERSONAL PREFERENCE SCHEDULE.
G. E. Fry and R. F. Reinhardt (U. S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.).
Aerospace Medicine, vol. 40, May 1969, p. 484-486.

As part of a larger study, the Edwards Personal Preference Schedule (EPPS) was administered to 288 Navy jet pilots who were entering advanced operational training. The EPPS was administered over the course of one year to essentially all pilots reporting to four Carrier Replacement Air Wing squadrons. Certain pertinent characteristics of the sample population are described. The sample group was found to be significantly different on almost all scales from both the Edwards' General Adult Male and College Male norms. A percentile norms table has been constructed from the actual raw score distributions and is presented. Certain implications and limitations of the findings are discussed. (Author)

A69-29295
EVALUATING BODY COMPOSITION.
George E. Kandel (USAF, School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 40, May 1969, p. 486-490. 8 refs.

The body composition of 60 USAF flying personnel was determined using the radioactive potassium (K-40) method. By comparing these results with relative weight, it was shown that the height-weight tables in Air Force Manual 160-1 are not reliable in the assessment of obesity. Body fat was determined by use of the triceps skinfold thickness, Von Doebeln's anthropometric method, Crook's overweight formula, and a composite of triceps skinfold thickness and Von Doebeln's methods. By comparing these results with the K-40 results it was shown that these methods are no better than height-weight in the assessment of obesity. (Author)

A69-29296
EFFECT OF ISOLATION ON BLOOD PRESSURE, BEHAVIOR AND RESPONSE TO EPINEPHRINE IN THE RAT.
R. T. Houlihan and R. G. Delaney (Pennsylvania State University, Dept. of Biology, University Park, Pa.).
Aerospace Medicine, vol. 40, May 1969, p. 491-495. 10 refs.
Research supported by the Pennsylvania State University; PHS Grant No. AM-06323; Contract No. NR-102-654.

The effect of isolation on blood pressure, pulse pressure, heart rate, and behavior were studied. Rats deprived of social and visual contact with other rats for as little as 15 weeks exhibited pronounced

nervousness and aggressiveness. These responses are associated with cardiovascular changes which result in an increased blood pressure, pulse pressure, and extreme oscillation in blood pressure during recording periods. This deprivation also results in a prolonged response to exogenous injected epinephrine. While the effects noted do not reflect long-term changes in cardiovascular activity, they do imply that isolation is an additional variable to be considered while making these measurements. It might be easier to keep one animal in a cage but the effect will modify the results. (Author)

A69-29297
EFFECT OF HYPOXIC HYPOXIA ON THE CATECHOLAMINE CONTENT AND SOME CYTOCHEMICAL CHANGES IN THE HYPOTHALAMUS OF THE CAT.
R. Debijadji, L. Perović, V. Varagić, and N. Stosić (Institute of Aviation Medicine, Zemun, Yugoslavia).
(International Academy of Aviation and Space Medicine, International Congress of Aviation and Space Medicine, 17th, Oslo, Norway, Aug. 5-8, 1968.)
Aerospace Medicine, vol. 40, May 1969, p. 495-499. 14 refs.
Research supported by KOMNIS.

The object of the investigation was to show the mode in which hypoxia of a high degree acts on the stores of catecholamines in the central nervous system. The authors exposed the cats to simulated altitude (8500 to 9500 m) in duration of 24 hr. Extraction and fluorimetric determination of catecholamines in the hypothalamus were done by the method of Euler and Lishajko (1959, 1961). Hypoxia in the decompression chamber was found to produce a significant depletion of catecholamines from the cat hypothalamus. The replenishment of the depleted stores was found to be slow. It approaches the control values on the sixth day after the exposure to height, but does not reach them even on the tenth day. In this respect the effect of hypoxia resembles that of reserpine. The effect of catecholamine precursors (L-DOPA and l-tyrosine) on the replenishment of the depleted stores of catecholamine in the hypothalamus was also studied. Cytochemical changes in the hypothalamic nuclei were found to occur parallel with the changes in hypothalamic catecholamine stores. (Author)

A69-29298
HISTOCHEMICAL STUDIES IN PULMONARY OXYGEN TOXICITY.
Raj K. Gupta, Peter M. Winter, and Edward H. Lanphier (New York, State University, School of Medicine; Veterans Administration Hospital, Buffalo, N.Y.).
Aerospace Medicine, vol. 40, May 1969, p. 500-504. 14 refs.
PHS Grants No. HE-06848-05; No. 5-TOl-GM-1273-03; Contract No. Nonr-969(03).

The importance of an extrapulmonary factor, dependent on arterial rather than alveolar oxygen tensions, in the development of pulmonary oxygen toxicity has been reported in a previous study. Dogs with surgically produced venous admixture of 50 to 55% of cardiac output were shown to be significantly protected against pulmonary oxygen poisoning. Histochemical quantification of damage reveals that it is not possible to separate observed pathology into a direct component dependent on alveolar gas pressures and indirect effects dependent on arterial tensions. The nature of damage to reticulin and elastic tissue and the development of hyaline membranes is discussed. (Author)

A69-29299
HISTOLOGIC CHANGES IN RAT SKIN AFTER 13 MEV PROTON IRRADIATION.
John E. Prince, Donald K. Hinkle, and Harold W. Casey (USAF, School of Aerospace Medicine, Brooks AFB, Tex.).
(Aerospace Medical Association, Annual Meeting, 38th, Washington, D.C., Apr. 10-13, 1967.)
Aerospace Medicine, vol. 40, May 1969, p. 504-508. 13 refs.
Contract No. AF 41(609)-2685.

Six levels of 13-Mev proton radiation, 200 to 2500 rads, were given 46 350-g Sprague-Dawley rats. Animals were exposed by "ferris-wheel" rotation around a cylindrical source parallel to the vertebral column. Each animal was biopsied five times at regular intervals beginning one week postirradiation and continuing for 19 weeks. Skin biopsies of the sixteenth week were evaluated in tissue culture. Acute changes were seen 1 to 3 weeks at 1300 rads or more. Chronic skin changes were most severe at the 2000 and 2500 rad levels and extended with decreasing severity to the 1300 rad group. In culture the biopsied skin from irradiated groups was less active in producing monolayers than skin biopsies from control rats. Subsequently, 26 of 34 irradiated rats developed skin neoplasms during a 21-month postirradiation observation period. (Author)

A69-29300 *
OPTOKINETIC REFLEX RESPONSES TO CROSS-COUPLED GYROSCOPIC STIMULI.
Bernard D. Newsom, James F. Brady, and Thomas W. O'Laughlin (General Dynamics Corp., Convair Div., Life Sciences Laboratory, San Diego, Calif.).
Aerospace Medicine, vol. 40, May 1969, p. 509-517. 21 refs.
Contract No. NAS 9-5232.

Applicability of vestibular studies performed on earth to the situation of a rotating spacecraft where motions of the head about the Z (spinal) axis are perpendicular to the plane of spin and cause maximum labyrinthine Coriolis accelerations has been questioned. In earth simulators, the Z axes of subjects are oriented at 90° to the spin plane, resulting in head turns nearly in the plane of spin rather than at right angles to it, as would be the case in an artificial g space station. Previous studies indicate a significantly greater performance decrement for Z_{90^o} (interplanar angle) head turns than for Z_{0^o} head turns. Z-axis head turns, therefore, may be anticipated to cause more operational problems than suggested in the rotation-tolerance literature to date. The present experiment demonstrates an increased leading eye movement (LEM) or anti-compensatory response of the oculomotor system as orientations of increased head-turn stress (gyroscopic cross-coupling) are encountered. Whether this is due to an increase in LEM drive or to a reduction in compensatory control is equivocal, but resulting delay in visual fixation correlates directly with performance degradation and vegetative discomfort. (Author)

A69-29301 *
DECREASED ANTIDIURETIC ACTIVITY MEASURED IN THE BLOOD OF CHRONICALLY CENTRIFUGED RATS.
Howard H. Bengele, Charles C. Wunder (Iowa, University, Dept. of Physiology and Biophysics, Iowa City, Iowa), and Ward W. Moore (Indiana, University, School of Medicine, Dept. of Physiology, Indianapolis, Ind.).
Aerospace Medicine, vol. 40, May 1969, p. 518-520. 12 refs.
PHS Grants No. T 01-GM-225; No. HE-10401; No. H-06308; Grant No. NGR-16-001-031.

Exposure of rats to 1.7 G's for periods of 1 to 9 days caused significant reductions in the antidiuretic activity of material extracted from their blood. This extraction and assay is recognized as being highly specific for the antidiuretic hormone (ADH). These changes, in the presence of an increased urine output and essentially no increase in the excretion of osmotically-effective solute, implies a mechanism for the observed centrifugation polyuria that involves reduced circulating ADH levels. (Author)

A69-29302
EFFECTS OF HYPERBARIC NITROGEN AND OXYGEN ON AUDITORY EVOKED RESPONSES IN MAN.
Peter B. Bennett, Kenneth N. Ackles, and Valerie J. Cripps (Defence Research Board, Defence Research Telecommunications Establishment, Toronto, Canada).
Aerospace Medicine, vol. 40, May 1969, p. 521-525. 16 refs.

Examination of the auditory evoked response (AER) as a measure of narcosis induced at depth in diving personnel. Experimental AER data were obtained using electrodes attached to the scalps of experienced divers by computer averaging techniques. Auditory signals (clicks) at 60 dB were presented biaurally at a rate of 60 per

min for 1 or 5 min. An arithmetic performance test was given before and during compression to depths between the surface and 300 ft (10 atm abs). The subjects breathed compressed air, oxygen, oxygen-helium, and oxygen-helium-nitrogen mixtures. Compressed air caused decrements in both the AER and arithmetic efficiency which correlated with depth. Hyperbaric oxygen depressed the AER but did not affect arithmetic performance. Evidence is presented to show that nitrogen is the major cause of compressed air narcosis and that oxygen is not synergistic. It is concluded that the AER technique affords a reliable and reproducible measure of narcosis. The AER decrement with oxygen is discussed in relation to conduction deficiencies in the human brain and convulsions due to hyperbaric oxygen. (Author)

A69-29303 #
PREFERENTIAL SHIFTS IN CONSUMPTION OF METABOLIC FUELS FOLLOWING EXPOSURE TO ROCKET FUEL SUBSTANCES.
H. L. Bitter, D. A. Clark, and W. W. Lackey (USAF, School of Aerospace Medicine, Pharmacology-Biochemistry Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 40, May 1969, p. 526-531. 9 refs.

A graphic approach utilizing the parameters heat output, gas exchange, respiratory quotient, and fractions of metabolic fuels shows that exposure to hydrazine or monomethylhydrazine (MMH), especially when combined with a drug to curtail the mobilization of fat from the adipose tissue, causes a decrease in respiratory quotient, associated with a shift toward the utilization of fat as the metabolic fuel for energy purposes. Biochemical analyses substantiated this conclusion about the metabolic effects of MMH and demonstrated that the effects in nonfasted rats were similar to those previously reported in fasted rats. (Author)

A69-29304
COMPARATIVE EVALUATION OF THE THORACIC IMPEDANCE AND ISOTOPE DILUTION METHODS FOR MEASURING CARDIAC OUTPUT.
W. V. Judy, F. M. Langley, K. D. McCowen, D. M. Stinnett, L. E. Baker, and P. C. Johnson (Baylor University, College of Medicine, Houston, Tex.).
Aerospace Medicine, vol. 40, May 1969, p. 532-536. 8 refs.
PHS Grant No. HE-5125.

Comparison of values of cardiac output determined simultaneously in 17 normal adult male human subjects by means of thoracic impedance changes and radioisotope dilution. The absolute values of cardiac output determined by the impedance technique were 1.31 times higher than those measured by radioisotope with the subjects at rest and after moderate exercise. Even though the absolute values as found by the two methods were not the same, the changes in magnitude were comparable. (Author)

A69-29305 #
GLUCOSE TOLERANCE IN DOGS EXPOSED TO ALTITUDE AND DRUG ADMINISTRATION. I - CHLORPROMAZINE.
A. T. Bernardini (USAF, School of Aerospace Medicine, Brooks AFB, Tex.) and M. Taub.
Aerospace Medicine, vol. 40, May 1969, p. 536-538. 13 refs.

The rate of disappearance of IV injected glucose from the blood of dogs at a simulated altitude of 27,000 feet was compared to the blood glucose tolerance of dogs at ground level. In another experiment, the dogs received chlorpromazine in addition to glucose. The glucose tolerance of these dogs at altitude was also compared to ground level conditions. The pO_2 of the inspired air for all experimental dogs was 152 mm Hg. Significant reduction in glucose half-time decay time occurred in all animals exposed to altitude when compared to ground level controls. In addition, a significant reduction in glucose decay values was also seen between drug and nondrug animals at ground level. Indications are that physiologic changes induced by chlorpromazine administration after glucose injection are altered by decreases in barometric pressure. (Author)

A69-29307
PSYCHOLOGICAL STUDIES OF AGING IN PILOTS.
Jacek Szafran (Southern California, University, Dept. of Psychology and Gerontology Center, Los Angeles, Calif.).
(Aerospace Medical Association, Annual Meeting, 39th, Washington, D.C., Apr. 12, 1967.)
Aerospace Medicine, vol. 40, May 1969, p. 543-553. 37 refs.
PHS Grant No. HD-0518.

Visual, auditory, and reaction-time responses in aging pilots, to explore a possible relationship between physiological and psychological data to determine whether the capacity for discrimination and choice declines with advancing age. Many of the characteristics allegedly suggestive of relative functional loss are not a necessary feature of the performance of a professionally successful and healthy middle-aged or older pilot. B.H.

A69-29309
PRELIMINARY IMPRESSIONS OF CARDIOVASCULAR FUNCTION IN THE STUDY OF PHYSIOLOGIC AND PSYCHOLOGIC AGING IN PROFESSIONAL PILOTS.
Robert Proper (Lovelace Foundation for Medical Education and Research, Dept. of Diagnostics and Clinical Biometrics, Albuquerque, N. Mex.).
(Aerospace Medicine Association, Annual Meeting, William Randolph Lovelace II Memorial Seminar, Washington, D.C., Apr. 12, 1967.)
Aerospace Medicine, vol. 40, May 1969, p. 557-560. 11 refs.
NIH Grant No. HD-0518.

Discussion of methods and preliminary results in a study of aging in pilots based on cardiovascular tests, complete pulmonary function and exercise tolerance tests, and psychological and special sense testing. The parameters determined are evaluated from the viewpoint of possible correlation to the age of the subject. G.R.

A69-29471 #
ELECTROKINETIC CONVERTER OF BIOMECHANICAL PARAMETERS [ELEKTROKINETICHESKII PREOBRAZOVATEL' BIOMEKHANICHESKIKH PARAMETROV].
M. S. Kasimzade and D. K. Dvoriankin (Akademiia Nauk Azerbaidzhanskoi SSR, Institut Energetiki, Baku, Azerbaidzhan SSR).
Akademiia Nauk Azerbaidzhanskoi SSR, Doklady, vol. 24, no. 12, 1968, p. 9-13. 6 refs. In Russian.

Development of an electrokinetic converter of biochemical parameters for use in the diagnosis and control of the behavior of an organism. The device proposed eliminates the drawbacks inherent to induction pickups (such as a stable supply voltage and large errors in the presence of vibrations). Test results show that the device is well suited for recording the biomechanical parameters during physiological investigations of human beings and animals. V.P.

A69-29632 #
ORGANIC-INORGANIC SYSTEMS AND LIFE.
Raymond Dyer (Oastler College, Huddersfield, England).
British Interplanetary Society, Journal, vol. 22, Apr. 1969, p. 141-148. 51 refs.
Research sponsored by the Medical Research Council.

Attention is directed to the chemical and biochemical phases involved in the evolution of the first living cell. The framework is one of complex and continual interaction between the developing organic macromolecular systems known or postulated to have been present and the simpler inorganic systems. Particular emphasis is laid on the importance of interactions between protein colloids and mineral salts at the stage of complex coacervates or protocells, with supporting evidence adduced from several related fields. The complex chemical systems postulated for nonliving structures are shown to be maintained in functional cells and organisms, thus providing an example par excellence of pattern in nature and a further a fortiori justification of the central hypothesis. (Author)

A69-29742 #
CERTAIN PROBLEMS CONCERNING THE EFFECT OF MACHINE VIBRATIONS ON THE PERFORMANCE OF A HUMAN OPERATOR [NEKOTORYE PROBLEMY VOZDEISTVIIA VIBRATSII MASHIN NA RABOTU CHELOVEKA-OPERATORA].
B. A. Potemkin.
IN: VIBRATIONS AND STABILITY OF DEVICES, MACHINES, AND CONTROL-SYSTEM ELEMENTS [KOLEBANIIA I USTOICHIVOST' PRIBOROV, MASHIN I ELEMENTOV SISTEM UPRAVLENIIA]. [A69-29741 14-32]
Edited by K. V. Frolov.
Moscow, Izdatel'stvo Nauka, 1968, p. 30-35. 15 refs. In Russian.

Description of a model of the human locomotor apparatus based on the analogy with an automatic control system with a feedback. The model is designed as an aid in studying the negative effects of high-frequency machine vibrations on the performance of human operators. A block diagram of a multicomponent motor muscle model based on this analog is constructed. A one-dimensional model proposed by Coerman et al. is assessed. The failure of this model to provide a complete description of human body responses to vibrations, including muscular activity, is indicated. Suggestions are given for improving this model. V. Z.

LC ENTRIES

A69-81111
CONTRIBUTION TO THE MICROPHOTOMETRIC DETERMINATION OF OXYGEN-SATURATION IN INDIVIDUAL ERYTHROCYTES [BEITRAG ZUR MIKROPHOTOMETRISCHEN SAUERSTOFF-SATTIGUNGS-BESTIMMUNG AN EINZELNEN ERYTHROCYTEN].

H. Huckauf, H. Hutten, and F. Waldeck (Johannes Gutenberg-U., Physiol. Inst., Mainz, West Germany).

Pflügers Archiv European Journal of Physiology, vol. 305, Dec. 19, 1968, p. 190–198. refs In German.

A microphotometric method for determining the extinction values in individual erythrocytes is examined for potential sources of error. The results are: (1) When the factors described in detail are observed, the error in the individual determination of an extinction value, based on the real value, can be kept below ±8%. For a greater number of measurements the error can be maintained below ±5% by employing statistical methods. (2) It is proved that in the case of individual erythrocytes, a linear relationship exists between extinction and O_2-saturation. In this way the prerequisites for measuring the O_2-dissociation curve of individual erythrocytes with the aid of microphotometry are ensured. (3) At the moment in this arrangement the prerequisite for measuring the hemoglobin content of an individual erythrocyte is not met, because the apparent extinction coefficients measured are approximately three times greater than those in hemoglobin solutions.

A69-81112
PROPHYLAXIS OF OXYGEN DEPRIVATION IN RATS AT SIMULATED HIGH ALTITUDE .

Robert L. Powell and Joseph P. Buckley (Pittsburgh, U., School of Pharm. Dept. of Pharmacol., Pa.).

Annals of the New York Academy of Sciences, vol. 148, Mar. 26, 1968, p. 671–690. 26 refs.
NASA Grant NSG (t-70) and USV Pharm. Corp. supported research.

Rats given various doses of phenformin HCl were subjected to both rarified atmospheres and exposure in a decompression chamber. Adrenal glands of some animals were tested for ascorbic acid depletion after decompression and treatment with the drug. The role of phenformin was also tested in other groups of rats for its action on the cardiovascular, respiratory and central nervous systems in decompressed animals. Results showed that phenformin HCl protected animals from lethal effects of severe hypoxia with increasing effect up to a dosage of 75 mg./kg. This effect is correlated with the increased blood pressure of the treated animals. Stimulation of the respiratory system resulted in greater equilibrium of blood with ambient oxygen and could account for the higher arterial oxygen tension in treated animals. Depression of the central nervous system and collapse of the cardiovascular system from hypoxia could also be prevented.

A69-81113
REDUCTION OF STROKE VOLUME AND INCREASE IN HEART RATE AFTER A PREVIOUS HEAVIER SUBMAXIMAL WORK LOAD.

L. H. Hartley and B. Saltin (Gymnastik-och idrottshögskolan, Dept. of Physiol., Stockholm, Sweden).

Scandinavian Journal of Clinical and Laboratory Investigation, vol. 22, no. 3, 1968, p. 217–223. 19 refs.
Grant PHS 1-F3-HE-32.645-01; Swed. Natl. Assn. against Heart and Chest Diseases, Sweden, Bank, and United Life, Mutual Group Insurance Co. supported research.

Eight middle-aged sedentary males were studied to determine the causes of a higher heart rate after previous work. Short duration work loads, at about 40% of maximal oxygen uptake (max V_{O_2}), caused a higher heart rate (average increase 23/min.) if performed 10 min. after a work load demanding about 75% of max V_{O_2}. Cardiac output did not change and hence stroke volume was decreased (average 16 ml.). These changes were less marked after significant improvement in physical condition as a result of training. In a cross sectional study of 69 individuals with max V_{O_2} from 30 to 62 ml./kg. x min. previous work induced less change in heart rate in the better trained individuals, also with the same work loads, relative to maximal capacity. The results are discussed; they do not seem to be related to differences in oxygen uptake or central blood volume changes. A myocardial factor is suggested as a possible explanation.

A69-81114
BONE MATRIX TURNOVER AND BALANCE IN VITRO. 1. THE EFFECTS OF PARATHYROID HORMONE AND THROCALCITONIN.

Barry Flanagan and George Nichols, Jr. (Harvard Med. School, Dept. of Med.; Peter Bent Brigham Hosp.; and Boston City Hosp., Boston, Mass.).

Journal of Clinical Investigation, vol. 48, Apr. 1969, p. 595–606. 37 refs.
Grants PHS AM 00854-12 and PHS AM 00854-13; John A. Hartford Found. supported research.

Labeled proline from incubation media has been shown to be incorporated into living bone matrix collagen *in vitro*. Hydroxyproline is release from fresh bone slices in similar systems in a characteristic curve against time. This hydroxyproline is derived from three distinct sources, each of which may be separately quantitated. Part of the total represents passive solubilization of matrix collagen, part is derived from new synthesis of soluble collagen occurring *in vitro*, and the remainder is released by cell-mediated resorptive action. The latter two processes are linear with time up to eight hr.; the former decays to zero at about two hr. Consequently, rates of collagen synthesis and of new collagen deposition and resportion can be quantitated simultaneously in the same system. The ability to measure these parameters of bone collagen metabolism provides methods both for the accurate evaluation of organic matrix resorption *in vitro* and for the accurate measurement of rates of collagen synthesis and collagen deposition. The application of the method is illustrated using parathyroid hormone and thyrocalcitonin. Parathyroid hormone diminishes collagen synthesis and stimulates collagen resorption. It reduces slightly the deposition of newly formed collagen in stable matrix. The net effect of these changes is to produce a marked negative balance. It does not significantly affect the solubility of matrix collagen. Thyrocalcitonin does not affect collagen synthesis or its deposition. It caused a marked fall in resorption rate. It has no effect on matrix collagen solubility. The net effect is to produce a marked positive balance of matrix collagen.

A69-81115
BONE MATRIX TURNOVER AND BALANCE IN VITRO. 2. THE EFFECTS OF AGEING.
Barry Flanagan and George Nichols, Jr. (Harvard Med. School, Dept. of Med.; Peter Bent Brigham Hosp.; and Boston City Hosp., Boston, Mass.).
Journal of Clinical Investigation, vol. 48, Apr. 1969, p. 607–612. 19 refs.
Grants PHS AM 00854-12 and PHS AM 00854-13; John A. Hartford Found. supported research

The rates of both formation and resportion of bone collagen may be accurately quantitated by kinetic analysis of hydroxyproline metabolism *in vitro*. Using this approach, the changes in bone collagen turnover with age in the rat were studied. The rates of synthesis and resportion of collagen decline with age although the resorptive activity per cell increased up to six mo. of age. The solubility of collagen declines with age. The fraction of the newly synthesized collagen which is deposited as matrix declines dramatically with age revealing a new and hitherto unsuspected aspect of the osteoporotic process. The collagen balance becomes progressively more negative over the first six mo. of life. These results indicate that even in an animal who is not subject to clinical osteoporosis, biochemical measurement reveals that such a trend exists. The application of this approach to human subjects is feasible and has important implications.

A69-81116
ECOLOGICAL STUDIES OF INTESTINAL BACTERIA. RELATION BETWEEN THE SPECIFICITY OF FECAL ABO BLOOD GROUP ANTIGEN-DEGRADING ENZYMES FROM ENTERIC BACTERIA AND THE ABO BLOOD GROUP OF THE HUMAN HOST.
Lansing C. Hoskins (Case Western Reserve U., School of Med., Dept. of Med., and Veterans Admin. Hosp., Gastroenterol. Serv., Cleveland, Ohio).
Journal of Clinical Investigation, vol. 48, Apr. 1969, p. 664–673. 31 refs.
Am. Federation for Clin. Res., Natl. Meeting, Atlantic City, Apr. 30, 1967.
Veterans Admin. supported research.

This report presents evidence for enteric bacterial adaptation to genetically controlled environmental factors in the individual human host. Human feces contains bacterial enzymes that degrade water-soluble A, B, and H antigens, and both the presence and the specificity of ABH blood group antigens in human gut mucous secretions are genetically determined for each individual. In this study, partially purified fecal blood group antigen-degrading enzymes from 31 subjects of known blood group and secretor status were obtained and their relative specificity for A, B, and H antigen was measured. Patterns of enzyme specificity were found that were related to the ABO blood type of each subject. This was most evident for enzyme preparations of blood group A, B, and AB secretors: enzyme preparations from group A secretors rapidly degraded A antigen but degraded B antigen only slightly during the same time interval; enzyme preparations from group B secretors degraded B antigen rapidly and A antigen only slightly, and enzyme preparations from group AB secretors degraded both A and B antigens. Bacterial adaptation of blood group A antigen-degrading enzyme activity was demonstrated in an *in vitro* anaerobic culture of fecal bacteria from a blood group B secretor. These findings are compatible with enteric bacterial adaptation of degradative enzymes to the genetically determined blood group antigens in their host's gut mucous secretions.

A69-81117
LASER PROPERTIES AND EYE HAZARDS.
George R. Peacock and Frederick van Nus. (U.S. Army Med. Res. Lab., Fort Knox, Ky.).
American Journal of Optometry and Archives of American Academy of Optometry, vol. 46, Mar. 1969, p 202–213. 51 refs

Eye injury is a recognized hazard of laser radiation. This paper includes a basic discussion of those laser output parameters that are important in understanding lasers and how they are related to laser eye injury. The three most significant properties of laser beams in this respect are wavelength, time characteristics and beam geometry. The first two determine the site most susceptible to injury and its sensitivity to laser exposure dose. The third, beam geometry, essentially governs the distance at which a given laser is capable of producing a hazardous exposure condition. A brief description of experimental injury findings and some threshold exposure doses, as reported in the literature, are summarized. Laser safety considerations are discussed.

A69-81118
THE HEART IN HEATSTROKE.
Michael C. Kew, Ronald B. K. Tucker, Israel Bersohn, and Harold C. Seftel (U. of the Witwatersrand and Johannesburg Gen. Hosp., Dept. of Med., C.S.I.R. Cardiopulmonary Res. Unit and Cardiovascular Res. Unit and South African Inst. for Med. Res., Johannesburg, South Africa).
American Heart Journal, vol. 77, Mar. 1969, p. 324–335. 29 refs.
South Africa, Chamber of Mines supported research.

Evidence of cardiac damage was found in 17 out of 26 Bantu goldminers with heatstroke. Myocardial injury was diagnosed on the basis of serum lactic dehydrogenase (LDH) isoenzyme patterns and electrocardiographically. A significant increase in the percentage of LDH-1 was present in 69% of the patients. Electrocardiographic tracings were abnormal in 58% of the cases. The changes consisted mainly of sinus tachycardia and nonspecific S-T segment and T-wave abnormalities, which were reversibe in those patients who were followed up. A good correlation (75%) were found between the isoenzyme and the electrocardiographic evidence of cardiac damage. Pathological examination of the heart in the two patients who died in the acute stage showed interstitial edema and degeneration of the muscle fibers. Although myocardial damage occured in the majority of the cases, in none was it severe enough to cause overt cardiac failure.

A69-81119
ADRENERGIC CONTROL OF COCHLEAR BLOOD FLOW.
Fumiro Suga and James B. Snow, Jr. (Okla. U., Med. Center, Dept. of Otorhinolaryngol., Oklahoma City).
Annals of Otology Rhinology and Laryngology, vol. 78, Apr. 1969, p. 358–374. 31 refs.
Am. Physiol. Soc., Fall Meeting, Washington, D.C., Aug. 22, 1967.
Grant NINDB NB 05418-05.

The adrenergic control of cochlear blood flow was studied with intravenous administrations of adrenergic, adrenergic blocking and antiadrenergic agents in guinea pigs anesthetized with a barbiturate. Cochlear blood flow changes were recorded from the basal turn utilizing an electrical impedance plethysmograph. Simultaneous recordings of cochlear potential, carotid artery pressure and electrocardiogram were made. Agents which are both α and β receptor stimulants increased cochlear blood flow with a rise in systemic blood pressure. The α receptor stimulants produced a transient decrease and a subsequent increase in cochlear blood flow. This increase appears to be a secondary change produced by a rise in systemic blood pressure. The β receptor stimulants appear to produce weak vasodilation in the cochlear, although cochlear blood

flow readily decreased with a fall in systemic blood pressure with large doses of these drugs. The α-adrenergic blocking agents increased cochlear blood flow while the β-adrenergic blocking agent decreased it. The antiadrenergic agent caused an initial increase and a subsequent decrease in cochlear blood flow. The cochlear vessels appear to be weakly controlled by the adrenergic nervous system, and this control is easily overcome by changes in systemic blood pressure. There was no apparent change in cochlear potential attributable to these autonomic nervous system agents.

A69-81120
LIGHT-INDUCED CLEAVAGE OF WATER IN A MODEL OF PHOTOSYNTHESIS [LICHTINDUZIERTE WASSERSPALTUNG IM PHOTOSYNTHESE-MODELL].

Helmut Metzner (U. Tübingen, Inst. für Chem. Pflanzenphysiol., West Germany).

Hoppe-Seyler's Zeitschrift für Physiologische Chemie, vol. 349, Nov. 1968, p. 1586–1588. 8 refs. In German.

Chlorophyll-coated silver chloride crystals develop traces of oxygen when illuminated in contact with water. The addition of a suitable electron acceptor converts this oxygen development into a continuous water photolysis initiated by chlorine radicals. With regard to spectral dependency and quantum efficiency this system resembles a suspension of isolated chloroplasts.

A69-81121
EFFECTS FROM REPEATED SHORT-TERM INHALATION OF FLUORINE.

M. L. Keplinger (Miami, U., School of Med., Res. and Teaching Center of Toxicol. and Dept. of Pharmacol., Coral Gables, Fla.).

Toxicology and Applied Pharmacology, vol. 14, Jan. 1969, p. 192–200. 10 refs.
Soc. of Toxicol., 7th Ann. Meeting, Washington, D.C., 1968.
NASA Grant NGR 10-007-012.

Mice, rats, and rabbits were exposed to fluorine for 5, 15, 30, or 60 min. at intervals ranging from 24 hr. to 1 wk. Lung damage was the most sensitive index of effect. Animals were sacrificed immediately after the last exposure, or at 7, 14, 21, or 45 days after the last exposure. A single exposure caused marked changes (grade 3) in the lungs and some changes in the liver and kidneys. After four exposures (at weekly intervals) to the same concentration, the lungs had slight changes (grade 1). Livers were normal. Kidneys showed slight changes at 7 and 14 days, but were normal at 21 and 45 days. Four exposures, at concentrations that caused no effect after 1 exposure, caused no effect either. Therefore, four exposures to fluorine caused no more damage than a single exposure to the same concentration. Repeated exposures were made with different concentrations during each exposure. A low, apparently harmless, level was used first. Then 4, 24, and 96 hr. later, the LC50 of fluorine was determined. The LC50's of preexposed animals were higher and there was less damage to the lungs than in control animals. Exposures to a low concentration were also repeated every third day (for four times). At 1, 3, and 7 days after the last exposure the LC50's were determined. Even at seven days the preexposed animals had higher LC50's and showed less edema in the lungs than animals that were not pretreated by previous exposure to fluorine.

A69-81122
ULTRASTRUCTURAL AND BIOCHEMICAL CHANGES IN BROWN FAT IN COLD-EXPOSED RATS.

John F. Thomson, Duane A. Habeck, Sharron L. Nance, and Karen L. Beetham (Argonne Natl. Lab., Div. of Biol. and Med. Res., Ill.).

Journal of Cell Biology, vol. 41, Apr. 1969, p. 312–334. 29 refs.
AEC supported research.

During the first three days of exposure of rats to 5°C., the nitrogen concentration of interscapular brown fat increased by 50% and remained at this elevated level for the duration of the eight wk. observation period, while the mass of tissue increased fourfold. The concentration of both deoxyribonucleic acid and ribonucleic acid per unit nitrogen reached a maximum after three days, then declined, however, the total quantity of each continued to rise. The concentration of various respiratory enzymes decreased during the first few days and then increased, but at different rates. The morphological changes in mature brown fat cells during cold acclimation were obsered to be: a reduction in fat droplet size during the first three days, followed by a gradual increase in size through six wk. in the cold; a continual increase in the amount of intermitochondrial ground substance during the first three wk., with increased granularity and glycogen content after one wk.; initial disappearance of glycogen between mitochondria, followed by the reappearance of a few isolated particles in the intermitochondrial ground substance after one wk. in the cold; initial increase in the density of intramitochondrial matrix for the first three to four days, followed by a gradual return to the control density; loss in integrity of mitochondrial outer membranes during the first four days, followed by gradual but incomplete restoration; temporary loss of the dense material in lipid droplets during the first 24 hr., with return after one wk. in the cold; and a 40% increase in mitochondrial diameter within one day, followed by a decrease in diameter within one wk. to a constant value about 15% larger than the controls.

A69-81123
EFFECT OF RESERPINE ON THE SPONTANEOUS VENTRICULAR FIBRILLATION DEVELOPING DURING INDUCED DEEP HYPOTHERMIA IN CATS.

K. C. Nielsen and Ch. Owman (Lund, U., Inst. of Anat. and Histol.; Lund, U. Hosp., Neurosurg. Clin. A, Sweden; and N. Y. U., Med. School, Dept. of Neurol. Surg., New York).

Archives Internationale de Pharmacodynamie et de Therapie, vol. 175, Oct. 1968, p. 412–421. 34 refs.
Assn. for Aid of Crippled Children, Anna Lisa and Sven-Eric Lundgren's Found., and Ollie and Elof Ericsson's Found. supported research.

Cats were subjected to general hypothermia by submersion in an ice-water bath. Cooling was intented to a pre-settled body temperature of 18°C. Arterial blood pressure, electrocardiograms, rectal temperature, and respiration were continuously observed. Angiotensin was administered to maintain the blood pressure above 60 mm. Hg if it fell below this level due to the reduction in body temperature. All untreated animals died in ventricular fibrillation at a mean rectal temperature of 21.4°C. In contrast to this, less than 30% of animals in the three groups given 10 mg./kg. of reserpine one, four or 24 hr. previously developed ventricular fibrillation, and at rectal temperatures that were lower than the controls. The remaining animals could be cooled to the 18°C rectal temperature without complications. Treatment with reserpine produced a 70 to 99% reduction in cardiac noradrenaline in all groups, whereas adrenal catecholamines were significantly lowered only 24 hr. after treatment. The results are primarily discussed against the background of our previous findings that prenylamine, which similarly depletes the sympatho-adrenal system of its catecholamine stores, also effectively controls the development of spontaneous hypothermic ventricular fibrillation. The possibility is considered that the beneficial effect of reserpine might be due not only to its catecholamine-depleting action but also to a "quinidine-like" myocardial depression. It is however, concluded that the reserpine experiments offer further evidence in favor of the view that

adrenergic mechanisms, notably in the heart, are of major importance for the spontaneous development of hypothermic ventricular fibrillation, and that the adrenal catecholamines probably are of little relevance under the present experimental conditions.

A69-81124
TOTAL AND RELATIVE ERYTHROCYTE LEVELS OF PINTAIL DUCKS (ANAS ACUTA) IN CHRONIC DECOMPRESSION HYPOXIA.

Robert R. Cohen (Colo. U., Dept. of Biol., Boulder).

Physiological Zoölogy, vol. 42, Jan. 1969, p. 108–119. 72 refs.
NSF, NDEA, Colo. U., and Thorne Ecol. Found. supported research.

To investigate the control of erythropoiesis in birds, one of two groups of seven adult female pintail ducks was exposed to the decompression hypoxia of 310 mm. Hg total pressure (corresponding to 7.0 km. altitude) for 64 days. Blood parameters, including total erythrocyte volume, were measured at intervals of approximately 10 days. The results provide further confirmation that birds possess a sensitive control of erythropoiesis which basically resembles that in mammals, in contrast to the lack of such a system in the lower, poikilothermic vertebrates. Erythrocyte parameters rose rapidly during the first 20 days of hypoxia. At the end of this period, venous hematocrit (Hct) had risen by 30% to a value of 60, total erthrocyte volume by 68% to 52 ml./kg. and total blood volume by 23% to 103 ml./kg. During the remaining period of low pressure, small further increases occurred in most of these parameters. No changes with hypoxia were seen in body weight, plasma volume, cellular hemoglobin concentration, or the ratio of whole-body Hct to venous Hct. A smaller amount of time was required for erythropoietic acclimation in the ducks than in small mammals. Erythrocyte levels, especially Hct, reached in the response to 310 mm. Hg were distinctly lower than those reported in small mammals at a similar pressure. These quantitative differences probably relate to differences between the two classes in the efficiency of other respiratory functions. The acclimated blood volume levels were similar to those in mammals at 350 mm. Hg. The lack of change in the ratio of whole-body Hct to venous Hct indicates that the large and small blood vessels increased in volume by similar degrees.

A69-81125
RECOVERY OF ERYTHROCYTE LEVELS FOLLOWING CHRONIC DECOMPRESSION HYPOXIA IN PINTAIL DUCKS (ANAS ACUTA)

Robert R. Cohen (Colo. U., Dept. of Biol., Boulder).

Physiological Zoölogy, vol. 42, Jan. 1969, p. 120–125. 22 refs.
NSF, NDEA, Colo. U., and Thorne Ecol. Found. supported research.

To further study the mechanism controlling erythropoiesis in birds, pintail ducks were tested for their ability to recover from acclimation to chronic hypoxia. The birds had been exposed to a total pressure of 310 mm. Hg for 64 days, resulting in distinct increases in erythrocyte levels. Recovery of these parameters was then followed for 28 days at an ambient pressure of 620 mm. Hg. Parameters measured included venous hematocrit, blood hemoglobin content, total volume of circulating erythrocytes, and plasma volume. Those parameters that had been elevated in acclimation to hypoxia decreased very rapidly after the return to ambient pressure, reaching normal levels after approximately 20 days. These include venous hematocrit, total volume of circulating erythrocytes blood volume, and whole-body hematocrit. It is concluded that a sensitive and rapidly acting mechanism exists in birds for reducing blood oxygen capacity when oxygen transport exceeds metabolic oxygen requirements. This mechanism most probably involves merely a reduction in the rate of erythropoiesis, as in the case of mammals. However, the results suggest that, in addition, the rate of erthrocyte destruction may be increased at this time.

A69-81126
JUDGMENTS OF THE ACCEPTABILITY OF AIRCRAFT NOISE IN THE PRESENCE OF SPEECH.

C. E. Williams, K. N. Stevens, and M. Klatt (Bolt Beranek and Newman Inc., Cambridge, Mass.).

Journal of Sound and Vibration, vol. 9, Mar. 1969, p. 263–275. 11 refs.
Contract FAA FA66WA-1566.

Listeners were asked to rate various aircraft flyovers in terms of their acceptability in the home. Ratings were assigned on a scale having four categories: "of no concern", "acceptable", "barely acceptable", and "unacceptable". Judgments were obtained of noise presented without speech and of noise presented simultaneously with speech. In those situations where speech was present, the listeners, after making their acceptability judgments for a given flyover, were asked questions regarding the content of the speech. Judgments were compared with the maximum noise level (PNL, SIL and A-weighted sound pressure level) occurring during the flyover. Correlations between listener ratings and the three physical measures were essentially the same, indicating that any one of the measures is equally effective for predicting listener acceptability of aircraft noise. For a given noise level, little difference was observed between ratings obtained when speech was absent and ratings obtained with speech present at a comfortable level. An increase or decrease in speech level resulted in an increase or decrease in acceptability. There was an appreciable deterioration in comprehension of verbal messages when the peak noise level of aircraft (as heard indoors) exceeded 86 PNdb, a level corresponding to a rating of "barely acceptable". Speech interference, whether actually present or estimated on the basis of past experience, appears to play a role in shaping the judgments individuals make regarding the acceptability of aircraft noise heard indoors.

A69-81127
SIMULTANEOUS AND SUCCESSIVE CUTANEOUS TWO-POINT THRESHOLDS FOR VIBRATION.

Paul Eskildsen, Ailene Morris, Carter C. Collins, and Paul Bach-Y-Rita (Pacific Med. Center, Smith-Kettlewell Inst. of Visual Sci., San Francisco, Calif.).

Psychonomic Science, vol. 14, Feb. 25, 1969, p. 146–147. 13 refs.
Grants PHS RD-2444-S-C1, PHS K3NB 14,094, and PHS FR-05566; T. B. Walker Found., Inc. supported research.

An array of tactors, of a type used in a video-tactile visual substitution system, was used to determine two-point thresholds for vibration on the skin of the back. In the first study simultaneous stimulus presentations using the constant stimulus method resulted in a median threshold of 17.8 mm. In the second study, both simultaneous and successive thresholds were near 11 mm. These results differ from classical studies using touch calipers which give simultaneous thresholds of 68 mm. and successive thresholds of 17 mm.

A69-81128
ROTARY PURSUIT PERFORMANCE AS A FUNCTION OF WATCHING DEMONSTRATIONS AT SLOWER SPEEDS.
Henry S. Rosenquist (Akron U., Ohio).
Psychonomic Science, vol. 14, Feb. 25, 1969, p. 157–159. 8 refs.
Grant UA RG-138.

Previous studies found that passive watching of an untracked rotary pursuit (RP) target did not affect final practice. A similar finding was obtained from the present experiment, using a different method. The subject actively watched a demonstrator achieve 50% time on target (TOT) at any one of three speeds. Results suggested that reactive inhibition was generated in discriminative processes rather than in eye movements.

A69-81129
FEEDBACK EFFECTS AND SOCIAL FACILITATION OF VIGILANCE PERFORMANCE: MERE COACTION VERSUS POTENTIAL EVALUATION.
Eric Klinger (Minn. U., Morris).
Psychonomic Science, vol. 14, Feb. 25, 1969, p. 161–162. 10 refs.
Grant NSF GS-1346.

In an investigation of coaction effects on performance, subjects undertook a visual vigilance task in both isolation and coaction with a peer. Performance was improved by the presence of a coactor only when the coactor had access to information about the quality of the subject's performance.

A69-81130
GENERALIZATION OF HABITUATION OF THE GSR TO WHITE NOISE OF VARYING INTENSITIES.
J. P. James and G. R. Hughes (Manitoba, U., Winnipeg, Canada).
Psychonomic Science, vol. 14, Feb. 25, 1969, p. 163–164. 6 refs.
Rocky Mt. Psychol. Assn., Meeting, Denver, 1968.
Grant NRC APA-223.

Two groups, each consisting of 40 university students, were given eight habituation trials of a two-sec. white noise at a mean intertrial interval of one min. One group received a 67-db. stimulus, the other a 76-db. stimulus. On Trials 9-12, 20 subjects from each group were tested for stimulus generalization at intensities of 70 or 73 db. Mean galvanic skin response on the first test trial was the measure of stimulus generalization. A reliable upward-sloping generalization gradient to increases in stimulus intensities and a trend for a downward-sloping gradient to decreases in intensities were found.

A69-81131
VISUAL AND TACTUAL INTERACTION IN JUDGMENTS OF THE VERTICAL.
Gary Kress and John Cross (St. Louis U., Mo.).
Psychonomic Science, vol. 14, Feb. 25, 1969, p. 165–166. 6 refs.

Four field-dependent and four-field independent subjects set a comparison bar to the apparent vertical while receiving either veridical or nonveridical reference information. Two intramodal and two intermodal conditions were used. Visual settings were significantly more accurate than tactual settings regardless of the reference modality used. The visual reference significantly increased the error of the tactual setting over that using a tactual reference. The differences between the groups were not statistically significant. The nature of the intermodal interaction needs further clarification.

A69-81132
HEART RATE AND SKIN RESISTANCE DURING SLEEP BEFORE AND AFTER 60 HOURS OF SLEEP DEPRIVATION.
James G. Craig, Michael W. McCabe, and Walter D. Fenz (Waterloo, U., Ontario, Canada).
Psychonomic Science, vol. 14, Feb. 25, 1969, p. 169–170. 9 refs.
Psychonomic Soc., Ann. Meeting, St. Louis, Nov. 1968.
MRC 2330 and OMHF 74.

Twelve male student volunteers were deprived of sleep for 60 hr. During the night before and during the night after deprivation, simultaneous recordings of heart rate and skin conductance were taken. When the night before deprivation was compared to the night after deprivation, heart rate was found to be significantly ($p < .05$) higher, while skin conductance tended to be lower, interacting significantly ($p < .05$) with time.

A69-81133
SIGNAL-DETECTION EXPERIMENTS AS TESTS FOR RISK-TAKING: A PILOT STUDY.
Y. H. Poortinga (Natl. Inst. for Personnel Res., Johannesburg, South Africa).
Psychonomic Science, vol. 14, Feb. 25, 1969, p. 185–186.

Auditory and visual signal-detection experiments were applied as tests of risk-taking. The percentage of errors in the responses was kept constant over subjects and blocks of trials by slight variations in signal strength. Subjects could express two levels of confidence for their decisions. The numbers of more confident decisions in the two experiments are highly correlated, especially under conditions of small monetary risk.

A69-81134
THE EFFECT OF PROLONGED VISUAL DEPRIVATION ON VARIOUS CUTANEOUS AND AUDITORY MEASURES.
J. Phelps and John P. Zubek (Manitoba, U., Winnipeg, Canada).
Psychonomic Science, vol. 14, Feb. 25, 1969, p. 194–195. 9 refs.
Grants DRB 9425-08 and NRC APA-290.

Subjects who were placed in darkness for a week but otherwise were exposed to a normal and varied sensory environment showed a significant increase in absolute pressure sensitivity of the finger, forearm, neck, and leg, but not of the palm, relative to a group of controls. Measures of tactual and auditory localization, on the other hand, showed no significant changes after visual deprivation. These results provide some experimental support for Schultz's sensoristatic theory.

A69-81135
THE THRESHOLD OF FUSION OF PAIRED LIGHT FLASHES AS A FUNCTION OF AGE IN NORMAL ADULTS.
Frank H. Farley (Wis., U., Madison).
Journal of Genetic Psychology, vol. 114, Mar. 1969, p. 143–148. 23 refs.

The two-flash threshold (TFT), which has been suggested in a number of reports to reflect level of cortical arousal or activation, was studied as a function of chronological age in 92 normal male adults ranging in age from 18 to 50 yr. No significant relationship, linear or otherwise, was found between TFT and age. Further research involving older and younger subjects than those in the present study was suggested.

A69-81136
NEUROGENIC BASIS FOR THE RISE IN BLOOD PRESSURE EVOKED BY NICOTINE IN THE CAT.
Gerard L. Gebber (Mich. State U., Dept. of Pharmacol., East Lansing).
Journal of Pharmacology and Experimental Therapeutics, vol. 166, Apr. 1969, p. 255–263. 17 refs.
Am. Med. Assn. Educ. and Res. Found. supported research.

The pressor response elicited small i.v. doses of nicotine (5-40 μg./kg.) was accompanied by an increase in centrally emanating nerve activity recorded from both pre- and postganglionic branches of the superior cervical ganglion. The pressor response was abolished by transection of the spinal cord and was somewhat reduced after denervation of the aortic and carotid body chemoreceptors. Nicotine-induced enhancement of postganglionic activity recorded from the innervated ganglion also was somewhat reduced after chemorecptor denervation. However, chemoreceptor denervation abolished the enhancement of centrally emanating preganglionic activity produced by nicotine. Although the doses of nicotine employed were too small to evoke a postganglionic discharge in the decentralized ganglion, they were sufficient to facilitate the postgaglionic action potential evoked by submaximal stimulation of the sectioned preganglionic nerve. It is concluded that the major component of the pressor response produced by small i.v. doses of nicotine is the consequence of facilitation of ganglionic transmission rather than a direct central effect of the compound on vasomotor areas. This study also illustrates that abolition of an autonomic neuroeffector response by spinal cord section does not necessarily indicate that the response was of supraspinal origin.

A69-81137
TEMPORAL SUMMATION DURING BACKWARD VISUAL MASKING.
Robert T. Kintz and Robert M. Boynton (Rochester, U., Center for Visual Sci., N.Y.).
Journal of the Optical Society of America, vol. 59, Feb. 1969, p. 212–216. 21 refs.
Grant PHS NB-00618.

The summative properties of double flashes were examined during a period of rapid change of visual sensitivity, caused by a subsequent masking stimulus. The results indicate that the eye first weights each input flash according to the sensitivity of the eye at the moment of presentation (as revealed by a single-flash masking function) and then summates the weighted response exactly. A possible physiological process which could accomplish the retroactive weighting is discussed.

A69-81138
EFFECTS OF ANOXIA ON ENERGY-RICH PHOSPHATES, GLYCOGEN, LACTATE AND PYRUVATE IN THE BRAIN, HEART AND LIVER OF THE DEVELOPING RAT.
Pekka H. Mäenpää and Niels C. R. Räihä (Helsinki, U., Dept. of Med. Chem., Finland).
Annales Medicinae Experimentalis et Biologiae Fenniae, vol. 46, no. 3, 1968, p. 306–317. 44 refs.
Sigrid Jusélius Found., Finnish Med. Found., Assn. for Aid of Crippled Children, and Helsinki, U. supported research.

Fetal (21 to 22 days), one-day, 10-day and adult rats were placed in an atmosphere of pure nitrogen for periods which roughly corresponded to their survival times. Samples of brain, heart and liver were rapidly frozen at different times after the beginning of anoxia, and determinations made of their content of creatine phosphate, ATP, ADP, AMP, glycogen, lactate and pyruvate. In all tissues studied, the depression of the content of energy-rich phosphates was slower in fetal and newborn animals than it was in adults. The ATP level in the heart of fetal and neonatal animals, in comparison with that in the other tissues studied, displayed less rapid depression during anoxia. The initial rates of lactate accumulation during anoxia were about fivefold slower in the brain and heart of fetal and newborn animals than they were in adults. In the liver, this difference was less than twofold. The lactate/pyruvate ratio increased in the tissues of fetal and newborn animals at a slower rate than in adults. In the brain, this increase evidenced a better correlation with the survival time in anoxia than in the other tissues studied. The decrease in tissue glycogen was most marked in fetal rates. The amounts of lactate plus pyruvate accumulating in the tissues were not always comparable with the amounts of glycogen which disappeared. The slower decline in energy-rich phosphates in fetal and newborn tissues during anaerobic conditions was interpreted as being a result of slower energy utilization, since faster generation through glycolysis was not observed.

A69-81139
STUDIES ON EXTRARENAL ERYTHROPOIETIN.
Walter Fried, Tom Kilbridge, Sanford Krantz, T. P. McDonald, and Robert D. Lange (Chicago, U., Med. School, Ill. and Tenn., U., Mem. Res. Center and Hosp., Knoxville).
Journal of Laboratory and Clinical Medicine, vol. 73, Feb. 1969, p. 244–248. 18 refs
Grants AEC-AT-(40-1)-3547 and PHS HE 1-567-02; Veterans Admin. Res. Fund supported research.

The plasma of nephrectomized rats exposed to intense hypoxia contained detectable amounts of an erythropoietic stimulating factor. The titer of this factor increased with further increase in the intensity of hypoxia. Extrarenal erythropoietin is capable of stimulating heme synthesis by bone marrow cells *in vitro* and is neutralized by antiserum to erythropoietin. These data indicate that extrarenal erythropoietin is probably identical to that of renal origin, and its production is regulated by the intensity of hypoxia.

A69-81140
EFFECT OF REDUCED GLUTATHIONE ON RAT ERYTHROCYTES: PRODUCTION OF PNH-LIKE FEATURES.
Neil H. Baum, Charles E. Mengel, and Stanley P. Balcerzak (Ohio State U. Hosp., Dept. of Med., Div. of Hematol. and Oncol., Columbus).
Journal of Laboratory and Clinical Medicine, vol. 73, Feb. 1969, p. 277–282. 12 refs.
NASA Contract NAS 9-6910, Contract Nonr-495(30), Grants PHS CA 08702-01, PHS CA 08699-03, PHS AM 12223-02, and PHS I TOI Ca 5192-01.

Incubation of rat red cells with reduced glutathion resulted in lysis of those cells in serum at a pH optimum of 8.4. Lysis was prevented by heat inactivation of serum and accentuated by addition of thrombin. In addition, these cells also lysed in low ionic strength sucrose solution and had a low acetylcholinesterase activity and increased lytic sensitivity to H_2O_2. They also had a marked shortening of *in vivo* survival. These findings suggested that the rat erythrocytes had acquired certain *in vitro* and *in vivo* lytic features similar to those of human paroxysmal nocturnal hemoglobinuria.

A69-81141
EQUATIONS OF HAND MOTION PATH FOR WORK SPACE DESIGN.
Appu Kattan (Puerto Rico, U., Ind. Eng. Dept., Mayaguez) and Gerald Nadler (Wis., U., Ind. Eng. Div., Madison).
Human Factors, vol. 11, Apr. 1969, p. 123–129. 8 refs.
Wis. Alumni Res. Found. and Eng. Expt. Sta. supported research.

This work developed a set of prediction equations for three-dimensional motions of the human hand, thus facilitating the design of the dynamic elements in work space. The variables considered were the distance moved and the direction of motion. It was concluded from the results that: (a) it is possible to develop accurate prediction equations for three-dimensional motions of body members; (b) distance has only a negligible effect on motion path; (c) the effect of direction on motion path is uniform except for the 90° motion; (d) only two sets of equations, one for 90° motions and the other for motions in other directions, are required to predict the path of any motion in the experimental region; (e) the overall length of motion path is only slightly more than the linear movement distance; and (f) the depth dimension in a three-dimensional motion is negligibly small.

A69-81142
THE NATURE OF INDUSTRIAL INSPECTION.
Douglas H. Harris (N. Am. Rockwell Corp., Autonetics Div., Anaheim, Calif.).
Human Factors, vol. 11, Apr. 1969, p. 139–148. 7 refs.

A framework is provided for understanding and improving the accuracy of industrial inspection operations. The basic elements in inspection tasks—interpretation, comparison, decision making, and action—are described, and a classification of industrial inspection tasks is provided. Several basic factors that may influence inspection accuracy, and research results indicating the extent of their impact, are discussed. These factors include task complexity, defect rate, repeated inspections, and vigilance.

A69-81143
VIGILANCE RESEARCH: ITS APPLICATION TO INDUSTRIAL PROBLEMS.
Russell L. Smith (Integrated Sci. Corp., Santa Monica, Calif.) and Luigi F. Lucaccini (PHS, Dental Health Center, Educ. Res. Branch, San Francisco, Calif.).
Human Factors, vol. 11, Apr. 1969, p. 149–156. 64 refs.
Human Factors Soc., 12th Ann. Meeting, Chicago, Oct. 1968.

Review of the vigilance literature of the past two decades reveals that the results of most studies have questionable application to industrial inspection tasks for which they were, in part, designed to investigate. It is concluded that: (1) little or no evidence exists indicating that the oft-found decrement in the laboratory has a parallel in the industrial (or military) setting; (2) motivational variables may comprise the key to explaining the decrement and general law level of performance; (3) the decrement may be an artifact arising from a general failure of subjects to follow experimental instructions; and (4) many characteristics of inspection tasks bear little resemblance of those of vigilance tasks. These conclusions are supported by a body of evidence which can no longer be ignored by the serious investigator seeking to understand vigilance behavior and expecting to generalize his results. Redirection of vigilance research and greater experimental control are emphasized.

A69-81144
WORK PHYSIOLOGY.
Harry L. Davis, Terrence W. Faulkner, and Charles I. Miller (Eastman Kodak Co., Rochester, N.Y.).
Human Factors, vol. 11, Apr. 1969, p. 157–165. 8 refs.

The Human Factors Group at Kodak Park has been actively studying industrial jobs for ten yr. Some of the most useful techniques of analysis are provided by the discipline of work physiology. This approach can be used: (1) to decide if a specific job is within the physical capabilities of people; (2) to decide which of two proposed methods is easier; (3) to evaluate in laboratory simulations the demands that will be posed by new jobs while they are still in the design stage; (4) to determine if a specific individual is able to perform certain jobs; and (5) to rank jobs according to physical difficulty for wage and salary purposes. These applications are illustrated by discussing studies of actual industrial jobs.

A69-81145
FUSION AND NONFUSION AS FACTORS IN AVERSION TO HIGH LUMINANCE.
William Mathis and Charles M. Bourassa (Good Samaritan Hosp. and Med. Center, Lab. of Neurophysiol., Portland, Ore.).
Vision Research, vol. 8, Dec. 1968, p. 1501–1506. 11 refs.

Exposure to high levels of luminance results in an experience of intense aversion. In the present experiment, subjects were asked which of two briefly presented viewing conditions were preferable. Study one reconfirmed the earlier findings that binocular viewing of high luminance was more aversive, i.e. less preferred, than monocular viewing. Study two showed that breaking fusion reduced aversion and study three showed that the increased aversion in binocular viewing depends on stimulation of corresponding retinal points. It was also found that stimulation of corresponding points on peripheral retinas produced more aversion than did stimulation of foveal retinas.

A69-81146
REVERSIBLE IMPAIRMENT OF THE HUMAN VAPOR BARRIER: AN ATTEMPT TO INCREASE WATER EXCRETION.
Frank E. Gump (Columbia U., Coll. of Physicians and Surgeons, Dept. of Surg., New York City, N.Y.).
Annals of Surgery, vol. 169, Mar. 1969, p. 386–391. 24 refs.

A simple gravimetric method for local measurement of cutaneous water loss has been described. Normal measurements on the forearm in afebrile resting subjects averaged 5.94 ± 1.32 gm. $H_2O/m.^2/hr$. The contribution of sweat land secretion to so-called insensible water loss has been stressed and explains the disparity between local (capsule) and whole body measurements of cutaneous water loss. Cutaneous water loss was increased by impairment of the vapor barrier following topical application of selected agents. It was possible to double water loss with bipolar solvent combinations resembling dimethylsulfoxide. The clinical applications of this study and the limitations of presently available agents have been discussed.

A69-81147
EVALUATION OF THE CAPACITY OF PULMONARY DIFFUSION FOR THE CARBON MONOXIDE IN RE-RESPIRATION DURING EXERCISE. RESULTS IN NORMAL SUBJECTS [VALUTAZIONE DELLA CAPACITA DI DIFFUSIONE POLMONARE PER IL CO IN RIRESPIRAZIONE DURANTE ESERCIZIO MUSCOLARE. RISULTATI IN SOGGETTI NORMALI].

G. Poggi, G. Pezzagno, and U. Pozzi (Pavia, U., Ist. di Med. del Lavoro, Italy).
Lavoro Umano, vol. 20, Nov. 1968, p. 513–522. 35 refs. In Italian.

The authors studied in 10 healthy, young, male subjects the behavior of the capacity of pulmonary diffusion for the CO (Dp) during exercise carried out on a cycloergometer at three levels of load corresponding to 70, 100 and 150 w. The measurement was performed following a method in re-respiration. Before the measurement of Dp the ventilatory and gaseous exchange data were collected by means of a Fleisch's metabograph. It was thus possible to control always, before the measurement of Dp, the attainment of the steady state. The values of Dp_{100} obtained during the three levels of load do not differ significantly each from the other. It was thought that the increase of Dp during exercise is due mainly to an increase of the pulmonary capillary volume (Vc) and therefore of the surface of exchange.

A69-81148
DIPHENIDOL AND VESTIBULAR FUNCTION.
Richard D. Katz, Abraham Eviatar, and Victor Goodhill (Calif., U., School of Med., Dept. of Surg., Div. of Head and Neck Surg., Otol. Sect. and Cedars-Sinai Med. Center, Cedars-Sinai Med. Res. Inst., Div. of Otolaryngol., Los Angeles).
Archives of Otolaryngology, vol. 89, Mar. 1969, p. 488–493. 10 refs.
Cedars-Sinai Gen. Res. Support Fund and Hope for Hearing Res. Found. supported research.

The vestibular suppressant effects of diphenidol (Vontrol) have been studied in rabbits of Dutch strain and compared with the effects of chlorpromazine (Thorazine). Diphenidol has been found to be a relatively ineffective, short-acting, and unpredictable suppressant of vestibular activity, as compared with chlorpromazine. A high incidence of side effects, including excitement, tremors, clonic movement of the extremities, tachypnea, and spontaneous nystagmus, followed injection with diphenidol.

A69-81149
NYSTAGMUS.
J. M. Fredrickson, R. L. Goode (Stanford U., Div. of Otolaryngol. Palo Alto, Calif.), H. H. Kornhuber (Hochschule, Med.-Naturwiss., Dept. of Neurol., Ulm, West Germany).
Archives of Otolaryngology, vol. 89, Mar. 1969, p. 504–511. 16 refs.

Despite what might be presumed on the basis of the vestibular end organ location with the cochlea, the electrophysiological evidence places the primate's cortical receiving area in the postcentral gyrus, and not in the temporal lobe. Directional preponderance of caloric induced nystagmus does not appear to be a reliable localizing sign for a temporal lobe lesion. Rather, when a lesion of the posterior cortical region extends to the underlying white matter and interrupts oculomotor efferents, a diagnostically significant diminution of optokinetic nystagmus to the opposite side results. Although neck joint afferents project to the vestibular nuclei, positional nystagmu of the peripheral type cannot be explained by cervical dorsal root lesions. Eye muscle afferents do not reach consciousness. They are, however, probably important for a servomechanism which executes oculomotor commands. A clinically practical classification of spontaneous nystagmus is provided consisting of: (1) vestibular nystagmus (jerk nystagmus which may be of peripheral or central origin); (2) gaze nystagmus (always of extravestibular central significance, either lesional or toxic); and (3) fixation nystagmus (usually a pendular nystagmus of congenital origin which is probably a central defect, but nonprogressive with a good prognosis).

A69-81150
THE EFFECTS OF GAMMA IRRADIATION ON THE DEHYDROGENASE ACTIVITIES AND ON THE PROTEINS OF IRISH GROWN WHEATS.
C. E. O'Hara (Agr. Inst., Dept. of Plant Chem. and Biochem., Oak Park, Carlow, Great Britain).
Radiation Botany, vol. 9, Feb. 1969, p. 33–38. 15 refs.

Grain samples of spring varieties Atle, Quern and Progress were treated with 1×10^6 rads and 5×10^6 rads of ^{60}Co γ-rays. The lower dose reduced production of formazan from 2,3,5-triphenyltetrazolium chloride (TTC) to 33% and 36% of the controls in the varieties Atle and Progress respectively, and to 48% in the case of Quern. At the higher dose no formazan was produced. Irradiation increased apparent biuret protein contents. This was further investigated by measuring the quantities of biuret protein and nitrogen extracted by 0.01 M pyrophosphate buffer, 0·05 N acetic acid and 0·1 N potassium hydroxide. In Progress and Quern varieties the irradiation increased the amount of pyrophosphate and acetic acid soluble biuret protein and nitrogen at the expense of the potassium hydroxide soluble biuret protein and nitrogen. In Atle the pyrophosphate and potassium hydroxide soluble biuret protein and nitrogen increased, with a decrease in acetic acid soluble biuret protein and nitrogen. These results show that the solubility properties of the proteins of Quern are like those of Progress, rather than Atle after irradiation.

A69-81151
VARIABLES INFLUENCING THE ENERGY METABOLISM OF THE BRAIN IN NORMO- AND HYPOTHERMIA.
H. S. S. Sarajas, Hely Oja, and S. S. Oja (Helsinki, U., Inst. of Physiol., Finland).
Annales Medicinae Experimentalis et Biologiae Fenniae, vol. 46, no. 4, 1968, p. 547–551. 25 refs.
Sigrid Jusélius Found. and Natl. Res. Council for Med. Sci. supported research.

The brain content of high energy phosphates and of some carbohydrate constituents was studied in three wk. old normothermic rats, which were unanesthetized or kept under barbiturate or ether anesthesia for varying periods, and in similarly anesthetized rats undergoing hypothermia of varying degrees and duration. In rats subjected to hypothermia of 23° C. for 10, 90 and 210 min. when under barbiturate anesthesia the brain contents of creatine phosphate (CrP), adenosine triphosphate (ATP) and glycogen were maintained. As compared to the levels obtained after 10-min. barbituarate anesthesia in normothermia the CrP content, together with the inorganic phosphate, even increased but the brain contents of lactate and glucose decreased. Following hypothermia of 210 min., however, the contents tended to be restored. The phosphate and carbohydrate constituents were maintained even in rats incurring terminal asphyxia as a result of progressive cooling to 20° C. under barbiturate anesthesia.

A69-81152
COMPUTER ANALYSIS OF HIPPOCAMPAL RHYTHM IN HYPOTHERMIC RABBITS.
P. T. S. Putkonen, H. S. S. Sarajas, and D. Stenberg (Helsinki, U., Inst. of Physiol., Finland).
Annales Medicinae Experimentalis et Biologiae Fenniae, vol. 46, no. 4, 1968, p. 552–556. 11 refs.
Natl. Res. Council for Med. Sci. supported research.

Gross electrical activity of the dorsal hippocampus was tape-recorded via chronically implanted electrodes from rabbits warming up spontaneously from induced hypothermia. Ten-sec. samples of the hippocampograms were analyzed with a digital

computer at 2° C. intervals within the hippocampal temperature range of 22° to 36° C. Rhythmic waves of some 0.8 c.p.s. were seen to emerge in most of the power spectra at 24° C. The dominant frequencies could be accurately calculated from the autocorrelograms beginning at 26° C. They rose linearly from 1.8 to 5.2 c.p.s. at 36° C. was reached. The activity was maximally concentrated into the band of the dominant frequency at 26° (average 36% of the activity). Following this the spectra gradually became more scattered with the rising temperature. The amplitude variance of the records rose abruptly during the development of rhythmic activity between 24° and 26° C., to remain practically uneffected thereafter by the rising temperature.

A69-81153
LIGHT DRIVEN SCATTERING CHANGES AND INCREASED 515 nm ABSORBANCE CHANGES ASSOCIATED WITH FATTY ACID INHIBITION OF PHOTOSYNTHESIS IN CHLORELLA.

R. G. Hiller (Calif., U., Lawrence Radiation Lab., Chem. Biodyn. Div., Berkeley).
Biochimica et Biophysica Acta, vol. 172, Apr. 8, 1969, p. 546–552. 14 refs.
C. F. Kettering Found. supported research.

The size and time of half decay of the 515 nm. positive and 475 nm. negative light driven absorbance changes in *Chlorella* was considerably increased by $1 \cdot 10^{-4} - 5 \cdot 10^{-4}$ M lipoic, caprylic and iodacetic acids and by $1 \cdot 10^{-5}$ to $8 \cdot 10^{-5}$ M nitrous acid. Salts of these acids at neutral pH, iodoacetamide and HCl did not affect the absorbance changes. The absorbance changes were restored to their original size and photosynthetic CO_2 fixation partially restored on washinging the cells free of lipoic acid. Light driven absorbance changes at 350 nm. (positive), 405 nm., 425 nm., 450 nm. and 648 nm. (all negative) were unchanged in magnitude on addition of acid but their decays were slowed. The greater part of the 515 to 475 nm. changes is therefore not due to Chlorophyll b. Addition of 10^{-3} M caprylic, lipoic, iodoacetic acids, methyl octonoate and hexyl resorcinol caused slow reversible light driven scattering changes which were not associated with volume changes of the whole cell.

A69-81154
INDUCTION OF RESPIRATORY METABOLISM IN ILLUMINATED CHLORELLA PYRENOIDOSA AND ISOLATED SPINACH CHLOROPLASTS BY THE ADDITION OF VITAMIN K5.

G. H. Krause and J. A. Bassham (Calif., U., Lawrence Radiation Lab., Lab. of Chem. Biodyn., Berkeley).
Biochemica et Biophysica Acta, vol. 172, Apr. 8, 1969, p. 553–565. 20 refs.
AEC supported research.

The effects on photosynthetic metabolism in *Chlorella pyrenoidosa* and in isolated spinach chloroplasts of adding vitamin K_5 were investigated. The most pronounced effect was the induction of the oxidative pentose phosphate cycle in the light, as indicated by the immediate appearance of 6-phosphogluconic acid upon the addition of vitamin K_5. The appearance of 6-phosphogluconic acid in isolated spinach chloroplasts demonstrated the operation of the oxidative pentose phosphate cycle in chloroplasts. The induction of the oxidative cycle was accompanied by inactivation of two enzymes of the photosynthetic carbon reduction cycle, or reductive pentose phosphate cycle. Those enzymes were fructosediphosphatase and phosphoribulokinase. Some inactivation of ribulosediphosphate carboxylase was also indicated. The inactivation of these enzymes may be related to the normal light-dark regulation of metabolism *in vivo*. Although it has been reported that addition of vitamine K_5 stimulates cyclic photophosphorylation in broken chloroplasts, such addition in the present experiments caused no increase in the level of ATP in photosynthesizing *Chlorella* or photosynthesizing intact spinach chloroplasts. A study of the changes of levels of labeled amino acids and carboxylic acids in photosynthesizing *C. pyrenoidosa* upon the addition of the inhibitor showed an increase in the levels of glutamic and citric acids and a decrease in the levels of aspartic and malic acids. These changes were interpreted as indicating a stimulated increase in the rate of oxidation of pyruvic acid to CO_2 and acetyl-CoA, which may increase the rate of conversion of oxaloacetic acid to citric acid, leading ultimately to the production of glutamic acid.

A69-81155
MARS: CORRELATION OF OPTICAL AND RADAR OBSERVATIONS.

J. C. Robinson (N. Mex. State U., Obs., Las Cruces).
Science, vol. 164, Apr. 11, 1969, p. 176–177.
NASA Grants NsG-142-61 and NGR-32-003-027.

A comparison of recent photographic and radar data on Mars indicates a good positive correlation between dark areas and radar reflection peaks and also between cloudy "desert" areas and radar minima. The data may be taken as evidence that dark areas are, in general, relatively smooth whereas deserts are relatively rough.

A69-81156
CIRCADIAN RHYTHM OF SEROTONIN IN THE PINEAL BODY OF IMMUNOSYMPATHECTOMIZED IMMATURE RATS.

Conceicao R. S. Machado, Laurence E. Wragg, and Anglo B. M. Machado (Northwestern U., Dept. of Biostruc., Chicago, Ill.).
Science, vol. 164, Apr. 25, 1969, p. 442–443, 13 refs.
Grant NIH 5 SO 1 FR 0531106 and Rockefeller Found. (A.B.M.M.) supported research.

In the pineal body of the immature rat the circadian rhythm of serotonin persists when sympathetic innervation is abolished by the administration of nerve growth factor antiserum. This rhythm is regulated by a mechanism that does not involve the sympathetic innervation and is, therefore, fundamentally different from that in the adult.

A69-81157
ENCEPHALIC CYCLES DURING SLEEP AND WAKEFULNESS IN HUMANS: A 24-HOUR PATTERN.

Ekkehard Othmer, Mary P. Hayden, and Robert Segelbaum (Washington U., School of Med., Dept. of Psychiat., St. Louis, Mo.).
Science, vol. 164, Apr. 25, 1969, p. 447–449. 11 refs.
Grants NIMH MH-07081 and NIMH MH-19247.

Twenty-four-hr. polygraphic tracings from normal humans indicate that a pattern of alternating periods of the presence and absence of rapid eye movement, shown to exist for normal sleep, exist over all 24 hr. of the daily period. This finding suggests that the so-called sleep-dream cycle of human sleep is not specific to sleep, but is a general activity pattern of the brain.

A69-81158
STEREOSCOPIC AND RESOLUTION ACUITY WITH VARIOUS FIELDS OF VIEW.

S. M. Luria (Naval Submarine Med. Center, Groton, Conn.).
Science, vol. 164, Apr. 25, 1969, p. 452–453. 12 refs.

Progressively restricting the field of view—without, however, obstructing the binocular visibility of the targets—does not affect resolution acuity, but stereoacuity is increasingly degraded.

A69-81159
INTEROCULAR TRANSFER OF ORIENTATIONAL EFFECTS.
Alberta S. Gilinsky and R. S. Doherty (Bridgeport, U., Dept. of Psychol., Conn.).
Science, vol. 164, Apr. 25, 1969, p. 454–455. 6 refs.
Grant NSF GB-6067.

Prolonged exposure of one eye to a diagonal line grating produces masking or decreased sensitivity for similar test gratings presented to the contralateral eye. These aftereffects are orientationally selective and suggest that narrow orientationally tuned channels found by electrophysiological methods in the visual cortex of the cat and the monkey may have neural correlates in the human brain.

A69-81160
RESPONSIVENESS OF THALAMIC AND CORTICAL MOTOR RELAYS DURING AROUSAL AND VARIOUS STAGES OF SLEEP.
M. Steriade, G. Iosif, and V. Apostol (RSR Acad., Inst. of Neurol., Bucharest, Rumania).
Journal of Neurophysiology, vol. 32, Mar. 1969, p. 251–265. 48 refs.

The responsiveness of the motor cortex and thalamic ventrolateral nucleus (VL) was investigated during protracted or short conditioning high-frequency stimulation of the mesencaphalic reticular formation in acute preparations at different levels of wakefulness and sleep (with bulbospinal, midpontine pretrigeminal, and rostropontine transections) and during sleep-wakefulness cycle in chronically implanted cats. Cortical responsiveness was tested by studying potentials evoked in the precruciate area by VL and red nuclear stimulation, and by analysis of VL-elicited or cortically evoked responses of the pyramidal tract; thalamic responsiveness was estimated by analysis of the VL postsynaptic response to stimulation of the cerebellothalamic pathway at the level of the red nucleus. During RF-induced arousal reaction in encéphale isolé cats (or increased wakefulness in midpontine pretrigeminal preparations) and on natural arousal from slow-wave sleep in behaving animals, VL responses were enhanced and polysynaptic responses relayed in the motor cortex were depressed, as indicated by the analysis of different components recorded in the pyramidal tract. Thus, the depression of the motor cortex responses during reticular arousal is so powerful that it appears in spite of the increased output from the VL. Decrease of the VL-evoked motor cortex response on natural arousal from slow-wave sleep contrasted with enhancement of the simultaneously recorded VPL-evoked response in the somesthetic area. Decrease of motor cortex responses during wakefulness is not dependent on desynchronization of the electrocorticographic (ECoG) activity, since it persisted during the arousal reaction even with an unmodified synchronized ECoG activity following administration of atropine. In sleeping, rostropontine preparations stimulation of the remaining reticular formation, in front of the transection, enhanced VL postsynaptic responses and abolished great cortical fluctuation in such preparations, decreasing the greatest cortical potentials to a level which exceeded, however, that of the obliterated responses during spindles. During drowsiness with ECoG spindles (onset of the natural sleep), a virtual disappearance of the VL postsynaptic response was observed, thus depriving the motor cortex of the input required for elaboration of a response to a rubral stimulus. With partial recovery of the VL output during slow-wave sleep, intrinsic cortical components develop and become even greater than during wakefulness. The paradoxical phase of sleep is characterized by maximal enhancement of the VL responsiveness, but by depression of cortical components evoked by postthalamic or direct cortical stimulation. The dissociation between responsiveness of the VL nucleus and motor cortex during wakefulness and various stages of sleep is discussed.

A69-81161
OBSERVATIONS ON TYPES OF RESPONSE TO COMBINATIONS OF NECK, VESTIBULAR, AND MUSCLE STRETCH SIGNALS.
Jeh Hyub Kim and Lloyd D. Partridge (Chon-Nam U., Med. School, Dept. of Physiol., Korea and Tenn., U., Med. Units, Dept. of Physiol. and Biophysics, Memphis).
Journal of Neurophysiology, vol. 32, Mar. 1969, p. 239–250. 31 refs.
Grant ESRF N-657.

Decerebrate cats were prepared for electrical stimulation of individual branches of the vestibular nerve, mechanical stretch of the triceps surae muscle, and rotation of the head with respect to the body. During ramp stretches the total muscle tension was measured. Stimuli were used in various combinations. Utricular nerve stimulus generally increased tension but in a few cats reduced tension. Individual canal nerve stimulus on either side gave effects which were qualitatively independent of the particular branch stimulated and were similarly indistinguishable from effects of utricular branch stimulus. Neck rotation was found to attenuate the action of utricular nerve stimulus on reflex tension, whatever the nature of the utricular nerve action. Two significantly different types of nerve signal combinations were demonstrated, multiplicative and additive. It is proposed that these should regularly be differentiated in all experiments involving combination of input signals in reflexes. A possible functional use of a multiplicative combination of vestibular signals with muscle stretch is proposed. This type if signal interaction could produce an effective postural adjustment during movement without the necessity of complex modifications to correct for different joint positions.

A69-81162
ATP ALTERATIONS IN ISOLATED BLOODLESS PERFUSED BABOON KIDNEYS WITH OXYGEN OR HELIUM GAS.
G. P. Murphy, R. Schoonees, J. H. Groenewald, C. P. Retif, J. J. W. van Zyl, and J. N. de Klerk (Johns Hopkins Hosp., James Buchanan Brady Urol. Inst., Baltimore, Md.; Stellenbosch, U., Fac. of Med.; and Karl Bremer Hosp., Bellville, Cape Province, South Africa).
Investigative Urology, vol. 6, Mar. 1969, p. 466–475. 11 refs.
Johns Hopkins Hosp., Stellenbosch, U., Cape Provincial Admin., and Western Province Blood Transfusion Serv. supported research.

Adenosine triphosphate (ATP) levels were measured in the renal artery, vein, and urine of 33 baboon kidneys during isolated bloodless perfusion, under normothermic, normobaric conditions and oxygen or helium exposure in the fresh state or after 24 hr. hypothermic (4°C.), hyperbaric (3 atm.) preservation. Some kidneys were subjected to ureteral occulsion. ATP is utilized by the oxygen exposed fresh kidney, and to a lesser degree immediately after renal preservation. Helium-exposed kidneys apparently do not utilize ATP to a similar degree. At any rate the renal responses to either gas in relation to ATP activity may be an index of kidney viability.

Kidneys in either gas environment respond to exogenous ATP which has a direct vasodilatory effect. Additional effects associated with ATP administration in either gas environment are reductions in the extraction ratios of PAH and creatinine, which reflect an intrarenal redirection of flow. ATP addition during ureteral occulsion alters some of the previously described renal circulatory responses.

A69-81163
DISUSE ATROPHY OF HUMAN SKELETAL MUSCLES.
Aneel N. Patel, Zohra A. Razzak, and Darab K. Dastur (J. J. Group of Hosp., Post Graduate Res. Labs., Neuropathol. Unit, Bombay, India).
Archives of Neurology, vol. 20, Apr. 1969, p. 413–421. 20 refs.
Muscular Dystrophy Group supported research.

Disuse atrophy of human voluntary muscle was studied in 14 cases, 11 with immobilization in plaster or traction after fracture of limb bones, two in plaster shells for spinal tuberculosis, and one with prolonged coma before death. Biopsy of the corresponding muscle of the opposite normal limb was also obtained in some. Frozen sections stained for succinic dehydrogenase activity revealed no significant difference in the activity between the immobilized and normal limb muscles. Histological atrophy of muscle fibers due to disuse was manifest in the form of small or large groups of atrophied fibers in five of the 14 cases. Measurements of fiber diameters in frozen and paraffin sections revealed these differences to be statistically significant. There was no correlation between the duration of immobilization and the degree of atrophy or between the latter and the girth of the immobilized limb. Except for relative increase of muscle nuclei in the atrophied fibers, there was no discernible change in the structure of the extrafusal or intrafusal muscle fibers (spindles seen in two cases), connective tissue, blood vesels, or nerves.

A69-81164
TIME RESPONSE OF JEJUNAL SUCRASE AND MALTASE ACTIVITY TO A HIGH SUCROSE DIET IN NORMAL MAN.
Norton S. Rosensweig and Robert H. Herman (Fitzsimmons Gen. Hosp., U.S. Army Med. Res. and Nutr. Lab., Metab. Div., Denver, Colo.).
Gastroenterology, vol. 56, Mar. 1969, p. 500–505. 11 refs.
Am. Gastroenterol. Assn., Natl. Meeting, Philadelphia, May 16, 1968.
Contract DA-49-007-MD-549.

This study determined the time required for the adaptive changes in human jejunal sucrase and maltase activities when dietary carbohydrate was changed from glucose to sucrose, sucrose to carbohydrate-free, and glucose to fructose. Four volunteer subjects were studied. The time for the increases and decreases in activity was two to five days and there was no further change for nine wk. thereafter. This time response is similar to the estimated time for intestinal epithelial cell turnover in the small intestine of man. It is proposed that the changes in disaccharidase activity produced by changes in dietary sugar content are due primarily to an effect on the crypt cell. The effect becomes increasingly manifest as these crypt cells divide and migrate up the villus.

A69-81165
SEQUENTIAL EFFECTS IN CHOICE REACTION TIME.
Roger W. Schvaneveldt and William G. Chase (Wis., U., Madison).
Journal of Experimental Psychology, vol. 80, Apr. 1969, p. 1–8. 14 refs.
Midwestern Psychol. Assn., Meeting, Chicago, May 1967.
NSF and Wis., U. Res. Comm. supported research.

Four experiments examined sequential dependencies in choice reaction time (RT) as a function of number of alternatives, stimulus-response (S-R) compatibility, and the intertrial interval (ITI). A fifth experiment investigated guessing strategies. The two-choice compatible RT data revealed speeded responses to stimuli following certain alternating as well as some repeating sequences of stimuli. Similar patterns were obtained in the guessing task of Exp. V. Negative recency occurred in both the two- and four-choice compatible tasks, and negative recency increased as ITI decreased. With less compatible S-R codes, repetitions facilitated RT in both two- and four-choice tasks only after two repetitions. With a highly incompatible four-choice task, one repetition was sufficient to facilitate RT maximally. With incompatible codes, ITI had no effect. It was suggested that the sequential effects in choice RT reflect processing strategies which depend on the complexity of the S-R code.

A69-81166
USE OF CUES IN THE VISUAL PERIPHERY UNDER CONDITIONS OF AROUSAL.
Donna M. Cornsweet.
Journal of Experimental Psychology, vol. 80, Apr. 1969, p. 14–18. 7 refs.
Grant PHS MH-13,622-02.

Evidence from various experiments indicates that under conditions of arousal, subjects are less attentive to information occurring in the visual periphery. It is not clear whether these findings resulted from the fact that the information presented to subjects's visual periphery was irrelevant to his primary task or from the fact that aroused subjects are less sensitive to peripheral visual information of any kind. In the present study, the peripheral visual cues were task relevant. Aroused subjects not only showed no reduction in range of cue use, but findings indicate that they, in fact, used the peripheral visual cues to a significantly greater degree than did nonaroused subjects.

A69-81167
INTERFERENCE IN SHORT-TERM MEMORY.
Gerald M. Reicher, Carol H. Conrad (Ore., U., Eugene), and Elizabeth J. Ligon (Mich., U., Ann Arbor).
Journal of Experimental Psychology, vol. 80, Apr. 1969, p. 95–100. 8 refs.
Contract AFOSR F44620-67-C-0099.

Two experiments investigated the locus of the effects of acoustic similarity in short-term memory. In the first, acoustic similarity of words making up the to-be-remembered list was varied independently of the acoustic similarity between the correct and incorrect response alternatives. The results indicate that subjects are more likely to choose the alternative which is similar to the greatest number of items in the list. A second experiment using a one-alternative yes/no procedure attempted to insure that the effects were not due to a guessing strategy and to allow the use of the signal detectability measure of sensitivity. Similarity within the list was shown to increase both hit and false-alarm rates resulting in an overall loss of sensitivity.

A69-81168
EFFECTS OF SECOND SIGNALS ON RESPONSE TIME TO FIRST SIGNALS UNDER CERTAINTY AND UNCERTAINTY.
Louis M. Herman (Hawaii, U., Honolulu).
Journal of Experimental Psychology, vol. 80, Apr. 1969, p. 106–112. 12 refs.
Grant NIMH MH-10831 and Hawaiian Elec. Co. supported research.

The effects of a second signal (S2) on response time (RT) to a first signal (S1) were investigated. Three groups of 16 subjects, matched for response speed on a pretest, were subsequently tested for RT to an S1 light under (a) stimulus-response certainty and (b) stimulus-response uncertainty. For Groups 1 and 2, an S2 light, requiring no response, followed S1 at interstimulus intervals (ISIs) of either 50, 100, or 150 msec., randomly selected, or not at all. For Group 1, two lights were in a reciprocal relation as S1 and S2; if one flashed on first, the other became the potential S2 light. For Group 2, the same two lights served as S1, but a third light was used exclusively for S2. Group 3 was never exposed to an S2 light. Results showed no significant group differences under the certainty condition. Under uncertainty, RT for Group 1 was significantly longer than that for either Group 2 or Group 3, but the latter two groups did not differ significantly. These effects were independent of ISI. The results were interpreted in terms of response-conflict views of double-stimulation effects.

A69-81169
VERBAL TESTS OF SPATIAL CONCEPTUALIZATION.
Lawrence C. Hartlage (Goodwill Ind., Indianapolis, Ind.).
Journal of Experimental Psychology, vol. 80, Apr. 1969, p. 180–182. 13 refs.

Spatial conceptualization in blind and sighted subjects was measured from ages seven through 18. Blind children without other impairment were matched with sighted children for age, sex, and estimated intellectual ability. There was a total of 100 blind and sighted subjects from five age levels. With control for ordering ability, the sighted subjects performed significantly better than blind subjects on spatial concepts at all grade levels. It was concluded that vision may be crucial in the development of spatial ability.

A69-81170
PERCEPTION OF LETTER ARRAYS AS A FUNCTION OF ABSOLUTE RETINAL LOCUS.
Maurice Hershenson (Wis., U., Madison).
Journal of Experimental Psychology, vol. 80, Apr. 1969, p. 201–212. 7 refs.

Perceptibility was found to be a function of absolute retinal locus with fixation on the second, fourth, or sixth position of briefly exposed, seven-letter arrays. These results suggest that perceptual reports are frequently contaminated with contributions from postperceptual processing in recognition experiments.

A69-81171
EFFECTS ON RABBIT MYOCARDIUM FOLLOWING SINGLE THORACIC IRRADIATION BY 200 kV X-RAYS, COBALT GAMMA RAYS AND 15.5 MeV ELECTRONS [HERZMUSKELVERANDERUNGEN DES KANINCHENS NACH EINZEITIGER THORAXBESTRAHLUNG MIT 200 kV-RONTGEN, KOBALT-GAMMA-STRAHLEN UND 15.5 MeV-ELEKTRONEN].
D. Kranz, J. Kunz, and H. Hegewald (Humboldt-U., Pathol. Inst., Berlin, East Germany).
Experimentelle Pathologie, vol. 2, no. 6, 1968, p. 351–359. 25 refs. In German.

The heart is considered to be irradiation resistent and hitherto cardiac lesions have been reported only after high doses of irradiation. The effect of various rays emphasizing the light microscopically demonstrable early changes as well as possible dependence of the degree of changes and period of survival of the experimental animals was studied. Two groups of 30 rabbits each were exposed to single 200 kv. X-radiation or to highly energetic electron beams. Thirty-six rabbits were exposed to cobalt gamma rays. Nineteen rabbits were used for control purposes. Single thorax irradiation was applicated by anterior-dorsal ray path to the animals fixed on a holder shelf. The radiated area was cranially limited by the upper margin of the sternum and caudally by the attachment of the processus ensiformis. In all the experiments the radiation-exposed area was 6×8 cm.^{2}, the supposed focal depth was 1.5 cm. The period of survival of the experimental animals varied from 12 hr. to five mo. The irradiation-induced changes were placed in three changes: (1) hyperemia of terminal flow with beginning exsudation, extended perivascular, interstitial and subepicardial edema, sparse perivascular round cell and eosinophilic leucocyte infiltrations; (2) necrosis and cell proliferation, focal necrosis of the heart muscle fibers, occurrence of myocardial necroses varying in extension prevailingly in the right ventricle, formation of polynuclear giant cells as well as proliferation of the interstitial connective tissue and of the pericardial surface cells, proliferation in the inner coat of the middle-calibrated vessels; and (3) late alterations (stage of fibrosis), formation of small spotted or coarse myocardial weals mainly in the musculature of the right ventricle, perivascular fibrosis and in single animals intramural focal calcifications. The first light microscopically visible changes were observed 12 hr. after irradiation. For the prevailing localization of the severe myocardial lesion in the right ventricle. The higher sensitiveness of this part of the heart against metabolic disorders are thought to be responsible. An additional charge originates in the simultaneously occurring alterations of the lungs. At these early stages no changes in the coronary arteries can be made responsible. There are discussed the possibilities of the origin of myocardial necroses in disorders of electrolysis which are considered to be a consequence of radiation dependent changes of membrane permeability. In the major coronary vessels later alterations occur producing constrictions of the inner coat and secondarily intensification of myocardial lesions. The additionally observed histopathologic changes are according to those previously reported in literature. It is made evident that none of the three applicated types of irradiation really produces different appearances if the same conditions, as there are similar dose power and similar dose distribution in the object, are taken into consideration. The increase in number of severe cardiac necroses induced by high speed electron effect is correlated to the higher number of animals surviving for a longer period, as an interval of some weeks from irradiation to examination leads to an increase of heart of muscle injuries independent of the type of the beams. This occurs mainly after application of feeble focal doses, whereas permeability disorders are prevailing after application of higher focal doses. This is evidently basing on a survival period lasting from some days up to some weeks. In this coherence also inhibition of the reactivity of connective tissue induced by higher doses of irradiation has to be discussed.

A69-81172
INFLUENCE OF INTESTINAL BACTERIA ON BILE ACID METABOLISM AND FAT ABSORPTION.
Irwin H. Rosenberg (Boston City Hosp., II and IV (Harvard) Med. Serv., Thorndike Mem. Lab. and Harvard Med. School, Dept. of Med., Boston, Mass.).
American Journal of Clinical Nutrition, vol. 22, Mar. 1969, p. 284–291. 53 refs.
Grants NIH AM-09115, NIH AM-5413, and NIH FR-0076.

The influence of intestinal bacteria on bile acid metabolism and fat absorption was discussed, and insights gained from studies of patients with intestinal bacterial overgrowth were summarized. A brief resume of normal physiological interactions was presented

as a background to discussion of the blind-loop syndrome. In a variety of disease states characterized by intestinal bacterial overgrowth, these normal relationships are altered with prominent physiological consequences. Recent clinical studies have suggested two possibilities as explanations for steatorrhea of the stagnant-loop syndrome: (1) the growth of organisms might elaborate toxic substances that either damage the mucosa or inhibit normal absorption mechanisms; and (2) the organisms might degrade enzymes or cofactors that are necessary for normal digestion and absorption. The necessity for continuing investigation was indicated.

A69-81173

CHANGES IN THE RESISTANCE OF THE ORGANISM AND ITS TISSUES IN ADRENALECTOMIZED ANIMALS DURING MUSCULAR WORK AND UNDER THE EFFECT OF DIBAZOL [IZMENENIE REZISTENTNOSTI ORGANISMA I EGO TKANEI U ADRENALEKTOMIROVANNYKH ZHIVOTNYKH PRI MYSHECHNOI TRENIROVKE I POD VLIIANIEM DIBAZOLA].

V. IA. Rusin.

Biologicheskie Nauki, no. 11, 1968, p. 34–38. 11 refs. In Russian.

Experiments conducted on white rats showed that adrenalectomy and auto-transplantation of suprarenal glands did not prevent the appearance of an increased resistance of the organism to cold, heat and physical exertion induced by muscular work and the administration of dibazol (2-benzylbenzimidazole hydrochloride). However, the correlation between the resistance of a whole animal and of some of its tissues was impaired as far as the hypophysis-adrenal system injury prevented the formation of tissue resistance in the adaptation process. It was suggested that intact hypophysis-adrenal system and tissue resistance were not an indispensable condition in the increase of specific and unspecific resistance of the whole organism.

A69-81174

LOCALIZATION OF CHOLINESTERASE IN CROSS-STRIATED MUSCLES OF ANIMALS UNDER VIBRATION EFFECTS [LOKALIZATSIIA KHOLINESTERAZY V POPERECHNOPOLOSATYKH MYSHTSAKH ZHIVOTNYKH PRI VIBRATSIONNOM VOZDEISTVII].

A. F. Lebedeva and N. E. Zhevrovskaia (Sanit.-Hyg. Med. Inst., Leningrad, USSR).

Arkhiv Patologii, vol. 30, no. 11, 1968, p. 45–48. 14 refs. In Russian.

The distribution of cholinesterase in the skeletal muscles was studied in albino rats subjected to vibration. Vibration stimulus caused changes in the localization of true cholinesterase in the cross-striated muscles of the rats. Along with normal localization of the enzyme, a fragmentation of the motor plaque structures was seen during short-term vibration, long-term action was followed by an increase of the number of changed motor plaques, the disappearance of structures and, at times, only motor plaque "shadows" remained. With increase of a vibration period the changes progressed gradually and proved to be most pronounced in the animals subjected to daily vibration (frequency 50 c.p.s., and amplitude of 0.8 mm.) for three and more months.

A69-81175

DEVELOPMENT OF INHIBITION OF THE SPIKE ACTIVITY OF SINGLE NEURONS IN THE RABBIT VISUAL CORTEX FOLLOWING LIGHT STIMULATION [RAZVITIE TORMOZHENIIA SPAIKOVOI AKTIVNOSTI V OTDEL'NYKH NEIRONAKH ZRITEL'NOI KORY KROLIKA PRI NANESENII SVETOVYKH RAZDRAZHENII].

V. B. Polianskii and E. N. Sokolov.

Biologicheski Nauki, no. 8, 1968, p. 21–24. 20 refs. In Russian.

The changes in the spike activity of single neurons in the visual cortex evoked by repeated rhythmic photic stimulation of 0.6 c.p.s. frequency, were studied in awake rabbits with the help of tungsten microelectrodes. In some neurons the progressive spread of complete inhibition of spike activity occurred on the 7th to 12th application of the stimulus; the complete inhibition lasted one to three sec. The inhibition spread progressively from the start of the interval between two stimuli to its middle. An hypothesis on the combined structure of the recurrent and tonic inhibition was suggested.

A69-81176

EFFECT OF NEUTRON IRRADIATION ON THE HEXOKINASE AND ALDOLASE ACTIVITY IN THE BRAIN AND CARDIAC MUSCLE OF RATS [VLIIANIE NEITRONNOGO OBLUCHENIIA NA AKTIVNOST' GEKSOKINAZY I AL'DOLAZY MOZGA I SERDECHNOI MYSHTSY KRYS].

M. F. Kukulianskaia, N. G. Guliaeva, and E. A. Shkrebneva.

Biologischeski Nauki, no. 8, 1968, p. 39–42. 18 refs. In Russian.

Exposure of rats to neutron irradiation in doses of 13.5 rads (dose rate 136 rem/hr.) induced the inhibition of hexokinase activity in the supernatant fluid and myelin fraction (mithochondrial subfraction) in the homogenates of brain tissues and low speed fraction of the heart muscle obtained by differential centrifugation. In the supernatant fluid of the heart muscle the hexokinase activity increased after irradiation. The changes of aldolase activity in the cellular fractions of both tissues were not significant.

A69-81177

THE CHANGES OF ELECTROLYTE AND UREA CONCENTRATION GRADIENTS IN THE RAT KIDNEY AFTER INJECTION OF DIAZOXID, PHENYLBUTAZON AND INDOMETHACIN.

J. Heller and P. S. Tata (Freie U., Dept. of Physiol., Berlin, East Germany).

Physiologia Bohemoslovaca, vol. 17, no. 1, 1968, p. 1–5. 16 refs.

Contract AF 61(052)-947.

The Na, K, and urea concentration gradients in the rat kidneys have been examined after injection of Diazoxide (3-methyl-7-chloro-1,2,4-benzothiadiazin-1, 1-dioxide), Phenylbutazone, and Indomethacine (1-/p-chlorobenxoyl/-5-methoxy-2-methylindole-3-acetic acid). The urine was examined for Na, K and urea and the plasma for Na. After the injection of Diazoxide (15 mg./kg.), the Na, K, and urea concentration were found to be elevated at the tip of the papilla. The urine flow was lowered, similarly as the sodium excretion. After the injection of Phenylbutazone (50 mg./kg.) the Na and K concentration in the papilla was elevated; the urea concentration was lowered, urine flow and sodium excretion were decreased. After administration of Indomethacin (10 mg./kg.) there were no changes in the electrolytes and urea gradients, or in renal function.

A69-81178

THE INFLUENCE OF CHLORTHALIDONE, ETOZOLINE AND TRIAMTERENE ON ELECTROLYTE AND UREA CONCENTRATION GRADIENTS IN THE RAT KIDNEY.

J. Heller and P. S. Tata (Freie U., Dept. of Physiol., Berlin, East Germany).

Physiologia Bohemoslovaca, vol. 17, no. 1, 1968, p. 6–11. 13 refs.

Contract AF 61(052)-947.

The sodium, potassium, and urea concentration in the cortex, inner and outer medulla, and in the papilla of the rat kidneys, was measured after injection of Chlorthalidone (1-oxo-3-/3'-sulfamyl-4'-chlorphenyl-3-hydroxy-isoindolin), Etozoline (2-carbaethoxy-methylene-3-methyl-5-N-piperidinothiazolidon-4), and Triamterene (2,4,7,-triamino-6-phenylpteridine). Sodium, potassium, and urea concentration in the urine as well as the plasma sodium concentration and urine and plasma osmolality were also measured. Chlorthalidone (20 mg./kg.) caused an increase in urine flow and in sodium and potassium excretion. The sodium and urea concentration gradients were lowered. Etozoline (50 mg./kg.) did not influence the sodium and potassium concentration in the kidney tissue. The urea concentration in the papilla was decreased. The urine flow, electrolytes, and urea excretion were increased. Triamterene (30 mg./kg.) increased the urine flow and sodium excretion without any effect on potassium excretion and electrolytes and urea concentration in the renal tissue.

A69-81179
EFFECT OF CATECHOLAMINES ON RESISTANCE OF THE MYOCARDIUM TO ANOXIA AND ON THE HEART GLYGOGEN CONCENTRATION.

O. Poupa, J. Procházka, and V. Pelouch (Czech. Acad. of Sci., Inst. of Physiol., Prague).

Physiologia Bohemoslovaca, vol. 17, no. 1, 1968, p. 36–42. 12 refs.

The finding that the repeated pretreatment of isoproterenol raised the resistance of the right ventricle of the heart to acute anoxia *in vitro* was verified. It was found that natural catecholamines (adrenaline, noradrenaline), administered repeatedly according to the same scheme as isoproterenol, did not raise the resistance of the isolated right ventricle to acute anoxia *in vitro.* Isoproterenol in the dose of one mg./kg. sharply lowered the resistance of the myocardium to acute anoxia *in vitro* within 60 min. Within 48 hr. after administration of this dose, however, the resistance of the myocardium rose to values significantly higher than the control values. This also occurred after the administration of the sixth dose of isoproterenol. A single dose of adrenaline and noradrenaline immediately influenced the resistance of the myocardium to acute anoxia *in vitro* substantially less. The repeated administration of catecholamines led to an increase in the heart glycogen concentration. After the fifth dose of isoproterenol it was fivefold, and after the fifth dose of adrenaline and noradrenaline only twofold a normal value. A difference was found in the immediate reaction of the heart glycogen reserves to the administration of isoproterenol and natural catecholamines. Within 60 min. after the administration of isoproterenol, depletion of the heart glycogen reserves occurred, but within 48 hr. the heart glycogen concentration was fivefold of the initial value. The same type of reaction was also found after the sixth dose of this substance. A reverse biphasic reaction was found after the administration of both natural catecholamines (an immediate increase, followed later by a decrease in the heart glycogen concentration).

A69-81180
THE EFFECTS OF SODIUM FLUOROACETATE ON THE RESPIRATORY EXCHANGE IN MICE AND RATS.

L. Novăk, J. Mišustová, and B. Hošek (Czech. Acad. of Sci., Inst. of Biophysics, Brno).

Physiologia Bohemoslovaca, vol. 17, no. 1, 1968, p. 97–103. 17 refs.
Czech. Physiol. Soc., 19th Meeting, Praha, Jan. 25, 1967.

It was found in mice and rats that an intraperitoneal injection of sodium fluoroacetate in sublethal doses of 2.5 to 7.5 mg./kg. produces a sharp decrease in the resting values of carbon dioxide output and oxygen consumption within 60 to 90 min. after the injection. In mice, the values of respiratory exchange decrease within two to five hr. following the injection of sodium fluoroacetate to a mere 15 to 20% of the initial values. The decrease of respiratory exchange coincides with the decrease of rectal temperature and falls into the period when citric acid accumulates in body tissues and when the sensitivity of the organism to irradiation occurs. The results are interpreted in favor of the hypothesis of the importance of the level of metabolic processes in the organism for its sensitivity to irradiation.

A69-81181
ADAPTATION OF RATS TO REPEATED OLIGEMIA OF THE CENTRAL NERVOUS SYSTEM PRODUCED BY POSITIVE RADIAL ACCELERATION OF 5 g.

S. Trojan and L. Jílek (Charles U., Fac. of Med., Inst. of Physiol., Prague, Czechoslovakia).

Physiologia Bohemoslovaca, vol. 17, no. 2, 1968, p. 153–159. 14 refs.

The effect of repeated general oligemia on the resistance of the organism and on the development of adaptive changes in the central nervous system was investigated. Oligemia was produced by positive radial acceleration of five g in rats in the initial periods of ontogenesis. None of the animals exposed to acceleration for 50 min. once daily from the first to the 17th day of life survived, while of those exposed for 25 min., 90% survived. The resistance of the central nervous system of these animals to ischemia (positive acceleration of 10 g) six and 48 hr. after the last exposure showed an increase of 50% and 65%. Of animals exposed to repeated oligemia from the 12th to the 17th day of life, 76% survived. The resistance of the central nervous system of these animals was raised only 48 hr. after the last exposure. After the exposure to oligemia of the central nervous system for 25 min. twice daily at four-hr. intervals from the first to the 17th day, 8% of the animals survived. After exposure under these conditions from the 12th to the 17th day, 60% survived. These rats had lower resistance to ischemia (10 g). After exposure to oligemia for 25 min. twice daily at six-hr. intervals, from the first and 12th day, 90% of the animals survived. The resistance of the central nervous system of these animals to ischemia (10 g) showed an increase of 70% and 60% respectively. Their resistance to ischemia (acceleration of 10 g) was also significantly higher than that of animals exposed to oligemia (acceleration of five g) once for 25 min. The results are discussed from the aspect of the reaction and adaptation of immature nervous tissue to oligemia and ischemia.

A69-81182
TISSUE METABOLISM IN RATS ADAPTED TO IMMOBILIZATION STRESS.

L. Macho, M. Palkovic, L. Mikulaj, and R. Kvetnanský (Slovak Acad. of Sci., Inst. of Endocrinol., Bratislava, Czechoslovakia).

Physiologia Bohemoslovaca, vol. 17, no. 2, 1968, p. 173–178. 23 refs.

The oxidation of glucose, pyruvate, alpha-ketoglutarate and succinate was determined in homogenates of the liver, heart and skeletal muscle in mornal rats and rats exposed to immobilization stress one, 10 and 40 times. The rate of oxidation of all substrates, excepting glucose, was decreased in the liver and skeletal muscle of rats immobilized once or 10 times. After 40 immobilizations rats adapt to this type of stress and the rates of oxidation were the same as in normal animals. In cardiac muscle the oxidation of substrates was increased in rats immobilized once or 10 times and considerably closer to normal in those adapted to this stress.

A69-81183
THE HEART-LUNG PREPARATION IN THE RAT: ACUTE ANOXIA AND TEMPERATURE.
J. Souhrada, K. Rakusan, and O. Poupa (Charles U., Fac. of Paediat., Inst. of Pathol. Physiol. and Czech. Acad. of Sci., Inst. of Physiol., Prague, Czechoslovakia).
Physiologia Bohemoslovaca, vol. 17, no. 2, 1968, p. 209–215. 21 refs.

The method of the "anoxic test" is described and evaluated in the working heart-lung preparation in the rat. A time value has been defined which determines the actual cardiac tolerance to anoxia, i.e. resistance of the heart to anoxia, and a quantitative evaluation has been made of the extend of cardiac damage caused by anoxia (restitution of the heart after anoxia). The protective effect of temperatures 26°C. and 34°C. upon the cardiac muscle has been demonstrated during anoxia.

A69-81184
ON GRAVI-SENSITIVITY IN PLANTS.
L. Anker (Botan. Lab., Utrecht, The Netherlands).
Acta Botanica Neerlandica, vol. 17, Oct. 1968, p. 385–389. 18 refs.

Comments are made on the following controversial points of the theory of geotropism: (1) the efficiency of the gravi-perception apparatus; (2) the candidature of starch for the statolith function; and (3) the existence of a gravi-perception sense organ.

A69-81185
EFFECT OF SODIUM FLUORIDE ON CALCIUM ABSORPTION AND BALANCES IN MAN.
Herta Spencer, Isaac Lewin, Josephine Fowler, and Joseph Samachson (Veterans Admin. Hosp., Metab. Sect., Hines, Ill.).
American Journal of Clinical Nutrition, vol. 22, Apr. 1969, p. 381–390. 31 refs.
Grants PHS DE-02486 and PHS AM-5572.

Calcium and phosphorus balances have been determined in nine patients under strictly controlled dietary conditions during a daily intake of an average of 20.6 mg. sodium fluoride. Calcium-47 absorption studies were conducted in eight of these patients. During sodium fluoride intake, the urinary calcium excretion of three of the nine patients was lower than in the control study. This decrease ranged from 15 to 30%. The fecal calcium excretions of the nine patients and the average calcium balances remained in a range similar to that in the control study. The phosphorus and nitrogen balances were similar in the experimental and control phases. In the majority of patients the plasma levels of Calcium-47 were lower during the intake of sodium fluoride than in the control studies indicating decreased absorption of Calcium-47. The average decrease of the Calcium-47 plasma levels was 30% and the average decrease in Calcium-47 absorption, determined from fecal Calcium-47 excretions, was 23%. These studies have shown that the intestinal absorption of calcium and the calcium balances did not improve during an intake of 20.6 mg. sodium fluoride/day given for 22–42 days.

A69-81186
ACUTE ANOXIA OF HEART MUSCLE IN A HEART-LUNG PREPARATION. THE EFFECT OF pH AND CARBON DIOXIDE TENSION OF THE PERFUSED BLOOD.
J. Souhrada, B. Mrzena, K. Rakusan, F. Zajic, and O. Poupa (Charles U., Fac. of Paediat., Inst. of Pathol. Physiol. and Czech. Acad. of Sci., Inst. for Cardiovascular Res. and Inst. of Physiol., Prague, Czechoslovakia).
Physiologia Bohemoslovaca, vol. 17, no. 6, 1968, p. 541–544. 13 refs.

Transient anoxia was induced in a heart-lung preparation from rats by ventilating the lungs with either pure nitrogen or with 95% nitrogen plus 5% CO_2. The resistance of the heart to anoxia (R_t) was prolonged if pure nitrogen was used, and so was the ability to recover from anoxia as determined by the magnitude of static work (Rep. %). The pH of the perfused blood and the pCO_2 remained unchanged if 5% CO_2 is added to the nitrogen. If the lungs are, however, ventilated with pure nitrogen, respiratory alkalosis was observed (an increase in pH and a fall in pCO_2 of the perfused blood). These data are discussed with respect to the relationship between acid-base equilibrium and cardiac metabolism during hypoxia.

A69-81187
RELATIONSHIP BETWEEN THE INTENSITY OF A LIGHT STIMULUS AND THE AMPLITUDE OF THE REACTION IN THE ELECTRORETINOGRAM IN MAN.
J. Peregrin and J. Sverak (Charles U., Med. Fac., Inst. of Physiol. and Ophthalmol. Clin., Hradec Kralove, Czechoslovakia).
Physiologia Bohemoslovaca, vol. 17, no. 4, 1968, p. 337–342. 13 refs.

The dependence of the potential values of the negative and positive components of the electroretinogram (ERG) in man on the intensity of photostimulation in the range of five log u. was studied. The relationship between the intensity of light stimuli and the potential value of the ERG [intensity-reaction (I-R) curve] can be expressed mathematically by a logistic function. Mathematical calculations and a comparison with the I-R curve of congenital hemeralopia indicate that the positive component of the ERG consists of a superposition of a photopic and scotopic wave at higher intensities. The time values of implicit times of both the negative and positive components of the ERG within the range of light stimuli used are given.

A69-81188
MAXIMUM OXYGEN CONSUMPTION DURING WORK-LOAD ON A TREAD-MILL.
S. Sprynarova (Res. Inst. of Phys. Cult., Prague, Czechoslovakia).
Physiologia Bohemoslovaca, vol. 17, no. 4, 1968, p. 383–393. 13 refs.

A group of 14 students were subjected to three different types of work-load and a tread-mill inclined at an angle of four % until subjectively exhausted. The maximum oxygen consumption values determined in progressively raised work-load and in constant work-load at two different rates were compared. The values of the maximum pulse rate, the lactate level in venous blood and the total running time were studied as criteria of the attainment of maximum oxygen consumption. The mean maximum oxygen consumption values found in the individual variants of the experiment did not differ, but differences were found in the mean values of lung ventilation, the respiration rate and oxygen utilization in the minute when maximum oxygen consumption was reached. Maximum oxygen consumption is a relatively constant value which can be attained over a relatively wide range of degrees of stress, but it is obtained in different ways. In low degrees of stress, maximum oxygen consumption is obtained by greater utilization of oxygen from the inspired air, with a lower respiration rate and smaller lung ventilation, while in high degrees of stress the reverse applies. A progressive increase in stress on the tread-mill, produced by raising the rate by 0.5 km./hr. every min., was regarded as a suitable method for the determination of maximum oxygen consumption.

Subjective exhaustion, which in this type of experiment led to work being stopped, correspond objectively to individual capacity. Maximum oxygen consumption is also correlated to a number of indices of circulatory and respiratory function during work-load in adults. Subjects with a higher oxygen ceiling have a more economical circulatory and respiratory reaction to a moderate degree of stress. In high degrees of stress (with full involvement of circulatory and respiratory function), the relationship between the oxygen ceiling and the manifestations of a more economical reaction to work-load is joined by the relationship between the oxygen ceiling and more economical energy output. The concept of maximum aerobic work is discussed.

A69-81189
INVESTIGATIONS OF THE BIOGENESIS OF CHLOROPHYLL A. 4. ISOLATION AND PARTIAL CHARACTERIZATION OF SOME BIOSYNTHETIC INTERMEDIATES BETWEEN MG-PROTOPORPHINE 9 MONOMETHYL ESTER AND MG-VINYLPHEOPORPHINE A 5, OBTAINED FROM CHLORELLA MUTANTS.

R. K. Ellsworth and S. Aronoff (Iowa State U., Dept. of Biochem. and Biophysics, Ames).

Archives of Biochemistry and Biophysics, vol. 130, Mar. 1969, p. 374–383. 19 refs.

Grant NSF GB 3935 and PHS supported research.

Through the use of mass, visible, and IR spectrometry on chromatographically-separated bands of esterified prophyrins and their derivatives obtained from *Chlorella* mutants AJ and BE, structures have been determined which appear to be the intermediates between Mg-protoporphine IX-65 methyl ester and protochlorophyllide *a* in the chlorophyll *a* pathway. A metabolic sequence is proposed which involves β-oxidation of the 62-propionate side chain to the 63-keto- derivative, which is then condensed with the γ-methine carbon to form the isocyclic ring of chlorophyll *a*. Reduction of the 42-vinyl- to the pheoporphine stage appears to be less specific, and possibly random. The β-oxidation sequence occurs for both the mono- and divinyl-protoporphine IX compounds. The proposed Δ^{63}-protoporphine IX compounds were not isolated, but their presence was inferred in the protoporphine IX band. The corresponding Mg chelates of the above porphyrins were isolated.

A69-81190
LIGHT-INDUCED NET UPTAKE OF SODIUM AND CHLORIDE BY CHLORELLA PYRENOIDOSA

J. Barber (East Anglia, U., School of Biol. Sci., Norwich, Great Britain).

Archives of Biochemistry and Biophysics, vol. 130, Mar. 1969, p. 389–392. 14 refs.

It has been found that a net uptake of Na^+ and Cl^- occurs when *Chlorella* cells are placed in the light. The magnitude of the intracellular levels and the kinetics of the tracer uptakes were similar for both ions. Removal of external Cl^- in the presence of other anions inhibited the Na^+ uptake. The results are interpreted as a light-induced accumulation of NaCl within a cytoplasmic compartment which is tentatively suggested to be the chloroplasts.

A69-81191
EFFECTS OF ANOXIA ON ENERGY-RICH PHOSPHATES, GLYCOGEN, LACTATE AND PYRUVATE IN THE BRAIN, HEART AND LIVER OF THE DEVELOPING RAT.

Pekka H. Maenpaa and Niels C. R. Raiha (Helsinki, U., Dept. of Med. Chem., Finland).

Annales Medicinae Experimentalis et Biologiae Fenniae, vol. 46, no. 3, 1968, p. 306–317. 44 refs.

Sigrid Juselius Found., Finnish Med. Found., Assn. for Aid of Crippled Children, and Helsinki, U. supported research.

Fetal (21 to 23 days), 1-day, 10-day and adult rats were placed in an atmosphere of pure nitrogen for periods which roughly corresponded to their survival times. Samples of brain, heart and liver were rapidly frozen at different times after the beginning of anoxia, and determinations made of their content of creatine phosphate, adenosine triphosphate, adenosine diphosphate, adenosine monophosphate, glycogen, lactate and pyruvate. In all tissues studied, the depression of the content of energy-rich phosphates was slower in fetal and newborn animals than it was in adults. The adenosine triphosphate level in the heart of fetal and nonetal animals, in comparison with that in the other tissues studied, displayed less rapid depression during anoxia. The initial rates of lactate accumulation during anoxia were about fivefold slower in the brain and heart of fetal and newborn animals than they were in adults. In the liver, this difference was less than twofold. The lactate/pyruvate ratio increased in the tissues of fetal and newborn animals at a slower rate than in adults.

A69-81192
THE USE OF MIDGET IMPINGERS AND MEMBRANE FILTERS FOR DETERMINING PARTICLE COUNTS.

Frank M. Renshaw, James M. Bachman, and James O. Pierce (Cincinnati, U., Coll. of Med., Dept. of Environ. Health, Kettering Lab., Ohio).

American Industrial Hygiene Association Journal, vol. 30, Mar.-Apr. 1969, p. 113–116. 7 refs.

Grant NIH TO1 UI 01061.

Two techniques for sampling airborne dust, the midget impinger and the membrane filter, were compared in a preliminary, statistically designed laboratory study. An aerosol consisting of polystyrene latex particles of 1.099 microns in diameter was generated in a chamber from which simultaneous samples were collected by the two methods indicated. The samples of aerosol thus obtained were prepared by standard laboratory techniques and counted by light field microscopy. The particle counts obtained from both sampling techniques were statistically compared and a relationship derived.

A69-81193
FLUORIDE ION ACTIVITY ELECTRODE FOR DETERMINATION OF URINARY FLUORIDE.

Mu-Wan Sun (N.Y. State Dept. of Labor, Div. of Ind. Hyg., New York).

American Industrial Hygiene Association Journal, vol. 30, Mar.-Apr. 1969, p. 133–136. 8 refs.

Urinary fluoride was determined directly using the fluoride ion activity electrode. The results were compared with values obtained from the microdiffusion colorimetric method and microdiffusion electrode method. The fluoride ion activity electrode was demonstrated to be a sensitive instrument which can be used to measure urinary fluorides without preliminary processing.

A69-81194
CHANGES OF THE ELEKTROLYTES IN THE RAT BRAIN DURING NORMAL DEVELOPMENT AND AFTER PRENATAL HYPOXIA.

M. Wender and O. Mularek (Med. Acad., Dept. of Neurol., Poznan, Poland).
Folia Biologica, vol. 16, no. 3, 1968, p. 247–255. 18 refs.

During the postnatal development of the rat a decrease of the sodium and chloride content in the brain was noted. During the same time the concentration of potassium was augmented. Experimental hypoxia occurring during the critical period of development of the rat (9.5 day of pregnancy) does not cause morphological developmental disturbances. In animals in which the experimental hypoxia was induced on the 9.5 day of fetal life a higher potassium content was found in the period between the first and 17th day of life. The water, sodium, and chloride content showed no deviations as compared with the data of the control animals.

A69-81195
MECHANICS OF BREATHING IN NORMAL SUBJECTS DURING BRIEF, SEVERE EXERCISE.
Robert Gilbert and J. Howland Auchincloss, Jr. (N.Y. State U., Upstate Med. Center, Dept. of Med., Syracuse).
Journal of Laboratory and Clinical Medicine, vol. 73, Mar. 1969, p. 439–450. 21 refs.
Grants PHS 2800 and PHS 2-K3-HE-19,414.

Thirteen normal subjects were studied during brief, severe treadmill exercise and during resting hyperventilation. Dynamic pulmonary compliance, expiratory non-elastic resistance, and total pressure change during the breathing cycle (Δ Pmax) were similar during exercise and hyperventilation. Inspiratory nonelastic resistance was slightly greater during exercise as compared with hyperventilation. A comparison of pressures, flows, and volumes during-spontaneous breathing at the exercise breaking point with those of forced vital capacity maneuver and maximum voluntary ventilation at the same degree of exercise showed that between 33 and 75% of the ventilatory reserves were utilized. There was no fixed value for Δ Pmax as which exercise was voluntarily terminated. Dyspnea was always greater during resistance breathing; Δ Pmax was always greater, but work of breathing was variable. Conclusions: (1) significant changes in pulmonary mechanics during brief, severe exercise are due to the accompanying hyperpnea; (2) dyspnea correlates better with Δ Pmax than with mechanical work of breathing; and (3) pulmonary mechanics do not dominate exercise performance in normal subjects.

A69-81196
EFFECT OF TEMPERATURE ON RESISTANCE TO ANOXIA AND OXYGEN CONSUMPTION OF THE ISOLATED HEART FROM HIBERNATING (GLIS GLIS) AND NON-HIBERNATING (RATTUS NORVEGICUS ALB.) MAMMALS.
O. Poupa, J. Procházka, and V. Pelouch (Czech. Acad. of Sci., Inst. of Physiol., Prague).
Physiologia Bohemoslovaca, vol. 17, no. 3, 1968, p. 237–240. 9 refs.

Changes in the resistance of cardiac muscle to acute anoxia *in vitro* and in the oxygen consumption of cardiac tissue are described in dependence on the temperature of the medium in hibernating *(Glis glis)* and nonhibernating (rat, *Rattus norvegicus* alb.) animals. The shape of the curves characterizing the dependence of these functions on the temperature is the same in both species, but the curve for hibernating animals is shifted in such a way that the decrease in oxygen consumption and the increase in the resistance to acute anoxia *in vitro* occur at lower temperatures in hibernating than in non-hibernating animals. The relationship of these findings to the enzyme pattern of the heart of hibernating and non-hibernating animals is discussed.

A69-81197
THE EFFECT OF CAFFEINE AND ALTITUDE HYPOXIA ON SOME CHANGES OF TISSUE METABOLISM IN THE RAT.
Z. Makoč and F. Vorel (Inst. of Aviation Med., Prague, Czechoslovakia).
Physiologia Bohemoslovaca, vol. 17, no. 3, 1968, p. 241–247. 30 refs.

The effect of caffeine and simulated altitude (9,000 m.) hypoxia on some aspects of carbohydrate metabolism was studied in rats. Caffeine (five and 20 mg./kg.) significantly decreased the resistance of rats to hypoxia. Caffeine alone caused a rise in the blood glucose level and in the lactic acid content of the brain and a fall in liver glycogen content. Hypoxia also caused the same changes. On combining hypoxia with caffeine administration no rise in the blood glucose level was seen but the level of heart and liver glycogen was further decreased and that of brain lactic acid further increased.

A69-81198
CHANGES IN FUNCTIONAL AND EFFICIENCY INDICATORS BETWEEN THE 18TH AND 50TH YEAR IN MAN.
E. Macková (Res. Inst. of Phys. Cult., Prague,Czechoslovakia).
Physiologia Bohemoslovaca, vol. 17, no. 3, 1968, p. 279–287. 24 refs.

It was found in a group of 37 relatively healthy men aged 18 to 50 yr. that body weight increases most rapidly between the 24th and 31st yr. and this is due to the formation of fat depots. At the same time respiratory functions, evaluated from the maximum lung ventilation, deteriorate. During the whole age period studied maximum oxygen consumption/kg. active body mass is decreased, the transport ability of the circulatory system (O_2 pulse) deteriorates and this is most pronounced after the 36th yr. when the work performance also decreases. The ability to utilize oxygen from the ventilated air and to increase the pulse frequency is not changed between the 18th and 50th yr.

A69-81199
INCREASED TOLERANCE OF ORTHOSTATIC STRESS IN PATIENTS WITH HEART DISEASE.
Walter H. Abelmann and Khaja Fareeduddin (Harvard Med. School, Dept. of Med. and Boston City Hosp., Second and Fourth (Harvard) Med. Serv., Thorndike Mem. Lab., Boston, Mass.).
American Journal of Cardiology, vol. 23, Mar. 1969, p. 354–363. 24 refs.
NASA Grant NsG 595, Grants PHS HE 10539, PHS HE 5244, and PHS FP-76.

Increased tolerance of orthostatic stress in patients with heart failure was studied. Responses of heart rate and blood pressure to passive 70° upright tilt were measured in six healthy subjects and 33 patients with heart disease and analyzed in relation to hemodynamic data in the supine position. The responses of heart rate and diastolic blood pressure correlated negatively with the level of right and left ventricular filling pressures and pulmonary arterial pressure. The response of heart rate correlated positively with cardiac index and negatively with arteriovenous oxygen difference and peripheral resistance. Thus, hemodynamic abnormalitites characteristic of heart failure were associated with increased orthostatic tolerance. In five healthy subjects the effect of expansion of intravascular volume upon the response to tilt was studied. After expansion heart rate and diastolic blood pressure increased less in response to orthostatic stress. In contrast, five individuals studied

after volume reduction by diuresis exhibited a vasodepressor response, accompanied by significant tachycardia. Improved tolerance of orthostatic stress by cardiac patients may thus be related to increased intravascular volume, increased peripheral resistance and increased ventricular filling pressures.

A69-81200
SYSTEMIC BLOOD PRESSURE IN WHITE MEN BORN AT SEA LEVEL: CHANGES AFTER LONG RESIDENCE AT HIGH ALTITUDES.

Emilio Marticorena, José Severino, Javier Galvez (Chulec Gen. Hosp., High Altitude Med. Res. Center, La Oroya, Peru), Luis Ruiz, and Dante Peñaloza (Peruvian U. "Cayetano Heredia", High Altitude Res. Inst., Cardiovascular Lab., Lima, Peru).

American Journal of Cardiology, vol. 23, Mar. 1969, p. 364–368. 24 refs.

Grant PHS HE-06910-05 and World Health Organ. supported research.

A retrorespective survey performed in 100 men born at sea level, residing at 12,398 ft. of altitude for two to 15 yr., has provided a basis for studying the systemic blood pressure changes possibly associated with prolonged residence in a hypoxic environment. Comparison of the blood pressure at the initial and final examinations revealed: (1) decrements of 10 mm. Hg or more for systolic and diastolic pressures in the whole sample in 56 and 46% of the subjects, respectively; (2) significant differences except for diastolic pressure in the subjects with the longest period of residence at high altitude; and (3) in lowlanders, a response of blood pressure to aging at this altitude differing from that at sea level. In general, the final blood pressure closely resembled that observed in healthy natives of the same altitude. Since diet, physical activity on the job, and habits in these subjects were similar to those of their original countries and quite different from those of the Andean population, it seems probable that these findings are causally related to an environmental hypoxic stimulus. Functional or anatomic vascular changes decreasing peripheral vascular resistance to blood flow would be the principal determinant of the observed differences.

A69-81201
CIRCULATORY DYNAMICS DURING HIGH ALTITUDE PULMONARY EDEMA.

Dante Penaloza and Francisco Sime (Peruvian U. Cayetano Heredia, High Altitude Res. Inst., Cardiovascular Lab., Lima, Peru).

American Journal of Cardiology, vol. 23, Mar. 1969, p. 369–378. 31 refs.

Grants DA-HC19-67-G-0025 and PHS HE-06910.

Cardiac catheterization studies have been carried out in two young male subjects who experienced acute pulmonary edema after a brief sojourn at sea level, when they returned to their native town located at 14,200 ft. above sea level. The investigation was performed at this altitude during the acute episode and was repeated after complete recovery. Further studies were made in one subject after prolonged residence at sea level. Severe hypoxemia, a marked degree of pulmonary hypertension and increased pulmonary vascular resistance were found during the acute pulmonary edema. These findings were associated with low cardiac output and pulmonary wedge pressure. The degree of pulmonary hypertension was significantly reduced after inhalation of 100% oxygen. Following recovery, physiologic observations were similar to those seen in healthy residents well acclimatized to high altitudes. The data obtained suggest the presence of arteriolar constriction at the precapillary level due to severe hypoxia. Several factors may explain the sever hypoxemia observed in patients with high altitude pulmonary edema. Exercise and sleeping may decrease significantly the arterial oxygen saturation at high altitudes. Pulmonary edema occurred during exercise in our first case, and during sleep in the second. However, special susceptibility appears to be present in humans who develop pulmonary edema after rapid exposure to high altitudes. The role of a sudden rise of pulmonary artery pressure in producing pulmonary edema without elevation of pulmonary wedge pressure is not clear.

A69-81202
EFFECT OF STAGNANT HYPOXIA OF THE BRAIN ON THE BLOOD GLUCOSE AND LACTIC ACID LEVEL AND ON SERUM LACTIC DEHYDROGENASE ACTIVITY DURING ONTOGENESIS IN THE RAT.

F. Vorel, L. Jilek, and S. Trojan (Charles U., Fac. of Med., Inst. of Aviation Med. and Inst. of Physiol., Prague, Czechoslovakia).

Physiologia Bohemoslovaca, vol. 17, no. 5, 1968, p. 411–415. 21 refs.

The authors studied the effect of isolated stagnant hypoxia of the brain (eight hours' ligature of the carotids) on changes in the blood sugar and lactic acid level and on serum lactic acid dehydrogenase (LDH) activity during ontogenesis in rats. Cerebral oligemia raised the blood sugar and lactic acid level and serum LDH activity in all age groups. The greatest changes in the given parameters were found in 25-day-old and adult rats and the smallest in 12-day-old animals. In the control rats, serum LDH activity and the blood lactic acid level fell significantly with advancing age. Questions related to the influence of activation of the sympathicoadrenal system on the increase in the blood sugar level and to the influence of motor activity on the increase in the blood lactic acid level are discussed. The cause of the changes in serum LDH activity is not yet clear. The rate of anaerobic metabolism in other organs as well as in the brain may possibly play some part in them. In conclusion, the positive effect of hyperglycemia on the resistance of the central nervous system to hypoxia and the positive or negative effect (in relation to age) of the increase in the blood lactic acid level are evaluated.

A69-81203
INTERACTION OF ABILITY LEVEL AND INTERPOLATED ACTIVITY (OPPORTUNITY FOR INCUBATION) IN HUMAN PROBLEM SOLVING.

Harry G. Murray and J. Peter Denny (Western Ontario, U., London, Canada).

Psychological Reports, vol. 24, Feb. 1969, p. 271–276. 12 refs.

Canada Council supported research.

Performance on a functional fixedness problem was investigated under conditions of continuous work on the problem vs. interpolation of unrelated activity, and in subjects of low vs. high problem-solving ability. The performance of low-ability subjects was most proficient under the interpolated-activity-condition, whereas for high-ability subjects performance was best under continuous work. It was suggested that different types of problem-solving processes occurred in low- and high-ability subjects, and that interpolated activity influenced these processes in opposite ways.

A69-81204
HYPNOTIC RECALL OF AIRCRASH CAUSE.

Bernard B. Raginsky.

International Journal of Clinical and Experimental Hypnosis, vol. 17, Jan. 1969, p. 1–19.

Soc. for Clin. and Exptl. Hypnosis, 20th Ann. Sci. Meeting, Chicago, Nov. 24, 1968.

Hypnotic techniques can be used to help a patient recall suppressed material which implicates him in a devastating disaster.

The cause of an aircrash was found after two short hypnotic sessions, where other orthodox methods used over a period of two hr. had failed. The method can be used in all cases of amnesia. The patient is made to hallucinate a threatening situation, and his hallucination gives a clue to the basic problem. He is then made to hallucinate a pleasant scene, which gives an indication of the method he uses to escape from the problem. This is repeated at the second session for confirmation. If the patient does not bring up the required material by free association under hypnosis, a dissociation of the personality is induced in which the observing ego watches what the experiencing ego is doing to cause the accident. The results demonstrate that in this case, at least, hypnotic techniques were more successful than sodium amytal interviews, free association, psychiatric interviews, physical and emotional isolation, pressure by authorities, and kindness of friends. Reference is made to the problems involved when the interests of the patient are in conflict with public safety.

A69-81205
AN AUTOMATIC METHOD OF MEASURING AND RECORDING INTRACRANIAL PRESSURE.

Mitsuo Numoto, J. P. Slater, and R. M. Peardon Donaghy (Vt., U., Div. of Neurosurg., Burlington).

Medical Research Engineering, vol. 8, Jan.-Feb. 1969, p. 38–39.
NIH and John A. Hartford Found. supported research.

An implantable silastic-rubber pressure-actuated switch was developed for long term monitoring of intracranial pressure. It is potentially useful in other systems where accurate measurement of low pressure is critical. The pressure inside the switch is regulated automatically by a servo pump to equilibrate it with the intracranial pressure. This system pressure is read on a manometer and is proportional to the intracranial pressure. The miniature contacts of the pressure switch are protected by a transistor amplifier with a relay to drive the servo pump.

A69-81206
CARBON DIOXIDE AND CEREBRAL CIRCULATORY CONTROL.

E. Skinhoj and O. B. Paulson (Bispebjerg Hosp., Dept. of Neurol. and Clin. Physiol., Copenhagen, Denmark).

Archives of Neurology, vol. 20, Mar. 1969, p. 249–252. 10 refs.

In unanesthetized human subjects the arterial pCO_2 was altered regionally by infusion of blood with different CO_2 content into the internal carotid or into the vertebral artery. The regional cerebral blood flow in the internal carotid system was found to be determined by the arterial pCO_2 in this artery and was not affected by infusion of CO_2 in the vertebralbasilar system. The results thus disprove the postulated existence of a brain stem center regulating the hemispheric blood flow.

A69-81207
VISUAL INFORMATION AND EVOKED RESPONSES FROM THE LEFT AND RIGHT HEMISPHERES.

Monte Buchsbaum and Paul Fedio (NIH, Natl. Inst. of Neurol. Diseases and Blindness, Natl. Inst. of Mental Health and Surg. Neurol. Branch, Lab. of Psychol., Bethesda, Md.).

Electroencephalography and Clinical Neurophysiology, vol. 26, Mar. 1969, p. 266–272. 17 refs.

Average evoked responses (AER) to verbal and non-verbal stimuli were recorded from left and right occipital EEG leads in ten normal right-handed subjects. Although the two types of stimuli were carefully matched for physical properties, their evoked potentia wave forms could be differentiated by means of a computational technique utilizing replicate evoked responses. AER wave forms for verbal and non-verbal stimuli were more different from the left hemispheric lead than from the right. Verbal stimuli had shorter AER latencies. Hemispheric differences in the AER are consistent with the hypothesis that the cerebral hemispheres in man assume an asymmetrical role in governing cognitive behavior.

A69-81208
MODIFICATION OF THE CORTICAL CLICK-EVOKED RESPONSE DURING EYE MOVEMENT IN CATS.

John S. Ebersole and Robert Galambos (Yale U., Dept. of Psychol., New Haven).

Electroencephalography and Clinical Neurophysiology, vol. 26, Mar. 1969, p. 273–279. 11 refs.
NASA Grant NsG-374.

Optokinetic nystagmus was induced in four cats by moving vertical black and white stripes before their eyes. The response to click stimuli triggered by the eye movements was recorded from electrodes chronically implanted along the classical auditory pathway. Computer-averaged click-evoked responses from the cortex declined linearly in amplitude as a function of eye movement velocity; no such relationship existed at subcortical auditory nuclei. Within 15 msec. after the onset of eye movement the amplitude of cortical evoked responses was substantially reduced, and at 100 msec., when the velocity of movement was beginning to decline, the depression was at its maximum (50% of control amplitude). Despite their disparate time courses, eye movements and depression of the cortical auditory evoked response are clearly interrelated. Some properties of a central mechanism that could be responsible for this are described.

A69-81209
VISUAL EVOKED POTENTIALS AT HYPOTHALAMIC AND TEGMENTAL AREAS OF THE UPPER BRAIN-STEM.

J. Bogacz and E. Wilson (Hosp. de Clin., Fac. de Med., Inst. de Neurol., Lab. de Neurofisiol., Montevideo, Uruguay).

Electroencephalography and Clinical Neurophysiology, vol. 26, Mar. 1969, p. 288–295. 29 refs.
Grant NIH NB-04382-04.

One hundred experiments were carried out in 23 albino rats with chronically implanted electrodes in the following areas: ventro-lateral tegmentum (VLT), posterior lateral hypothalamus (PLH), anterior lateral hypothalamus (ALH), septal area (S), tecto-tegmental area (TT) and the visual cortex (VC). Four to five experiments were repeated in each animal. Photic stimulation was carried out by means of a miniature lamp fastened to the frontonasal bone, the evoked response being summated with a CAT Mnemotron. Recordings were obtained using as reference an intracerebral electrode as well as from pairs of electrodes with a small inter-electrode distance. In two rats with electrodes implanted chronically at VC, PLH and VLT, on both sides, enucleation of one eye was carried out. Photic stimulation tests, during one to two hr., were performed leaving the animal unrestrained in a wood or red plexiglass box. Photic stimulation provoked a response, preferably in the caudal group of the areas surveyed. Both with the referential and the bipolar recording the response predominated in, or was confined to, the PLH and VLT. On the other hand, the response was absent or showed a very small amplitude at more rostral regions. Changes in wakefulness and sleep provoked modifications in the tegmental and hypothalamic responses; these did not parallel those of the visual cortical response. Enucleation of one eye did not provoke important changes in the characteristics of the response on the side of the preserved eye in PLH and VLT.

A69-81210
THE INFLUENCE OF HIGH OXYGEN PRESSURE ON THE ELECTRICAL ACTIVITY OF THE BRAIN.
D. Harel, D. Kerem, and S. Lavy (Hadassah U. Hosp., Dept. of Nervous Diseases, Lab. of Exptl. Neurol. and Hebrew U., Hadassah Med. School, Jerusalem, Israel).
Electroencephalography and Clinical Neurophysiology, vol. 26, Mar. 1969, p. 310–317. 22 refs.
Natl. Council for Res. and Develop. supported research.

In the present study the origin and site of hyperbaric oxygen convulsions was investigated. The electrical activity of intact rabbit brain in curarized animals was studied with the help of electrodes implanted in cortical and subcortical areas and the electroencephalogram was continuously recorded before, during and after seizures. Early abnormal cerebral activity, consisting of runs of slow waves or bursts of sharp waves, was most frequently recorded from cortical leads. There was no constant focus in any particular cortical area examined, neither was their appearance simultaneous in several structures. In half of the animals the early abnormal activity developed into generalized discharge. Occasionally, early changes were first recorded in subcortical areas, spreading to cortex and other adjacent subcortical areas. In conformity with previous experimental work carried out by other investigators our results show that no brain structure plays a particular role in the genesis and development of hyperbaric oxygen seizures; neither could any area be demonstrated as particularly sensitive in their production. Our studies appear to imply that, in the intact brain of curarized rabbits, these seizures have a random origin, or else develop simultaneously in many brain structures.

A69-81211
COMBINED TELEPHONE AND RADIOTELEMETRY OF THE EEG.
J. Hanley, J. R. Zweizig, R. T. Kado, W. R. Adey, and L. D. Rovner (Calif., U., Center for Health Sci., Brain Res. Inst., Space Biol. Lab., Los Angeles).
Electroencephalography and Clinical Neurophysiology, vol. 26, Mar. 1969, p. 323–324.
Grants AF 49(638)1387 and PHS 5PO7-FR-257.

Multichannel local radiotelemetry of the eletroencephalogram (EEG) was combined with onward transmission of the EEG data by telephone as frequency modulated audio subcarriers from the radio receiver located in the subject's house. Records are presented from a normal 10-yr.-old child, and are free from major artifacts. On-line spectral analysis was performed, together with acquisition of paper and analog magnetic tape records.

A69-81212
COMPARISON OF AMPHETAMINE SULPHATE AND CAFFEINE CITRATE IN MAN.
Malcolm Lader (U. Coll. London, Dept. of Pharmacol. and Inst. of Psychiat., Dept. of Psychiat., London, Great Britain).
Psychopharmacologia, vol. 14, no. 2, 1968, p. 83–94. 28 refs.

Ten male volunteer subjects were administered single doses of one of the following compounds on five successive weekly occasions using a fully balanced design: 5 mg. and 10 mg. of amphetamine sulphate, 300 mg. and 600 mg. of caffeine citrate and lactose placebo. Two hr. after ingestion subjective estimations of several mood attributes were made using graphic rating scales. The palmar skin conductance (sweat gland activity) and pulse rate were recorded during the presentation of 20 identical auditory stimuli consisting of one sec. one kHz. tones of 100 dm. intensity, the interval between the tones varying randomly from 45 to 80 sec. The rate of diminution of the skin conductance responses to the repeated stimuli (habituation rate) was slowed by both drugs. The number of spontaneous fluctuations in the skin conductance tracing was increased by both drugs. Slope-ratio bioassays were computed for both these variables which were then combined in a discriminant-function analysis to increase the precision of the assay. Pulse rate was elevated by amphetamine but not by caffeine. The subjective effects of the drugs were complicated because one subject demonstrated a paradoxical response to amphetamine being relaxed, drowsy and slow while under its influence. Some problems in comparisons of psychopharmacological agents in normal humans are discussed in the light of the results obtained.

A69-81213
THE EFFECT OF FEEDING FREQUENCY ON DIURNAL PLASMA FREE FATTY ACIDS AND GLUCOSE LEVELS.
Walter M. Bortz, Paula Howat, and William L. Holmes (Lankenau Hosp., Div. of Res., Philadelphia, Pa.).
Metabolism, vol. 18, Feb. 1969, p. 120–123. 11 refs.
Grant NIH AM-08887.

The effect of variation in feeding frequency was noted on the diurnal plasma free fatty acids (FFA) and glucose levels in five lean males. It was shown that the single meal pattern resulted in higher mean FFA and glucose levels. The significance of these observations to the relationships between meal pattern and serum lipids and glucose tolerance is discussed.

A69-81214
EFFECT OF COFFEE INGESTION ON CATECHOLAMINE RELEASE.
Samuel Bellet, Laurian Roman, Oscar DeCastro, Kwan Eun Kim, and Alfred Kershbaum (Philadelphia Gen. Hosp., Div. of Cardiol., Pa.).
Metabolism, vol. 18, Apr. 1969, p. 288–291. 14 refs.
Grant NIH HE-5165; Sugar Res. Found., Inc. and Found. for Cardiovascular Res. supported research.

Urinary catecholamine excretion was studied in 18 young male subjects during a control period and following the ingestion of coffee. This study showed that ingestion of coffee in moderate amounts resulted in a significant increase in the urinary catecholamine excretion. The possible effects of such long-term catecholamine stimulation is discussed, especially with reference to their effect on blood lipids.

A69-81215
EFFECTS OF PRECEDING DIET AND FASTING ON GLUCOSE TURNOVER IN NORMAL DOGS.
J. S. Cowan, M. Vranic, and G. A. Wrenshal (Toronto, U., Dept. of Physiol. and Banting and Best Dept. of Med. Res., Canada).
Metabolism, vol. 18, Apr. 1969, p. 319–330. 20 refs.
Med. Res. Council and Banting Res. Found. supported research.

The rate of endogenous production of glucose (turnover), as determined by two to 12 successive injections of C^{14}-labelled glucose, decreased progressively during fasting in each of 19 experiments on 13 normal dogs. Approximately the same equifinal rate (three gm./kg.-day body weight) was approached during fasts of two to three days in each of 12 experiments preceded by dietary conditioning, this level being reached rapidly after diets high in carbohydrate and slowly after diets high in fat or protein. After 30 days of fasting in three normal dogs, glucose production had fallen to about two gm./kg.-day.

A69-81216
EFFECT OF COLD ON PLASMA PROTEIN-THYROXINE INTERACTION IN THE GUINEA PIG.
Takashi Yamada, Hitoshi Fukuda, Yoshihiro Takemura, and Kojiro Shichijo (Gunma U., School of Med., First Dept. of Internal Med., Maebashi, Japan).
Metabolism, vol. 18, Apr. 1969, p. 339–347. 23 refs.

In an attempt to study a possible alteration in the interaction of protein and thyroxine of animals exposed to cold, the uptake of labeled thyroxine by muscle was measured in the presence of plasma from control guinea pigs and those exposed to the cold. The uptake of labeled thyroxine was less in the presence of control plasma than in the presence of plasma obtained from animals exposed to the cold. The magnitude of this response to cold depends largely upon the severity of the cold. Plasma albumin decreased significantly in animals exposed to cold. TSH significantly augmented the uptake of labeled thyroxine by muscle in the presence of plasma, but ACTH was without effect in this system. Epinephrine and norepinephrine did not alter the uptake of labeled thyroxine by muscle *in vitro* in the presence of plasma. It is suggested that more free thyroxine is available to cells due to a lower binding affinity of plasma protein for thyroxine produced by a decrease of plasma albumin in animals exposed to cold. An increase of circulating TSH may play an additional role for an increase of free thyroxine in animals exposed to the cold, possibly by altering protein-thyroxine interaction.

A69-81217
DOSE-RESPONSE EFFECTS OF SECOBARBITAL ON HUMAN MEMORY.
Wayne O. Evans and Keith E. Davis (U.S. Army Res. Inst. of Environ. Med., Natick, Mass. and Colo., U., Boulder).
Psychopharmacologia, vol. 14, Jan. 17, 1969, p. 46–61. 20 refs.

The fundamental purpose of this experiment was to obtain empiric, replicatable, dose-response data from human subjects on the psychological effects of a common psychoactive drug. Six normal humans were first trained for six sessions on a series of tasks involving different aspects of memory and attention. Their individual sensitivity to secobarbital was also determined. After training, they were tested at zero and three levels of drug on a doubleblind basis. The drug levels for a given subject were selected so that the highest level was just under that which would make the subject untestable. The four point dose-response curves were replicated three times for each subject. Some of the tasks performed by the subjects were affected by the drug in the expected manner as related to dose. Some tasks were unaffected by the drug. In no case were there drug effects which did not follow a regular dose-response curve. In all cases the dose response curves for an individual subject were replicable. The data from the experiment were interpreted as evidence for an effort stress effect inherent in some tasks. When the demand load of the tests was great, even very high doses of secobarbital had no effect. When the demand load of a task was lower, a dose related drug action was obtained. Some questions were raised by the data on the generality of the Mirsky-Kornetsky hypothesis as to the differential effects of barbiturates on the continuous performance test and the digit symbol substitution test at all dose ranges. Finally, additional evidence was added to the position that a common effect of intoxicating chemicals is to produce a less differentiated, i.e., simpler, mental structure.

A69-81218
ERGONOMY AND AVIATION MEDICINE [ERGONOMIE UND FLUGMEDIZIN].
H. Schmidtke (Tech. Hochschule, Inst fur Ergonomie, Munich, West Germany).
Wehrmedizinische Monatsschrift, vol. 12, Dec. 1968, p. 481–487 In German.

The relationship between ergonomy and aviation medicine results from the fact that in both fields the human being, as a link of complex human being-machine-systems, is the object of research. From the field of ergonomy the author refers to information problems during observation tasks-information uptake: adaptation, contrast, grouping, coding, as well as to studies of the vigilance problem during underdemand and overdemand situations. The author presents the experimental results of, among others, radar tests.

A69-81219
ON A NEW METHOD OF DETERMINING THE FLOWRATE IN THE ASCENDING AORTA, THE STROKE VOLUME AND THE CARDIAC OUTPUT WITH THE AID OF BALLISTOCARDIOGRAPHY [UBER EINE NEUE METHODE DER BESTIMMUNG DER STROMUNGSGESCHWINDIGKEIT IN DER AORTA ASCENDENS, DES SCHLAGVOLUMENS UND DER HERZLEISTUNG MIT HILFE DER BALLISTOKARDIOGRAPHIE].
K. Burkhart and H. W. Kirchoff (Flugmed. Inst. der Luftwaffe, Furstenfeldbruck, West Germany).
Wehrmedizinische Monatsschrift, vol. 12, Dec. 1968, p. 494–498. In German.

The authors describe a new, bloodless method to determine the stroke and minute volume which can be performed with the aid of ballistocardiography (BKG). A special BKG table was constructed for this purpose and the table permits the determination of power components. Using the theory of Hagen Poiseuille it is possible to calculate the mean flow rate in the ascending aorta. With the aid of the known relationships between centrifugal force, mass, angular and linear velocity it is possible to determine the stroke and minute volume. With the aid of the stated calculation method it is also possible to determine the cardiac output. In conclusion the author reports the mean values of stroke volumes, arranged according to age groups, which were calculated according to the above method. For comparative purposes the authors also report the values of stroke volume, which were determined according to the iodine isotope indicator method.

A69-81220
STUDIES ON THE RESISTANCES OF BREATHING EQUIPMENT OF HIGH-PERFORMANCE AIRPLANES [UNTERSUCHUNGEN UBER DIE WIDERSTANDE IN ATEMANLAGEN VON HOCHLEISTUNGSFLUGZEUGEN].
H. A. Gerlach (Flugmed. Inst. der Luftwaffe, Furstenfeldbruck, West Germany).
Wehrmedizinische Monatsschrift, vol. 12, Dec. 1968, p. 499–502. In German.

The author examined the inspiratory respiration-resistances of breathing equipment in high performance airplanes. The highest resistance to inspiration is produced by the inspiration valve of the oxygen mask. With the same amplitude of the intraesophageal pressure by which approximately 24.0 1./min. are exchanged during free breathing, only 13.0 1./min. can be exchanged when breathing through a mask. After building a protective filter into the breathing equipment, the respiratory minute volume which can be exchanged with the same pressure amplitude is reduced to approximately 11.0 1./min. This article is only a preliminary report as the studies have not yet been concluded.

A69-81221
CHANGES OF THE TYPE OF RESPIRATION WHEN BREATHING THROUGH A MASK [VERANDERUNGEN DES ATEMTYPS BEI MASKENATMUNG].
R. Eife (Flugmed. Inst. der Luftwaffe, Furstenfeldbruck, West Germany).
Wehrmedizinische Monatsschrift, vol. 12, Dec. 1968, p. 503–506. In German.

On account of the increase of the inspiratory and exspiratory resistance to breathing when breathing through a mask, respiration changes in the same manner as with an obstructive ventilatory disorder. A respiratory minute volume, respiratory rate and the maximum inspiratory flow rate decrease as compared to the measured values of free respiration. The respiratory volume is increased. The insertion of a protective filter does not result in a significant additional change of these values. This is a preliminary report as the studies have not yet been completed.

A69-81222
A REPORT ON THE EXPERIENCE WITH HYPERBARIC TREATMENT OF EMERGENCIES IN THE INSTITUTE OF AVIATION MEDICINE OF THE LUFTWAFFE [ERFAHRUNGSBERICHT UBER DIE HYPERBARE THERAPIE BEI NOTFALLEN AM FLUGMEDIZINISCHEN INSTITUT DER LUFTWAFFE].
E. Burchard (Flugmed. Inst. der Luftwaffe, Fürstenfeldbruck, West Germany).
Wehrmedizinische Monatsschrift, vol. 12, Dec. 1968, p. 512–514. In German.

Eight cases of gas gangrene were reported which were treated, as well as three cases with Caisson's disease after diving accidents. Despite initial technical difficulties treatment with hyperbaric oxygen was found the most effective method of treatment of even most severe gas gangrene infections.

A69-81223
BAROTRAUMA DURING HYPERBARIC OXYGENATION [BAROTRAUMA BEI HYPERBARER OXYGENATION].
G. Fröhlich (Flugmed. Inst. der Luftwaffe, Fürstenfeldbruck, West Germany).
Wehrmedizinische Monatsschrift, vol. 12, Dec. 1968, p. 517–518. In German.

The causative mechanism of barotitis during descent in flight and during entry into the Caisson is explained. The various stages of objective and subjective ear symptoms, up to rupture of the tympanic membrane are discussed. The personnel in the hyperbaric chamber must be examined for normal patency of the tubes; all patients whose level of consciousness is decreased or who are unconscious must have a paracentesis. This is also true for patients with a common cold of the upper airways. The therapeutic measures and the prognosis in patients with barotitis are described.

A69-81224
EFFECTS OF OZONE ON CELLS IN VITRO.
Donald M. Pace (Pacific, U., School of Pharm., Dept. of Physiol. and Pharmacol., Stockton, Calif.), Paul A. Landolt, and Byron T. Aftonomos (Neb., U., Inst. for Cellular Res., Lincoln).
Archives of Environmental Health, vol. 18, Feb. 1969, p. 165–170. 16 refs.
Grant PHS AP-00092-08 and Damon Runyon Mem. Fund. supported research.

Even low concentrations of O_3 (4 p.p.m.) appear to retard cell proliferation and interfere with mitotic activity. The effect of O_3 seems to depend not only upon concentration of the gas and length of exposure, but also upon cell density: the greater the numbers, the greater the resistance. It is probable that O_3 may damage the cell membrane, as is shown by the increased vacuolar content and consequent "swelling" of the cells. Furthermore, it alters the collagenous-like substance by means of which cells attach themselves to the substratum so that they tend to become detached. Results also suggest that cells *in vitro* may develop a tolerance to O_3. No explanation can be given at present but the possibility suggested by Stokinger, the stimulation of activity of the pentose phosphate pathway, could apply.

A69-81225
DOMINANCE OF THE RIGHT CEREBRAL HEMISPHERE FOR STEREOPSIS
Amiram Carmon and Harold P. Bechtoldt (Iowa, U., Neurosensory Center and Depts. of Psychol. and Neurol., Iowa City).
Neuropsychologia, vol. 7, Mar. 1969, p. 29–39. 33 refs.
Grants PHS NB-00616 and PHS NB-03354.

Patients with unilateral right hemispheric lesions exhibited marked deficits in performance (more errors and longer response times) relative to patients either with unilaterial left hemispheric lesions or with no brain damage on stereoscopically presented stimuli in a task requiring the location of a form in depth from binocular disparity cues without the aid of figure-ground contours or of monocular cues of form and depth. The stimuli were modifications of the random dot stereograms developed by a previous investigation. No deficits in the performance of the left hemisphere patients were found. The results are consistent with the hypothesis of relative dominance of the right hemisphere for stereopsis in the absence of monocular cues of form and depth.

A69-81226
THE EFFECT OF BODY AND HEAD TILT IN THE PERCEPTION OF VERTICAL: COMPARISON OF BODY AND HEAD TILT WITH LEFT AND RIGHT HANDED, MALE AND FEMALE SUBJECTS.
D. H. Groberg, R. E. Dustman, and E. C. Beck (Utah, U. and Veterans Admin. Hosp., Salt Lake City).
Neuropsychologia, vol. 7, Mar. 1969, p. 89–100 19 refs.

Experiments are reported in which subjects were asked to estimate gravitational vertical in a darkened room. A padded laterally tilted chair and headholder designed to hold head and body at different angles was used to study the effect of independent and combined tilts of head and body. Right and left handed men and women were investigated. Results indicated a differentiation of visual, vestibular and proprioceptive sensations in perception of vertical. The vestibular proprioceptive differentiation provides a reasonable explanation for the Müller E and A phenomena often reported in Aubert effect experiments. Although there were no handedness differences, men and women differed significantly on some measures.

A69-81227
PROPRIOCEPTIVE INFORMATION, MUSCLE FATIGUE, CONTROL OF CARDIAC ACTIVITY AND RESPIRATION DURING EXERCISE [PROPRIOTSEPTIVNAIA INFORMATSIIA, UTOMLENIE I REGULIATSIIA SERDECHNOI DEIATEL'NOSTI I DYKHANIIA PRI MYSHECHNOI RABOTE].
D. Mateev and E. Kiselkova (G. Dimitrov Higher Inst. of Phys. Cult., Dept. of Physiol., Sofia, Bulgaria).
Fiziologicheskii Zhurnal SSSR, vol. 54, Nov. 1968, p. 1308–1314. 5 refs. In Russian

The effect of static exercise performed four times by alternating hands has been investigated. Fatigue sets in earlier in the weak (left) extremity, the period of its effective work during exercise is shortened, increase in the pulse and respiration rates is more pronounced. Similar effects have been observed with an interrupted circulation. Myographically recorded potentials of muscles of the weak hand during exercise are noted for their higher frequencies and amplitudes as compared to those of the stronger hand. Frequency and amplitude of muscle biopotentials, both in the weak and in the strong hand, are lowered with the development of fatigue. During exercise efferent impulsation along both parts (sympathic and parasympathic) of the automatic nervous system is involved in the control of the vegative functions, the sympathic tone being prevalent. The effect of the latter, however, is decreased due to an increased tone of the vagus responsible for lowering the excessive energy consumption and the pulse and respiration acceleration. Following cessation of the work, an increased tone of the vagus makes provision for a quick return of the pulse to the initial level, or even below. Atropine injection results in a more significant pulse quickening with functional stress, lesser slowing of the pulse, when changing loaded hands, and a slower normalization of the pulse following cessation of the work.

A69-81228
ONOTOGENETIC DEVELOPMENT OF RESPIRATORY AND CARDIOVASCULAR SYSTEMS IN RATS UNDER CONDITIONS OF TRAINING (TO THE MECHANISM OF THE VAGAL TONE INITIATION) [RAZVITIE DYKHATEL'NOI I SERDECHNO-SOSUDISTOI SISTEMY U KRYS V ONTOGENEZE V USLOVIIAKH TRENIROVKI (KMEKHANIZMU VOZNIKNOVENIIA TONUSA BLUZHDAIUSHCHEGO NERVA)].
V. D. Rozanova and B. S. Musin (USSR, Acad. of Med. Sci., Inst. of Normal and Pathol. Physiol., Lab. of Aging Physiol., Moscow). *Fiziologicheskii Zhurnal SSSR*, vol. 54, Nov. 1968, p. 1327–1334. 14 refs. In Russian.

Respiration and cardiac contraction rates in 13-mo. old rats subjected during 12 mo. to a combined, hypoxic and muscle training (groups: II, III, and IV, accordingly) were lower when compared to those of control animals of similar age. The results obtained with atropine injection are indicative of the vagal origin of the slower cardiac contraction rate. In trained rats, however, the degree of the vagal tone is significantly higher. Activity of the blood acetylcholinesterase is sharply reduced in the process of 12-mo. training of the rats of the II, III and IV groups, which is the evidence of intensification of the cholinergic humoral controlling mechanisms in the process of training. Hypoxic stress combined with the muscle training results in a more rapid drop of the respiratory and cardiac system activity and in a sharper decrease in respiration at the end of the training procedure.

A69-81229
CORRELATION BETWEEN THE OSMOTIC RESISTANCE ALTERATIONS, THE GLYCOLYSIS ACTIVITY AND OTHER PROPERTIES OF ERYTHROCYTES DURING ADAPTATION TO HYPOXIA [SOPOSTAVLENIE IZMENENII OSMOTICHESKOI REZISTENTNOSTI S AKTIVNOST'IU GLIKOLIZA I DRUGIMI SVOISTVAMI ERITROTSITOV V PROTESSE ADAPTATSII K GIPOKSII].
Z. I. Barbashova, G. I. Grigor'eva, N. M. Livshits, V. P. Nesterov, L. N. Simanovskii, and O. I. Tarakanova (USSR, Acad. of Sci., I. M. Sechenov Inst. of Evolutionary Physiol. and Biochem., Leningrad). *Fiziologicheskii Zhurnal SSSR*, vol. 54, Nov. 1968, p. 1342–1347. 7 refs. In Russian

Alterations of the erythrocyte properties, when training rats in an altitude chamber at simulated altitudes of 2,500 to 7,600 m. have been observed as early as on the 10th day exposure. The alterations were the following: a rise in osmotic resistance, an increase of glycolysis activity and an enlargement of the size of a single erythrocyte. A total number of the red blood cells, reticulocyte numbers and hemoglobin content were also increased. Osmotic shifts and energetic exchange alterations in erythrocytes, however, were reliable not until the 20th or 30th day of training procedure. A positive correlation was established between the rise in the erythrocyte osmotic resistance and the increase in the glycolysis activity. Correlation between alterations of osmotic properties of the red blood cells and content of the cations (sodium and potassium) in erythrocytes was not evident. A suggestion on the relationship between the rise of erythrocyte osmotic resistance and adrenal hypofunction has not been confirmed. On the contrary, eosinophilia observed during the training in an altitude chamber is suggestive of a certain intensification of the adrenal cortex function.

A69-81230
THE REACTION OF THE RESPIRATORY CENTER TO CARBON DIOXIDE AT HIGH ALTITUDES [REAKTSIIA DYKHATEL'NOGO TSENTRA NA UGLEKISLOTU V USLOVIIAKH VYSOKOGOR'IA].
K. IU. Akhmedov, R. S. Vinitskaia, and N. A. Koganova (USSR, Acad. of Med. Sci., A. V. Vishnevskii Inst. of Surg., Moscow). *Fiziologicheskii Zhurnal SSSR*, vol. 54, Nov. 1968, p. 1348–1354. 13 refs. In Russian.

The respiratory responses to carbon dioxide (CO_2) were investigated in three groups of subjects at an altitude of 3,600 m. (lowlanders sojourning for a period of six wks., lowlanders having lived for one to three yr. at these altitudes and highlanders native to the same altitudes. Their CO_2 response curve was studied and compared. A decrease of the alveolar CO_2 tension threshold levels was observed in all the subjects. The variations in the sensitivty threshold occurred even with increased oxygen concentration in the inhaled gas mixtures. The fall in the sensitivity threshold with normal reaction of the respiratory center to CO_2 maintained the hyperventilation during chronic hypoxemia. This constant hyperventilation somewhat increased the alveolar oxygen tension and decreased arterial hypoxemia, but at the same time produced hypocapnia. The change in the respiratory center under these conditions was a necessary link of the compensatory reaction of the organism during chronic hypoxemia.

A69-81231
CARDIAC VOLUME AS AN INDICATOR OF FITNESS AND BURDENING OF THE CIRCULATION [OBJEM SRDCE JAKO UKAZATEL ZDATNOSTI A ZATIZENI OBEHU].
J. Cermák.
Casopis Lékaru Ceských, vol. 107, Dec. 13, 1968, p. 1546–1551. 17 refs. In Czech.

Based on results of 800 examinations of the cardiac volume using the teleroentgenographic method (i.e. in a recumbent position under control of the respiratory phase) made in 1962 to 1965 in 310 subjects (boys aged 12 to 15 yr., obese boys of similar age, adolescent and adult sportsmen with marked overweight performing physical work), the application and evaluation of the teleroentgenographic method was demonstrated. Criteria are presented by means of which fitness can be assessed as well as the degree of burdening of the circulation.

A69-81232
THE RESPIRATORY RHYTHM AND VARIATION OF NEUROMUSCULAR EXCITABILITY [RESPIRACNI RYTMUS A KOLISANI NERVOSVALOVE DRAZDIVOSTI SYNCHRONIZACE AUTORYTMU].
L. Stejskal.
Casopis Lékarü Ceských, vol. 107, Dec. 13, 1968, p. 1551–1555. 15 refs. In Czech.

During the phase of inspiration the activity of striated muscles, respiratory and nonrespiratory muscles and myocard, is accelerated. This cyclical respiratory activity (CRA) is marked especially in certain pareses of the motor system in particular if the subject undergoes hyperventilation or the Valsalva maneuver. The paper gives results which indicate that during increased muscle effort the individuals, both healthy and diseased, regularly retain the breathing in inspiration phase. From this firm association practical conclusions are inferred as regards the method of motor reeducation by means of movements against resistance, which is at the present time a method of choice for reeducation of most pareses. In the phase of exspiration and during the Müller test the cyclical respiratory activity is extinguished and the neuromuscular excitability is decreased. This is the reason the phase of exspiration is a physiological medium for relaxation and extension of extent by the so-called redressive motion and for reeducation of active movements of weakened muscles in a spastic paresis. It can be assumed that the cyclical increase in certain biological activies, linked to the phase of inspiration, is a result of association of central autorhythms. During the phase of inspiration, certain governing structures undergo a mass activation with corresponding facilitation of peripheral effects; during exspiration there is a central and peripheral relaxation.

A69-81233
KETOSIS, WEIGHT LOSS, URIC ACID, AND NITROGEN BALANCE IN OBESE WOMEN FED SINGLE NUTRIENTS AT LOW CALORIC LEVELS.
Janet Dale Bell, Sheldon Margen, and Doris Howes Calloway (Calif., U., Dept. of Nutr. Sci., Berkeley).
Metabolism, vol. 18, Mar. 1969, p. 193–208. 13 refs.
NASA Grant NGR-05-003-068 and Grant PHS AM 10202.

Five obese women were fed for six successive five-day periods 400 kcal. from single energy sources and 800 kcal. combinations of these. At 400 kcal./day, ketosis was least with carbohydrate and greatest with fat as the diet. Four hundred kcal. exogeneous protein per day, without any other dietary energy source, was found to reduce the degree of ketosis. The addition of 400 kcal. exogenous carbohydrate to 400 kcal. protein was found effectively to prevent the development of ketosis in the obese, but addition of 400 kcal. as fat was not beneficial. As has been previously observed, serum uric acid was found to rise and urinary uric acid to fall in obese subjects on low-calorie, high-fat diets. A low-calorie, high-carbohydrate diet had the reverse effect. Loss of weight, sodium, and potassium was much greater with diets based on fat than on carbohydrate. Four hundred kcal. carbohydrate per day had a greater protein-sparing effect than 400 kcal. fat per day in obese women. There appeared to be adaptation to continued low-calorie intake, evidenced by progressively less negative nitrogen balances in successive periods. In the last period, one subject maintained positive balance with only 400 kcal., as a protein. It was concluded that carbohydrate is necessary in the diet to prevent ketosis and loss of cations, to spare tissue protein and to promote adequate clearance of uric acid, when endogenous fat is the chief source of energy. Exogenous protein can fulfill part of this function, but it is less effective than carbohydrate at equivalently low calorie intakes.

A69-81234
MEDICAL INVESTIGATION OF THE LOSS OF THE COMET 4B AIRCRAFT, 1967.
J. K. Mason and S. W. Tarlton (R.A.F. Inst. of Pathol. and Trop. Med., Halton, Aylesbury, Bucks, Great Britain).
Lancet, no. 7592, Mar. 1, 1969, p. 431–434. 8 refs.

The investigation of the case of a Comet 4B aircraft which disappeared during the night of Oct. 11–12, 1967, when flying from London to Nicosia, is of interest for three main reasons: firstly, because the deliberate destruction of transport aircraft in the air is fortunately very rare; secondly, because the interpretation of the medical findings was largely based on the 1955 report in *The Lancet* of the Comet 1 disasters (Armstrong et al. 1955); and, thirdly, because the case demonstrates well how the principles of multilinear accident investigation can be successfully applied. Multilinear investigation implies the coordinated, yet independent, investigation of an accident along the circumstantial, engineering, and medical avenues. This sytem has been particularly well established in civilian aircraft accidents under the aegis of the Chief Inspector of Accidents of the Board of Trade.

A69-81235
PLASMA-CALCITONIN IN MAN.
T. V. Gudmundsson, N. J. Y. Woodhouse, T. D. Osafo, L. Galante, E. W. Matthews, I. MacIntyre (Roy. Postgraduate Med. School, Wellcome Unit of Encodrinol., London, Great Britain), A. D. Kenny (Mo., U., Space Sci. Res. Center, Columbia), and R. C. Wiggins (Middlesex Hosp., Med. School, London, Great Britain).
Lancet, no. 7592, Mar. 1, 1969, p. 443–446. 19 refs. Med. Res. Council, Ciba Ltd., and Brit. Empire Cancer Campaign for Res. supported research.

Calcitonin is present in normal adult plasma. In five samples obtained in a fasting state at 9 a.m. the levels ranged from 170 to 331 Medical Research Council milliunits per liter; in five afternoon samples a higher figure was obtained (256 to 492 milliunits per liter). In three totally thyroidectomized patients the plasma-calcitonin was normal. Calcium infusion increased the plasma-calcitonin levels in healthy volunteers. It is concluded that calcitonin is a hormone in man. C cells in man are not confined to the thyroid so that total thyroidectomy need not produce calcitonin deficiency.

A69-81236
THE BEHAVIOR OF GRANULOCYTE AND LYMPHOCYTE COUNT AS WELL AS SEGMENT INDEX OF NUCLEI OF NEUTROPHIL GRANULOCYTES IN PERIPHERAL BLOOD OF PERSONS PROFESSIONALLY EXPOSED TO IRRADIATION IN CORRELATION WITH PERSONAL DOSIMETER VALUES [DAS VERHALTEN DER ZAHL DER GRANULOZYTEN UND LYMPHOZYTEN SOWIE DES SEGMENTINDEX DER KERNE DER NEUTROPHILEN GRANULOZYTEN IM PERIPHEREN BLUT BERUFLICH STRAHLENEXPONIERTER PERSONEN IN ABHANGIGKEIT VOM PERSONENDOSIMETERWERT].
A. Buhr and H. zur Horst-Meyer.
Radiobiologia Radiotherapia, vol. 9, no. 6, 1968, p. 683–687. 13 refs. In German.

Investigations of occupational exposure to irradiation have revealed an increase in lymphocyte count and segment index of the nuclei of neutrophil granulocytes which is correlated to the personal dosimeter values (taken as extent of exposure). There is no constant relationship with granulocyte count.

A69-81237

CIRCADIAN RHYTHMS IN MEN AS INFLUENCED BY ARTIFICIAL LIGHT-DARK CYCLES OF VARIOUS PERIODS [CIRCADIANE PERIODIK DES MENSCHEN UNTER DEM EINFLUSS VON LICHT-DUNKEL-WECHSELN UNTERSCHIEDLICHER PERIODE].

J. Aschoff, E. Pöppel, and R. Wever (Max-Planck-Inst. für Verhaltensphysiol., Seewiesen and Erling-Andechs, West Germany).

Pflügers Archiv European Journal of Physiology, vol. 306, Feb. 3, 1969, p. 58–70. 22 refs. In German.

Circadian rhythms of 10 subjects were studied under the influence of an artificial light-dark cycle including twilight-transitions. The Zeitgeber was changed to periods either longer or shorter than 24 hr. Three out of seven subjects became synchronized completely to 26 2/3 hr.; two subjects were synchronized with their activity-rhythm but not with the rhythm of rectal temperature (internal desynchronization), and two were completely desynchronized. One out of five subjects followed a Zeitgeber period of 22 2/3 hr., but only with the activity rhythm, while all others were complete desynchronized. These experiments demonstrate that an artificial light-dark cycle synchronizes circadian rhythms in men only to periods which are close to 24 hr. For the activity rhythm, this range of entrainment is larger than for the temperature rhythm. By other means than by the demonstration of free-running rhythms after the exclusion of Zeitgebers, these results establish the endogenous character of human circadian rhythms. The finding that the rhythms of activity of rectal temperature can vary independently, suggests that the two rhythms have to be considered as separate oscillators. Both the external phase-relationship between Zeitgeber and activity rhythm, as well as the internal phase-relationship between the rhythms of activity and of temperature, are functions of the Zeitgeber period. With an increase of the Zeitgeber period by one hr., the activity rhythm is advanced relative to the Zeitgeber by 17°, and the temperature rhythm is advanced relative to the activity rhythm by 21°. The results suggest either different types of action of the Zeitgeber on activity and on temperature, or different types of oscillations underlying the two rhythms.

A69-81238

AUTONOMOUS CIRCADIAN RHYTHMS IN MEN AS INFLUENCED BY DIFFERENT LIGHT CONDITIONS [AUTONOME CIRCADIANE PERIODIK DES MENSCHEN UNTER DEM EINFLUSS VERSCHIEDENER BELEUCHTUNGS-BEDINGUNGEN].

Rütger Wever (Max-Planck-Inst. für Verhaltensphysiol., Seewiesen and Erling-Andechs, West Germany).

Pflügers Archiv European Journal of Physiology, vol. 306, Feb. 3, 1969, p. 71–91. 28 refs. In German.

The circadian rhythm was tested with 75 human subjects in complete isolation from environment. Fifty-two subjects lived under constant illumination, 20 subjects switched on the light while getting up, and switched it off while going to bed (illumination by choice) and with three subjects, the illumination was changed between the two kinds mentioned before. With 38 subjects, the intensity of illumination was varied during the experiment in order to examine the influence of light intensity on the circadian period. The interpretation of all the results shows that under illumination by choice: (a) the period is longer (significant with $p < 0.001$); (b) the standard deviation around the mean value of period is greater ($p < 0.005$); and (c) the tendency for internal desynchronization is greater ($p = 0.005$) than under constant illumination. These results correspond with predictions derived from a hypothesis for circadian rhythms. Only under illumination by choice does the circadian period depend on the intensity of illumination according to the following rule: the correlation between light intensity and period tends to be positive in individual experiments and negative in group experiments ($p = 0.048$). This result corresponds with theoretical considerations. Against that, under constant illumination the period depends frequently on light intensity but not according to a rule neither in individual experiments nor in group experiments. Also, the tendency for internal desynchronization is independent of the existing light intensity. In order to explain these results, the hypothesis is offered that under objectively constant illumination the subject is exposed subjectively to a light-dark cycle because the eyes are open during activity time and close during rest time. It follows that under constant illumination, the same feed-back of the self-selected light-dark cycle on the circadian period is effective as under illumination by choice, but to a smaller amount.

A69-81239

RESPONSE DIFFERENCES IN SOME STEROID-SENSITIVE HEPATIC ENZYMES IN THE FASTING RAT.

Arthur Yuwiler, Edward Geller, and Shawn Schapiro (Calif., U., Center for Health Sci., Los Angeles; Veterans Admin. Hosp., Develop. Neuroendocrinol. Lab., San Fernando; and Veterans Admin. Center, Neurobiochem. Lab., Los Angeles, Calif.).

Canadian Journal of Physiology and Pharmacology, vol. 47, Apr. 1969, p. 317–328. 36 refs.

Grants PHS HD 01058, PHS AM 08775, PHS AM 06603, and PHS FR-3.

The activities of the glucocorticoid-inducible enzymes, tryptophan pyrrolase, tryptophan and tyrosine σ-ketoglutarate transaminases, and phenylalanine and trytophan hydroxylases, were measured during fasting and realimentation. Of these, only tryptophan pyrrolase activity increased during the fasting period, despite sustained elevations in adrenocortical activity as evidenced by increased levels of corticosteroids. The increase appeared to reflect increased synthesis and resembled substrate induction. Total liver transaminase activity was unaltered by fasting whereas hydroxylase activity decreased. The results demonstrate the non-equivalence of exogenous glucocorticoid administration and the endogenous adrenal activation accompanying this stress in elicting enzyme induction.

A69-81240

COMPARISON OF FASTING PLASMA AMINO ACID PATTERNS IN THE PIG, RAT, AND CHICKEN.

John Boomgaardt and Bruce E. McDonald (McGill U., Macdonald Coll., Dept. of Animal Sci., Quebec, Canada).

Canadian Journal of Physiology and Pharmacology, vol. 47, Apr. 1969, p. 392–395. 12 refs.

Grant QARC McA-65-225.

Comparison of free amino acid levels in plasma (PAA) at 8, 12, 16, 20, and 24 hr. postprandial in pigs, rats, and chickens revealed differences between mammalian and avian species in the fasting metabolism of amino acids. PAA patterns during fasting were more variable for chickens than for either rats or pigs. There was a marked increase in the plasma lysine level in chickens (27.5 to 115.8 μg./ml.) as fasting was extended from eight to 24 hr. Plasma lysine levels in pigs and rats, by contrast, increased from 14.2 to 19.5 μg./ml. and 39.8 to 63.7 μg./ml. respectively during the same period of fast. Plasma threonine and methionine levels also increased in chickens during fasting whereas the levels of these amino acids in pigs and rats decreased or remained unchanged during a 24-hr. fast. Extending the period of fast to 36 hr. in chickens and 48 hr. in pigs resulted in further small increases in the plasma lysine concentration.

A69-81241
A NOTE ON THE COMBINED EFFECTS OF EXERCISE AND FOOD RESTRICTION ON PLASMA ENZYME ACTIVITIES IN THE RAT.
J. R. Beaton and B. Oyster (Hawaii, U., Dept. of Food and Nutr. Sci., Honolulu).
Canadian Journal of Physiology and Pharmacology, vol. 47, Apr. 1969, p. 396–398. 6 refs.
Hawaii, U. supported research.

Plasma activities of malic dehydrogenase (MDH) and glutamic-pyruvic transaminase (GPT) were measured in adult male rats made to swim for one hr. either as a single, acute exercise or in repeated exercises (training) in the presence of a 50% food restriction. Food restriction *per se* elevated MDH and lowered GPT activities. Food-restricted rats responded to both acute exercise and training by an elevated plasma MDH activity. The effect of exercise on plasma MDH activity in these animals was greater than in rats fed ad libitum and was greater than could be accounted for by the summation of the individual effects of training and of food restriction. Plasma GPT activity was not altered by exercise in rats fed ad libitum or in food restricted animals. It would appear, as suggested previously, that plasma MDH activity may be a useful biochemical criterion of training.

A69-81242
INVESTIGATIONS ON THE EFFECTS OF HYPERBARIC OXYGEN ON ENZYME ACTIVITY.
Nicole Bégin-Heick, P. Hochstein, and Gale B. Hill (Duke U., Med. Center, Depts. of Physiol. and Pharmacol. and Radiol., Durham, N.C.).
Canadian Journal of Physiology and Pharmacology, vol. 47, Apr. 1969, p. 400–402. 9 refs.
Grants PHS CA-10330 and PHS K3-GM-4857; N. C. Tuberc. Assn. Inc. supported research.

The ability of hyperbaric oxygen to produce lasting effects on enzyme activities was investigated. Mice were subjected to hyperbaric oxygen until they suffered sustained convulsions. The enzyme activities were then determined in brain and liver tissue. The results presented indicate that under these conditions of *in vivo* exposure and *in vitro* assay, hyperbaric oxygen does not affect permanently the activities of the enzymes which were examined.

A69-81243
THE EFFECTS OF MATURATION AND AGING ON THE WAVE FORM OF VISUALLY EVOKED POTENTIALS.
Robert E. Dustman and Edward C. Beck (Utah, U. and Veterans Admin. Hosp., Salt Lake City).
Electroencephalography and Clinical Neurophysiology, vol. 26, Jan. 1969, p. 2–11. 48 refs.
Contract NICHHD PH-43-67-1451.

Visually evoked responses (VER) of 215 normal subjects, aged one mo. to 81 yr., were studied with the following results. Amplitudes of several waves in the first 250 msec. of the VER changed markedly with age. In responses recorded from the occiput there was a rapid increase in amplitude reaching a maximum in five to six yr.-old-children. The mean amplitude of VER at this age was about twice as large as in some older age groups. With children of seven yr. and older there was a decline in amplitude until ages 13 to 14, when an abrupt increase in amplitude appeared. Amplitude appeared to stabilize at about age 16. With older subjects, mean age 67 yr., earlier components, those appearing in the first 100 msec., were consistently larger and arrived significantly later. With infants, mean age three yr., later components, those after 100 msec., had significantly longer peak delays. A comparison of responses from different brain areas as well as the degree of homogeneity of VER at different age levels showed a gradually changing relationship with increasing age.

A69-81244
A STUDY ON PHASE RELATIONSHIP IN HUMAN ALPHA ACTIVITY. CORRELATION OF DIFFERENT REGIONS.
H. Hori, K. Hayasaka, K. Sato, O. Harada, and H. Iwata (Tohoku U., School of Med., Dept. of Neuropsychiat., Sendai, Japan).
Electroencephalography and Clinical Neurophysiology, vol. 26, Jan. 1969, p. 19–24. 15 refs.

The phase relationships of alpha activities in six normal adults were studied by means of a decatron toposcope. The similarity of the change in phase difference of alpha waves obtained through adjacent electrodes was quantified by using the correlation coefficient (r). According to the values of r, the brain could be divided into three blocks: (1) frontal; (2) parietal and occipital near the midline; and (3) temporal and its marginal portions in the parieto-occipital regions. The highest, moderate and the lowest values of r were found over the frontal, the parietal and occipital, and the temporal lobes, respectively.

A69-81245
DETECTION OF PHOTOGENIC EPILEPSY IN MAN BY SUMMATION OF EVOKED SCALP POTENTIALS.
B. L. Bablouzian, P. W. Neurath, S. Sament, and C. W. Watson (New England Med. Center Hosps., Boston, Mass.).
Electroencephalography and Clinical Neurophysiology, vol. 26, Jan. 1969, p. 93–95.
Grants PHS FR-05598 and PHS NB-621301A1.

Summated light evoked scalp potentials in man were obtained simultaneously with ink-writer records, and "light sensitive" subjects were compared to controls. One hundred flash stimuli responses per record were averaged from the parietal and occipital regions. The results, displayed with a CAT 400C, showed marked differences between the subjects and controls. At the low frequencies of one and three f/sec. used, no observable ink-writer abnormalities or seizures are generally produced. The controls' summated response wave trains had a maximum response peak at about 80 msec. after the stimulus and oscillations of decreasing amplitude after this first maximum; those of the sensitive subjects had larger amplitude, more regular periodicity, and the peak amplitudes increased with time. Such characteristic patterns (that in practice can only be observed with relative ease by automatic summating methods) correspond to the known aberrant cerebral excitability and promise to aid in its detection and diagnosis.

A69-81246
PORTABLE RADIATION AND LIGHT DETECTOR USING A P-I-N SILICON DIODE.
Peter Bloch and Charles S. Worrilow (Pa., U., Dept. of Radiol., Philadelphia).
Physics in Medicine and Biology, vol. 14, Apr. 1969, p. 277–281.
Grants PHS 3T1-RH50-02S3(67) and PHS 5 RO1 RH-00443-15.

A portable survey instrument using a silicon p-i-n diode as the radiation detector was designed. It can be used to measure exposure rates in the range 50 mr/hr. to 10 r/min., or exposures between one m and 10 r. The radiation waveform can be visualized by attaching an oscilloscope to the output of the instrument. The response per roetgen of the instrument shows a variation of ±8%

in the HVT range from two to eight mm. Al. When used as a detector of optical radiation in conjunction with a Wratten No. 102 filter, the spectral response closely matches the Standard C.I.E. luminosity curve. The instrument can, therefore, also be used to measure the luminance of fluoroscopic screens to determine the conversion efficiency of conventional fluoroscopes as well as image intensified fluoroscopes.

A69-81247
REPETITION AND PROBABILITY EFFECTS IN A SERIAL CHOICE REACTION TASK.
D. J. Hale (Aston, U., Appl. Psychol. Dept., Birmingham, Great Britain).
Acta Psychologica, vol. 29, Mar. 1969, p. 163–171. 9 refs.
S.R.C. supported research.

Each of five subjects in one of three groups performed 5,000 reactions on either a 2, 4 or 8 choice serial choice reaction task. Reaction time (RT) and errors were analyzed for four sequence positions - runs, alternations, rank alternations and intervals. The usual repetition effect occured at all choice levels and as repeated RT decreased during a run so did the RT from the following alternation. There was a smaller probability estimation effect with the interval analysis and a very slight effect for rank alterations. The results demonstrate the simultaneous and interdependent operation of repetition and probability mechanisms.

A69-81248
THE EFFECTS OF HYPOXIA ON CERTAIN ASPECTS OF VISUAL PERFORMANCE.
Morton K. Ohlbaum (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
American Journal of Optometry and Archives of American Academy of Optometry, vol. 46, Apr. 1969, p. 235–249. 26 refs.
Am. Acad. of Optometry, Ann. Meeting, Chicago, Dec. 10, 1967.

Accommodation, convergence and stereoacuity were measured in 19 aviators at sea level and at altitudes to 18,000 ft. Most subjects showed a decrement of all three skills, while none improved. Hypoxia has a detrimental effect on these functions, but there is considerable variation in tolerance to oxygen deprivation. No change was observed in phorias or in plus acceptance at near. A small but steady shift toward myopia was observed with increased altitude.

A69-81249
EFFECT OF DURATION ON AMPLITUDE DISCRIMINATION IN NOISE.
G. Bruce Henning and Joseph Psotka (Defence Res. Estab. Toronto, Downsview, Ontario, Canada).
Journal of the Acoustical Society of America, vol. 45, Apr. 1969, p. 1008–1013. 18 refs.

Amplitude-discrimination performance is found to be independent of the duration of the signals to be discriminated for durations ranging from 20 to 200 msec. provided that the radio of signal energy to noise-power density is kept constant. If the ratio of signal energy to noise-power density is manipulated by altering either the noise-power density or the signal duration, then discrimination performance is also independent of that ratio once it exceeds 20 db. The implication of these findings is discussed.

A69-81250
MULTIPLE RATINGS OF SOUND STIMULI.
Jean S. Kerrick, David C. Nagel, and Richarda L. Bennett (Bolt Beranek and Newman Inc., Van Nuys, Calif.).
Journal of the Acoustical Society of America, vol. 45, Apr. 1969, p. 1014–1017.

Sixteen brief sounds (music, vehicle sounds, and artificial sounds) were judged on each of 15 bipolar scales by 20 subjects. Without instructions, subjects use the descriptors "loud" and "noisy" as synonomous. On the other hand, subjects do not equate either loudness or noisiness with acceptability, although there appears to be a moderate relationship when only vehicle or aircraft sounds are rated by subjects. The implications of these findings for instructions in psychoacoustic research are discussed.

A69-81251
SUPRATHRESHOLD AUDITORY ADAPTATION.
T. Palva and J. Kärjä (Oulu, U., Dept. of Otolaryngol., Finland).
Journal of the Acoustical Society of America, vol. 45, Apr. 1969, p. 1018–1021. 8 refs.
State Res. Council for Med. Sci supported research.

Perstimulatory suprathreshold adaption was measured in 38 normal adult persons between 250 and 6000 Hz. at 20, 40, 60, and 80 db. SL. In the experimental ear, the continuous stimulus had a constant intensity. In the control ear, the adjustable balancing stimulus had a duration of 200 msec. with a silent interval of similar legnth. Adaptation increased at all frequencies as a function of SL up to 60 db., but testing at 80 db. brought no further increase. At low tones, adaptation was smaller than at high frequencies. There were large individual differences; 5% showed no adaptation at all, 45% a very rapid growth, and 50% a slower adaptation reaching a maximum in 2 1/2 to 3 min. Average adaptation was 30 db. at the high frequencies. In children, the same test generally revealed no adaptation at all; in old age, adaptation was comparable to the normal adult group.

A69-81252
EFFECT OF MASKING NOISE AND PULSE LEVEL UPON JITTER DETECTION.
Irwin Pollack (Mich., U., Mental Health Res. Inst., Ann Arbor).
Journal of the Acoustical Society of America, vol. 45, Apr. 1969, p. 1022–1024. 7 refs. NSF supported research.

Jitter-detection thresholds were determined over a wide range of pulse levels and in the presence of band-limited masking noise. Pulse level modifies jitter thresholds of high pulse frequencies substantially more than that of low and intermediate pulse frequencies. This result is apparently at variance to that predicted by a simple temporal coding underlying auditory jitter. Noise masking is substantially more effective upon relatively low-frequency pulse trains (average interpulse intervals between two and 15 msec.) than upon higher-frequency pulse trains. Noise masking by low or high noise frequencies is substantially less effective than intermediate noise frequencies, in the vicinity of one kHz. This frequency region has also been implicated by other investigators as critical for pulse-frequency discrimination.

A69-81253
ATHLETIC PERFORMANCE AT MODERATE ALTITUDE.
Merritt H. Stiles.
Northwest Medicine, vol. 68, Mar. 1969, p. 243–248. 8 refs.

Studies reported at an International Symposium on the Effects of Altitude on Physical Performance, recommendations from the Olympic Advisory Panel on Sports Physiology, and discussions

with coaches and physiologists experienced in competition at altitude led to a set of recommendations regarding training for the Mexico City Olympic Games. New world records were set during the Mexico City Games in almost all Track and Field sprint events. Performance times were prolonged in distance events, though less prolonged than anticipated in some events. Though many Olympic records were broken in swimming events, relatively few new world records were established.

A69-81254
STATISTICAL STUDY ON THE RORSCHACH INITIAL LATENCY TIMES CARRIED OUT ON A GROUP OF 150 SUBJECTS [STUDIO STATISTICO SUI TEMPI DI LATENZA INIZIALI RORSCHACH ESEGUITO SU UN GRUPPO DI 150 SOGGETTI].
F. Sparvieri.
Rivista di Medicina Aeronautica e Spaziale, vol. 31, Jul.–Dec. 1968, p. 359–369. In Italian.

In 150 subjects undergoing the Rorschach test, the initial latency times were measured for each plate and the simple and cumulative frequency values as well as percentage ranks were calculated. The differences in initial latency times for every theoretically possible pair of plates were also caclulated, on the basis of which it was established that there exist two groups of plates, with statistically significant differences between them, one of which (plate IX, VI, IV) has high initial latency times, the other (plate III, I, VIII) low initial latency times.

A69-81255
SPONTANEOUS PNEUMOTHORAX DUE TO EXPLOSIVE DECOMPRESSION DURING FLIGHT [PNEUMOTORACE SPONTANEO DA DECOMPRESSIONE ESPLOSIVA DURANTE NAVIGAZIONE AEREA].
G. Rotondo (Milan, U., Ist. di Med. Legale e delle Assicurazioni, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 31, Jul.–Dec. 1968, p. 371–400. 36 refs. In Italian.

The case of a spontaneous pneumothorax which happened to a military pilot during a high altitude flight on a T_{-33} jet plane as a result of the sudden depressurization of the cockpit was described. The etiopathogenetic mechanism was discussed. Various physical, physiological and physiopathological factors which affect the lesions, especially pulmonary ones, resulting from explosive decompressions in various circumstances and conditions of high altitude flight in pressurized vehicles were reviewed. Finally the important medico-legal aeronautic aspects of the case were discussed. Prevention of the possible physio- and anatomo-pathological effects of such decompression during flight by means of the adoption of adequate preventive measures in the field of aeronautical medicine, aeronautical engineering and flight security was discussed.

A69-81256
CONSIDERATIONS ABOUT THE RELATIONSHIPS BETWEEN THE PERCENTAGE OF ALCOHOL IN THE BLOOD AND IN THE BREATH [CONSIDERAZIONI IN TEMA DI RAPPORTI TRA TASSO DI ALCOOL NEL SANGUE E NELL'ARIA ESPIRATA].
G. Paolucci (Centro di Studi e Ric. di Med. Aeron. e Spaziale, Aeron. Mil., Rome).
Rivista di Medicina Aeronautica e Spaziale, vol. 31, Jul.–Dec. 1968, p. 401–419. 15 refs. In Italian.
Intern. di Igiene e Med. Prevent., 5th Congr., Rome, Oct. 8–12, 1968

At the Study and Research Center on Aeronautical and Space Medicine, tests were carried out on volunteer subjects to establish possible correlations between the quantity of alcohol in the blood and in the breath and the behavior of the subjects in time after absorbing an alcoholic drink, in the equivalent quantity of ethanol equal to g. 0.50/kg. of body weight. From the results obtained it was concluded that the relationship between the quantity of alcohol present in the blood and in the breath is not constant in time and also varies in individual subjects. The following opinions were felt to be justified: (1) the quantity of alcohol found in the breath does not always reflect the real alcoholemia; (2) it is impossible to establish with certainty the actual psychophysical capacity of subjects with a percentage of alcohol in the blood under g. 0.8%, as it was found that subjects with a theoretically acceptable percentage (about 0.30%) may be in an evident state of prostration; while, on the contrary, subjects with a percentage of about g. 0.80% may often appear almost completely normal.

A69-81257
PSYCHICAL INJURIES FROM FULGURATION: A PROBLEM OF AERONAUTICAL PROFESSIONAL MEDICINE STUDIED THROUGH A CASE DESCRIPTION [I DANNI PSICHICI DA FOLGORAZIONE: UN PROBLEMA DI MEDICINA DEL LAVORO AERONAUTICO ESAMINATO ATTRAVERSO LA DESCRIZIONE DI UN CASO].
L. Longo
Rivista di Medicina Aeronautica e Spaziale, vol. 31, Jul.–Dec. 1968, p. 410–417. 9 refs In Italian.

A case history which involved psychical troubles due to fulguration in a non-commissioned officer of the Air Force was discussed. The problem of psychical injury after an electric shock was considered both from the point of view of professional aeronautical pathology, stressing the fact that cases of exposure to such electro-traumatic accidents are by no means rare in this environment, and from the medico-legal point of view.

A69-81258
VESTIBULAR AND AUDIOLOGICAL ASPECTS OF WHIPLASH INJURY AND HEAT TRAUMA.
J. U. Toglia, P. E. Rosenberg, and M. L. Ronis (Temple U., School of Med., Dept. of Otorhinol., Philadelphia, Pa.).
Journal of Forensic Sciences, vol. 14, Apr. 1969, p. 219–226. 10 refs.

Complaints concerning faulty inner ear function are common following whiplash or other head injuries. Such complaints include vertigo, unsteadiness, tinnitus, hearing loss, and difficulty in understanding speech. Patients presenting such complaints should be assumed to have pathology of the vestibular or auditory systems until this has been shown not to be so. Detailed examinations of the auditory and vestibular system are mandatory. Such examinations can only be performed utilizing modern techniques and apparatus. Electronystagmography and detailed audiologic studies are imperative for patients complaining of these symptoms. Well over two-thirds of the patients examined in this study demonstrated specific physiologic bases for their complaints. Most of the pathology observed was subtle and not immediately observable through cursory examination. Once determined, however, the pathology can almost always explain the symptoms, and appropriate medical or surgical management may be instituted. There is a dangerous tendency to attribute complaints of dizziness, tinnitus, etc., to psychological and emotional etiologies rather than to physiologic causes. It is believed that the vast majority of patients exhibiting such symptoms have a valid physical cause for their complaints.

A69-81259
THE EFFECT OF DOSED PHYSICAL STRAIN ON CHANGES IN LEUCOCYTES AND THEIR PHAGOCYTIC CAPACITY [VPLYV DOZOVANEJ FYZICKEJ NAMAHY NA ZMENY LEUKOCYTOV A ICH FAGOCYTARNEJ SCHOPNOSTI].
J. Kolesár and M. Antal.
Fysiatrický a Reumatologicky Vestnik, vol. 47, Feb. 1969, p 9–15. 18 refs. In Czech.

Adult healthy non-sportsmen were subjected to physical work of different intensities on a bicycle ergometer. The work load of the first group was 325 kmp./min. for 15 min., that of the second group was 650 kpm./min. for 15 min. and that of the third group was 325 kpm. for 30 min. The phagocytic capacity was examined in all observed persons before, immediately after and in the third, sixth and 24th hr. after exercise. The phagocytic capacity of leucocytes was observed by means of phagocytic activity, phagocytic index, total number of phagocyted bacteria and phagocytic activity expressed by a total number of active leucocytes. The persons with high physical strain proved to exhibit more marked changes in the observed indices. The leucocyte count and phagocytic activity expressed by the total number of active leucocytes was in third hr. and in the sixth hr. significantly higher in relation to the original value. In the 24th hr. after the load most of the observed indices returned to the original values.

A69-81260
CONTENT OF NINHYDRINPOSITIVE COMPOUNDS IN THE HEART AND SKELETAL MUSCLE IN THE RAT DURING ACCLIMATION TO HIGH-ALTITUDE CONDITIONS [OBSAH NINHYDRINPOZITIVNYCH LATOK V SRDCI I SVALE POTKANOV PRI AKLIMATIZACII NA VYSOKOHORSKE PROSTREDIE].
E. Balázová, P. Mäsiar, and V. Baláž.
Fysiatrický a Reumatologicky Vestnik, vol. 47, Feb. 1969, p. 16–22. 33 refs. In Czech.

Acclimation to a high altitude environment (1,350 m. above sea level) in the conditions of metabolic load by cardiopathogenic diet proves to change the metabolism of basic ninhydrine-positive protein compounds (NPL) in the heart and skeletal muscle of rats. The decrease of NPL in acid, neutral and basic areas in cardiac muscle and the decrease of NPL in the neutral area in the skeletal muscle were observed. It was assumed that the change mentioned is a non-specific reaction of acclimation on the level of protein metabolism in tissue reflecting activated cell metabolism during acclimation.

A69-81261
PHOTOREACTIVATION OF MANGANESE CATALYST IN PHOTOSYNTHETIC OXYGEN EVOLUTION.
G. M. Cheniae and I. F. Martin (Res. Inst. for Advan. Studies, Baltimore, Md.).
In Plant Physiology, vol. 44, Mar. 1969, p 351–360. 38 refs.
NASA Grant NASW-1592 and Grant AEC(30-1)-3706.

The formation of active O_2 evolving centers following addition of Mn^{2+} to Mn deficient *Anacystis nidulans* cells yielded an estimate of 6 to 12 Mn atoms associated with each O_2 evolving reaction center. Restoration of activity upon addition of Mn ions is affected in three ways: (1) Stimulation of the uptake of exogenous Mn into the cells—this uptake occurs in darkness, but enhanced 5 to 10 fold by light; a high concentration of dichlorophenyl dimethylure (DCMU) (1×10^{-5} M) decreases this light enhanced influx no more than 50 to 75%; (2) Photoreactivation of the O_2 evolving centers, after excess Mn has been accumulated in the cells essentially no increase in Hill activity is observed unless the cells are illuminated. This photoreactivation is fully inhibited by 10^{-6} M DCMU and partially by benzoquinone. The Q_{10} of photoreactivation proper is close to one; (3) Photoinhibition of the activation—photoreactivation occurs most effectively in weak intensities (< one-fiftieth photosynthetic saturation in normal cells). Apparently at higher intensities an inhibitory photoprocess is overriding. This inhibition proved reversible. The photoreactivation leads to new stable O_2 evolving centers as evidenced by an increase in the rate at saturating intensity, quantum yield, and the O_2 gush.

A69-81262
THE VISIBILITY OF RATE OF CHANGE OF LUMINANCE IN THE PRESENCE OR ABSENCE OF A BOUNDARY.
M. Waygood (J. J. Thomson Phys. Lab., Whiteknights Park, Reading, Great Britain).
Optica Acta, vol. 16, Jan.–Feb. 1969, p. 61–64. 8 refs.

Luminance change visibility of a Ganzfeld and circular target subtending 15° at the eye was measured for 12 subjects. Visibility of change increased from about 50% at rate of change of 0.03 Log units/sec. to 80% at 0.17 Log units/sec. Visibility of change for any one rate and target was identical irrespective of the sign of luminance change. Visibility of luminance change in the Ganzfeld was generally 15% lower than in the 15° target. The luminance change detecting mechanism must therefore depend less upon area signal than on contrast information.

A69-81263
THE MAGNITUDE OF TRANSLATIONAL HEAD MOVEMENTS.
J. M. Findlay (J. J. Thomson Phys. Lab., Whiteknights Park, Reading, Berks, Great Britain).
Optica Acta, vol. 16, Jan.–Feb. 1969, p. 65–68. 5 refs.
Grant MRC G/964/278/B.

Results are presented from an experiment to measure the magnitude of translational head movements during steady fixation when the head was supported in various ways. The significance of the results for eye movement recording is discussed.

A69-81264
COLOUR STEREOSCOPY.
I. G. H. Ishak, F. S. Said, and F. Abd-Elsalam (Ain Shams U., Fac. of Sci., Abbassia, Cairo, U.A.R.).
Optica Acta, vol. 16, Jan.–Feb. 1969, p. 69–74. 7 refs.

The distances at which two differently situated colored targets appear to lie at the same distance from an observer were calculated using a semi-automatic apparatus, which is a modification of Wright's apparatus. The apparatus, when set to work, provides two circular targets of angular subtense of 20 min., seen against a black background. The results of ten observers were statistically analyzed, and the analysis supports the view that a red mark situated at the same plane as a blue mark appears nearer. The data can be nearly quantitatively explained on the basis of: (1) Einthoven's theory and the Stiles–Crawford effect; or (2) chromatic difference of magnification.

A69-81265
PREVENTION OF HYPOXIC VASOCONSTRICTION IN CAT LUNG BY HISTAMINE-RELEASING AGENT 48/80.
Anton Hauge and Norman C. Staub (Calif., U., San Francisco Med. Center, Cardiovascular Res. Inst. and Dept. of Physiol., San Francisco).
Journal of Applied Physiology, vol. 26, Jun. 1969, p. 693–699. 20 refs.
Grant PHS HE-06285.

In the anesthetized, open-thorax cat measurements were made of pressure and flow through the pulmonary vasculature of one lobe ventilated with air or hypoxic gas mixtures while the remainder of the lung breathed oxygen to prevent systemic hypoxia. A comparison was made of the cat lung in the living animal with the isolated perfused rat lung in which Hauge showed a correlation between lung tissue histamine and the pulmonary vasoconstrictor response to acute alveolar hypoxia. The cat unilobar preparations gave strong and reproducible vasoconstrictor responses to three-min. periods of alveolar hypoxia. The dose-response curves for five cats showed thresholds at 14 to 10% inspired O_2 and half-maximal responses at 7 to 4% inspired O_2. The time course of the response was rapid. The histamine-releasing agent 48/80 abolished the hypoxic vascular response in each of nine cats without blocking the ability of the lobar vessels to respond to other vasoconstrictors. In three cats followed for up to 1.5 hr. recovery from the 48/80 effect was evident. These data support in another species the hypothesis that histamine may play a role in mediating the pulmonary vascular resistance increase seen during alveolar hypoxia.

A69-81266
HYPEROXIA COMPARED TO SURFACTANT WASHOUT ON PULMONARY COMPLIANCE IN RATS.

David L. Beckman and Harold S. Weiss (Ohio State U., Coll. of Med., Dept. of Physiol., Environ. Physiol. Lab., Columbus).

Journal of Applied Physiology, vol. 26, Jun. 1969, p. 700–709. 56 refs.

NASA Grant NsG 295-62.

Air and saline pressure-volume (P-V) curves were run on lungs from 220-g. rats after 60 to 66 hr. in one atm. O_2. Inflation (inf) and deflation (def) were continuous: with air at 20 sec./cycle to 20 cm. H_2O and with saline at 0.8 ml./min. to the air V. Total lung compliance (C_L) was determined from the change in V of the air curves between 5-15 cm. H_2O, tissue compliance (Ctis) from the slopes of the saline curves and compliance due to surface forces (Csurf) from $1/C_L = 1/Ctis + 1/Csurf$. Lecithin in the lung transudate obtained by saline perfusion was used as an index of surfactant. Hyperoxia decreased lecithin by 62%, (623 ± 48 to 293 ± 35 μg./lung) and all compliances (using an average of inf and def, C_L by 65%, Ctis by 48%, and Csurf by 72%). Surfactant washout in controls decreased C_L and Csurf similarly, but increased Ctis. Lecithin was highly correlated ($r = 0.7$) with either C_L or Csurf. O_2 thus lowered C_L both by decreasing surfactant and by increasing tissue rigidity.

A69-81267
EFFECTS OF EXERCISE ON KNEE LIGAMENT SEPARATION FORCE IN RATS.

Jerome Zuckerman and G. Alan Stull (Md., U., Motor Performance Lab., College Park).

Journal of Applied Physiology, vol. 26, Jun. 1969, p. 716–719. 13 refs.

Forty-seven adult male rats of the Wistar strain were randomly divided into four groups for a nine-wk. experimental period. The swimming group was permitted spontaneous activity in addition to swimming in a tank for 15 min./day, five days weekly. The running group was permitted spontaneous activity plus running on a treadmill for 15 min./day, five days weekly. The voluntary exercise group was permitted spontaneous exercise but engaged in no forced activity. The sedentary subjects remained in their cages for the entire experiment. At the end of the experimental period, the animals were sacrificed and the strength of the right rear medial and left rear lateral collateral ligaments was tested. Statistical analysis of the data indicated that for both ligaments forced physical activity increased the amount of force required to separate the ligament from its bony attachment.

A69-81268
EFFECTS OF UPRIGHT POSTURE ON RENAL ELECTROLYTE CYCLES.

Anthony H. Vagnucci, Alvin P. Shapiro, and Robert H. McDonald, Jr. (Pittsburgh, U., School of Med., Montefiore and Presbyterian-U. Hosps., Dept. of Med., Pa.).

Journal of Applied Physiology, vol. 26, Jun. 1969, p. 720–731. 45 refs.

Grants PHS HE-05711, and PHS FR-56; Western Pa. Chapter of the Arthritis Found. and Presbyterian-U. Hosp. supported research.

Five normal subjects followed protocols of continuous recumbency (R) or quiet erect posture 0700 to 1900 hr. (S_d), 1600 to 0400 hr. (S_n), each protocol for at least three days. The daytime peaks of Na and in less degree of Cl cycles can be depressed by upright position. Their tendency to reappear, notwithstanding this strong stimulus, the absence of natriuresis when recumbency is assumed at 0400, the confinement of recument natriuresis to the interval of 1000 to 0100, are indications that the circadian rhythm can modify the postural effects quantitatively and qualitatively. The GFR cycle is not significantly affected by posture; this factor may play a role in the R cycles and in modifying the postural effects in S_d and S_n. in upright position aldosterone increases in concurrence with, and perhaps secondary to, a norepinephrine rise. The available evidence does not favor a role of this steroid in the cycles of R and in their postural changes of S_d and S_n. Upright posture does not modify the potassium cycle. Cortisol may play a role in the mechanism of the latter.

A69-81269
FREQUENCY DEPENDENCE OF PULMONARY QUASI-STATIC HYSTERESIS.

Franco Saibene and Jere Mead (Harvard U., School of Public Health, Dept. of Physiol., Boston, Mass.).

Journal of Applied Physiology, vol. 26, Jun. 1969, p. 732–737. 14 refs.

Grants PHS AP-00229, PHS GM-08391, and PHS GM-409.

The quasi-static component of hysteresis presented by the volume-pressure diagram of the human lungs was determined at very low rates of volume changes and in quasi-static conditions for three different tidal volumes: as others have found, it appears to increase with the depth of the breath. Under controlled conditions of volume history the quasi-static and dynamic components of hysteresis were separated at high rates of volume change. Quasi-static hysteresis was found to decrease as respiratory frequency increases. From these findings it would appear that during quiet breathing the contribution of quasi-static hysteresis is probably nil. Also during exercise, since the effect due to the increased tidal volume is counterbalanced by that due to increased flow, this contribution is very small.

A69-81270
CEREBRAL BLOOD FLOW AND METABOLISM DURING ACUTE SALICYLATE INTOXICATION IN THE GOAT.

S. Craighead Alexander and Allan L. Smith (Pa., U., School of Med., Dept. of Anesthesia, Philadelphia).

Journal of Applied Physiology, vol. 26, Jun. 1969, p. 745–751. 33 refs.

Grants PHS GM-09070-06, PHS GM-15403-01, and PHS 5-T10-GM-215-11.

The effect of acute salicylate intoxication on cerebral blood flow (CBF), cerebral metabolism, and cisternal CSF composition was evaluated in 13 artificially ventilated goats during N_2O-O_2 anesthesia. End-tidal pCO_2 was kept constant at 38 torr in seven animals and 20 torr in six animals. Measurements were made in

the control state and after arterial blood salicylate concentration had been constant at 70 mg./100 ml. for two hr. CBF of the normocarbic animals increased from 61.0 ± 9.4 (SE) to 110.5 ± 18.3 ml./100 g. per min. (81%), while cerebral O_2 consumption (CMR_{O2}) increased from 2.77 ± 0.48 to 4.16 ± 0.50 ml./100 g. per min. (50%). Sagittal sinus blood pO_2 (pV_{O2}) increased from 51.5 ± 1.9 to 63.7 ± 3.1 torr, since blood flow increased more than metabolic rate. Salicylate increased CBF of the hypocarbic animals from 39.8 ± 6.5 to 50.1 ± 8.2 ml./100 g. per min. (26%), while brain O_2 consumption was augmented from 3.28 ± 0.44 to 4.49 ± 0.42 ml./100 g. per min. (37%). Hypocarbia diminished pV_{O2} as expected, but intoxication of the hypocarbic animals produced no further change in this value. CSF lactate increased from 3.71 to 5.89 mM in the normocarbic animals and from 4.43 to 5.73 mM in the hypocarbic animals. Parallel increases in pyruvate concentration also occurred and lactate/pyruvate ratios were not altered in either group. CSF (HCO_3^-) and pH values were not altered by salicylate intoxication in either group. These data indicate that although salicylate increased CMR_{O2} and lactate production, brain oxygenation was adequate at both normal and reduced levels of $paCO_2$.

A69-81271
ENERGY UTILIZATION IN INTERMITTENT EXERCISE OF SUPRAMAXIMAL INTENSITY.

R. Margaria, R. D. Oliva, P. E. Di Prampero, and P. Cerreteli (Milan, U., Dept. of Physiol., Italy).

Journal of Applied Physiology, vol. 26, Jun. 1969, p. 752–756. 9 refs. World Health Organ. and Ital. Natl. Res. Council (CNR) supported research.

In supramaximal exercise the extra energy which is not met by oxidation is drawn from splitting of high-energy phosphate, and only when this source is exhausted is energy drawn from the other anaerobic source, the splitting of glycogen into lactic acid. In strenuous intermittent exercise, no lactic acid is formed if the oxygen debt contracted during the working period can be met completely by the alactic phosphagen-splitting mechanism; the oxygen debt contracted during the working period must then be completely paid during the rest period. If these conditions are met, very heavy intermittent exercise can be carried out indefinitely, leading to a total amount of work much greater than would have been possible were the exercise protracted continuously until exhaustion. The payment of the alactic oxygen debt fraction is confirmed to be a fast process, the half-reaction time being about 20 to 25 sec.; the capacity of this mechanism in young fit nonathletic subjects is about 20 ml./kg. body wt.

A69-81272
VENTILATORY RESPONSE TO HYPOXIA IN ACUTELY POLYCYTHEMIC DOGS.

J. H. Eisele, J. Pegg, and J. W. Severinghaus (Calif., U., Med. Center, Cardiovascular Res. Inst. and Dept. of Anesthesia, San Francisco).

Journal of Applied Physiology, vol. 26, Jun. 1969, p. 757–759. 6 refs.
Grants PHS 5-K6-HE-19,412, PHS HE-06285, and PHS 5T1-GM-63.

It is possible that carotid body chemoreceptor activity is altered by the marked polycythemia and hypervolemia seen in people with chronic mountain sickness, and that this might account for their insensitivity to hypoxia. To examine this explanation, six dogs under steady-state halothane anesthesia were made hypoxic (F_{IO_2} 0.12 and 0.10) while the $pACO_2$, base excess, and halothane concentrations were kept constant. After their hypoxic ventilatory responses were determined, the dogs were transfused with red cells raising the hematocrit from a mean of 39 to 67%. Approximately one hr. later they were again made hypoxic which produced ventilatory responses very similar to the control responses. This suggests that the hematologic changes accompanying chronic mountain sickness do not, themselves, produce an altered chemoreceptor response to hypoxia.

A69-81273
EFFECTS OF EXERCISE AND TRAINING ON PLASMA LIPIDS AND LIPOPROTEINS IN THE RAT.

Nicholas M. Papadopoulos, Colin M. Bloor, and Jim C. Standefer (Army, Dept., Div. of Biochem. and Walter Reed Army Med. Center, Walter Reed Army Inst. of Res., Dept. of Cardiorespirat. Diseases, Washington, D.C.).

Journal of Applied Physiology, vol. 26, Jun. 1969, p. 760–763. 12 refs.

The effect of strenuous exercise and training was studied on plasma triglyceride, nonesterified fatty acid (NEFA), cholesterol, and phospholipid levels, as well as plasma lipoprotein fractions separated by a new agarose gel electrophoretic method. Exercise consisted of four hr. swimming; physical training was induced by swimming four hr. daily for four wk. The results showed a significant decrease in the level of triglycerides with a concomitant increase of NEFA in the plasma of trained exercised animals. Cholesterol concentration decreased gradually during the four-wk. training period, whereas the phospholipid and cholesteryl ester levels remained unchanged. One lipoprotein zone disappeared with training. Lipid analysis of the zones indicated a relative decrease of triglyceride and NEFA, in this particular zone. Strenous exercise and training resulted in marked changes of plasma lipids and lipoproteins. The significanc of these changes in physiologic and pathologic conditions is discussed.

A69-81274
TELEMETERED HEART RATE RESPONSE TO SELECTED COMPETITIVE SWIMMING EVENTS.

John R. Magel, William D. McArdle, and Roger M. Glaser (N.Y., City U., Queens Coll., Dept. of Health and Phys. Educ., Lab. of Appl. Physiol., New York).

Journal of Applied Physiology, vol. 26, Jun. 1969, p. 764–770. 46 refs.
Grant NSF GU 2370.

Heart rate response prior to, during, and in recovery from selected competitive swimming events was determined in seven male members of the Queens College varsity swimming team by means of radiotelemetry. The swimming events studied were the 50-, 100-, 200-, 500-, and 1,000-yd. swims. The heart rate increased rapidly during the initial stages of each race and then climbed progressively toward maximum as the race proceeded. Several plateaus in heart rate and swimming speed were reached during the 500- and 1,000-yd. events. The longer swimming events tended to elicit higher peak heart rates (181 beats/min.) than the shorter, sprint events (173 beats/min.). Recovery from the 50-yd. event was more rapid than any of the longer distances. In an attempt to control for the effects of work duration when comparing heart rates running and swimming, all subjects ran distances comparable in time to those they had swum. The pattern of heart rate response in running was essentially similar to swimming, but the magnitude of the response was greater in all running events. The maximum heart rates during running were significantly greater than those obtained during swimming for a similar time period.

A69-81275
CARDIORESPIRATORY AND METABOLIC RESPONSES TO LIVE E. COLI AND ENDOTOXIN IN THE MONKEY.
C. A. Guenter, V. Fiorica, and L. B. Hinshaw (Civil Aeromed. Inst.; Okla., U., School of Med.; and Veterans Admin. Hosp., Oklahoma City).
Journal of Applied Physiology, vol. 26, Jun. 1969, p. 780–786. 23 refs.
Contract ND N00014-68-A-0496 and Veterans Admin. Hosp. supported research.

Septicemia and the administration of endotoxin may have different effects in the production of shock. Hemodynamic, respiratory, and metabolic effects of live organisms (*Escherichia coli*) were compared with endotoxin and saline in rhesus monkeys. Six animals were given *E. coli*, six endotoxin, and five served as controls. Studies were conducted for two to four hr. The mean cardiac output decreased 62% within 60 to 90 min. in the *E. coli* group and 41% in the endotoxin group. This was associated with a dramatic decrease in systemic pressure and peripheral resistance in all animals. The mean arterial $P_{CO}2$ decreased to 24 mm. Hg in the *E. coli* group and 26 mm. Hg in the endotoxin group. Arterial hypoxemia developed in four animals and high alveoloarterial oxygen gradients were present at some time during the study in all the animals. Blood lactate levels increased and catecholamine levels rose after one to two hr. of hypotension. Control animals did not demonstrate these changes. The profound hemodynamic, respiratory, and metabolic effects of the septicemia in the monkey simulate observations in humans in septic shock. The rate of onset of measurable changes and the severity of hypoxia were the major differences observed in *E. coli* and endotoxin groups.

A69-81276
REFLEX RESPONSES OF HUMAN SWEAT GLANDS TO DIFFERENT RATES OF SKIN COOLING.
Mukul R. Banerjee, Reynaldo Elizondo, and Robert W. Bullard (Ind. U., Dept. of Anat. and Physiol., Bloomington).
Journal of Applied Physiology, vol. 26, Jun. 1969, p. 787–792. 14 refs.
Contracts AF F44620-68-C-0014 and Army 17-68-C-8066.

Reflex responses of the sweat glands to regional cooling of a skin area were studied on male human subjects resting in a hot room. The lower leg placed in a water bath was isolated for 15-min. periods by arterial occlusion to establish the neural nature of the generalized sweating response. The effect on sweat gland activity of altering the magnitude and rate of temperature decrease of the water, as well as the size of the skin area cooled, was studied. The characteristic response to a step decrease in bath temperature was a sharp depression in sweating followed shortly after the bath temperature stabilized by a reversal with recovery toward the initial sweating levels. Depression in generalized reflex sweating due to cooling of the lower leg was directly related to the magnitude of temperature change, the rate of temperature decrease, and the size of the skin area stimulated. For the same magnitude of temperature decrease, the depression in sweating was inversely related to the overall thermal drive of the subject. The reflex sweating activity associated with cooling of a skin area could be explained largely on the basis of rate response of thermosensitive nerve fibers to temperature changes.

A69-81277
MECHANISMS OF INJURY DUE TO INTENSE ± Gz VIBRATION IN WATER-IMMERSED CATS.
Donald J. Sass (Natl. Naval Med. Center, Naval Med. Res. Inst., Bethesda, Md.).
Journal of Applied Physiology, vol. 26, Jun. 1969, p. 819–826. 17 refs.
NASA Contract R-10.

This paper describes the pattern and developmental sequence of injury in cats produced by intense ± G_z vibration. Anesthetized cats were positioned upright in a water-immersion restraint and vibrated in the long axis of the body with vertical sinusoidal motion. Frequency and peak acceleration varied between 3.5 and 20 Hz, and ± 1 and ± 15 G_z, respectively. Exposures at ± 4 G_z or less were for 30 min. but at the higher accelerations the time ranged between 15 sec. and 30 min. Autopsies were performed immediately after vibration. The major injury occurred in the lung, and resembled lung injury due to blast, impact deceleration, and chest wall impact. The common mechanism seems to be excessive transpulmonic pressure resulting from abrupt change in thoracic volume. In an earlier investigation in this laboratory supine cats were subjected to ± G_x vibration in a water-immersion restraint. Pulmonary collapse and hemorrhage were the major injuries and were attributed to the heart pounding the lungs against the chest wall. Comparison of the results of the two studies indicate that body position in relation to the direction of vibration is a critical factor in the mechanism of vibration injury.

A69-81278
EFFECT OF ACCELERATION ON REGIONAL LUNG EMPTYING.
J. G. Jones, S. W. Clarke, and D. H. Glaister (Queen Elizabeth Hosp., Dept. of Med., Birmingham and Roy. AF Inst. of Aviation Med., Farnborough, Hampshire, Great Britain).
Journal of Applied Physiology, vol. 26, Jun. 1969, p. 827–832. 19 refs. Med. Res. Council and United Birmingham Hosp. supported research.

The single-breath test of Fowler was modified to produce wide regional differences in lung nitrogen concentration, by inspiration of a small volume of air at residual volume into nitrogen-free lungs. The subsequent pattern of sequential lung emptying at varying expiratory flow rates was studied in three normal subjects at increasing levels of acceleration up to +4 G_z, by continuous analysis of the expired nitrogen. At slow expiratory flow rates there was a marked terminal rise in nitrogen concentration over the last 15-20% of the vital capacity. This rise and the proportion of the vital capacity over which it occurred increased with added acceleration, indicating closure of basal airway units at a progressively higher lung volume. With increasing expiratory flow rate the closure of basal airway units at higher accelerations was enhanced. It was predicted that there would be virtually no gas trapping at 0 G, but a large volume at +9 G_z acceleration. Added acceleration changes lung emptying, and leads to increasing inequalities of ventilation and perfusion.

A69-81279
ELECTRIC-FIELD DISTURBANCES NEAR THE HUMAN BODY.
Philip C. Richardson and Robert M. Adams (USAF School of Aerospace Med., Aerospace Med. Div. (AFSC), Brooks AFB, Tex.).
Journal of Applied Physiology, vol. 26, Jun. 1969, p. 838–840.
Grant AF-AFOSR-766-67.

Small oscillatory electric-field disturbances occur near the human body concurrent with each heart beat and respiration. An investigation of the sources of these field changes revealed the signals to be unrelated to blood flow or streaming potentials. A charged body-proximity hypothesis is suggested.

A69-81280
A PUMP SYSTEM FOR PERFORMING INDICATOR-DILUTION CURVES WITHOUT BLOOD LOSS.
Joseph D. Cohn (Aerospace Med. Res. Lab., Wright-Patterson AFB, Ohio).
Journal of Applied Physiology, vol. 26, Jun. 1969, p. 841–843. 7 refs.
A method is described by which idocyanine green dye-dilution curves are obtained without blood loss. Inflow arterial blood is circulated past a densiometer curvette and returned to the subject through an outflow cannula by means of a roller-pump system. This system may be used for performing indicator-dilution studies in small animals and infants where blood sampling must be kept to a minimum.

A69-81281
CALIBRATION OF CLARK OXYGEN ELECTRODE FOR USE IN AQUEOUS SOLUTIONS.
M. E. LeFevre (N.Y., City U., Mt. Sinai Med. and Graduate Schools, Dept. of Physiol., Div. of Biophysics, New York City and Brookhaven Natl. Lab., Med. Res. Center, Upton, N.Y.).
Journal of Applied Physiology, vol. 26, Jun. 1969, p. 844–846.
NASA Grant 33-171-(001), Grants NIH AM-13037, and NSF GB-7764; AEC supported research.

This paper describes a rapid and simple method for the preparation of oxygen standard solutions for use with the oxygen electrode. The method involves the mixing of two solutions, one equilibrated with 100% oxygen, the other with 100% nitrogen. The electrode response in water equilibrated with known oxygen-nitrogen gas mixtures was found to be indistinguishable from the response obtained in mixed solutions calculated to give the same percent oxygen saturation. The method was applied to the preparation of solutions for multipoint calibrations of the Clark electrode and shown to be reliable and accurate. Its application to the testing of electrodes is illustrated by analysis of the performance of a defective electrode and repair by ammonium hydroxide treatment.

A69-81282
AN INEXPENSIVE MOTOR-DRIVEN TREADMILL FOR EXERCISING SMALL LABORATORY ANIMALS.
Maurice J. Jette, Larry M. Windland, and Lawrence I. O'Kelly (Ill., U., Dept. of Psychol., Comp. Lab., Urbana).
Journal of Applied Physiology, vol. 26, Jun. 1969, p. 863–864.

A method is described for constructing a 10-unit motor-driven treadmill to exercise small laboratory animals. The apparatus consists of a continuous belt riding on wooden rollers which rest on a metal frame. Ten individual compartments, arranged in two adjoining sections and suspended over the belt, provide the animal with an adequate running area. The rear of each section is fitted with a shock grid for conditioning the animal to run. The belt was constructed of neoprene and an electric drill powered the apparatus. The total cost, excluding the drill, amounted to less than $120.00. Shaping of the animal to run is discussed.

A69-81283
THE INTERPLAY OF DRIFTS AND FLICKS IN BINOCULAR FIXATION.
Gaetan J. St. Cyr and Derek H. Fender (Calif. Inst. of Technol., Pasadena).
Vision Research, vol. 9, Feb. 1969, p. 245–265. 24 refs.
Grants NIH NB 03627 and NIH GM 01335.

A study of spontaneous human eye movements during monocular and binocular fixation was made in order to determine the corrective roles of flicks and drifts. It is found that both types of motions correct fixational errors although flicks are somewhat more active in this respect. Vergence error is a stimulus for correction by drifts but not by flicks, while binocular vertical discrepancy of the visual axes does not trigger corrective movements.

A69-81284
SCOTOPIC AND PHOTOPIC FUNCTIONS FOR VISUAL BAND MOVEMENT.
Vivianne C. Smith (Columbia U., New York, N.Y.).
Vision Research, vol. 9, Feb. 1969, p. 293–303. 25 refs.
Contract Nonr 266(46) and Columbia U. supported research.

The threshold velocity at which a light, rotated in a frontoparallel plane around a foveal fixation target, appears as a filled band of light rather than a moving luminous object was determined with parametric manipulation of: (1) eccentricity of the moving target; (2) arc length traversed; and (3) luminance and wavelength composition of the target. The velocity at threshold increases as luminance and arc length increase. The use of spectrally selective illuminants gave results suggesting that the response in white light for a 10′ target at 5.7° from the fovea is determined by a scoptopic mechanism at all luminances and at 3.3° from the fovea by a scotopic mechanism at low luminances and a photopic mechanism at high luminances.

A69-81285
CORRELATION BETWEEN GLYCOLYSIS AND ERYTHROCYTE OSMOTIC RESISTANCE CHANGES IN RATS UNDER HIGH ALTITUDE CONDITIONS [SOPRIAZHENNOST' IZMENENII GLIKOLIZA I OSMOTICHESKOI REZISTENTNOSTI ERITROTSITOV KRYS V USLOVIIAKH VYSOKOGOR'IA].
L. N. Simanovskii, G. I. Grigor'eva, and O. I. Tarakanova (USSR, Acad. of Sci., I. M. Sechenov Inst. of Evolutionary Physiol. and Biochem., Leningrad).
Fiziologicheskii Zhurnal SSSR, vol. 54, Dec. 1968, p. 1440–1443. In Russian.

Changes in glycolysis activity, erythrocyte osmotic resistance and morphological pattern of the oxygenated blood of albino rats acclimatized to altitudes of 3,200 m. have been investigated. It has been shown that the glycolysis activity and erythrocyte osmotic resistance are increased and well correlated. The changes of erythrocyte properties are assumed to be related with "rejuvination" of the oxygenated blood.

A69-81286
COMBINED EFFECT OF CARBON MONOXIDE AND HYDROGEN SULFIDE [KOMBINIROVANNOE DEISTVIE OKISI UGLERODA I SEROVODORODA].
R. K. Mel'nichenko (Krivoy Rog, Sci.-Res. Inst. of Labor Hyg. and Occupational Diseases, USSR).
Vrachebnoe Delo, no. 7, Jul. 1968, p. 87–90. 12 refs. In Russian.

Experiments conducted on white rats, exposed for six mo. to the effect of 0.3 ml./l. of carbon monoxide and to the combination of 0.3 ml./l. of carbon monoxide with 0.05 ml./l. hydrogen sulfide, showed a marked toxic effect of the carbon monoxide and hydrogen sulfide combination. Data of previous acute experiments and results of this study suggested the necessity to reconsider the present hygienic standards of work conditions in an environment containing carbon monoxide and hydrogen sulfide.

A69-81287
EFFECT OF IONIZING RADIATION, SULFHYDRYL COMPOUNDS AND HYPOXIA ON THE PHOSPHORYLATION OF THYMIDINE IN THE RAT THYROID GLAND AND THE SPLEEN [VLIIANIE IONIZIRUIUSHCHEI RADIATSII, SUL'FGIDRIL'NYKH SOEDINENII I GIPOKSII NA FOSFORILIROVANIE TIMIDINA V ZOBNOI ZHELEZE I SELEZENKE KRYS].
I. V. Filippovich and E. F. Romantsev (USSR, Min. of Health, Inst. of Biophysics, Moscow).
Radiobiologiia, vol. 8, Nov.-Dec. 1968, p. 800–805. 16 refs. In Russian.

The effect of the radioprotectors beta-mercaptoethylamine (MEA) and S-beta-aminoethylisothiouronium (AET), and the radiosensitizers dl-penicillamine and beta-mercaptoethanol on thymidine phosphorylation in the thyroid and spleen were studied in irradiated and non-irradiated rats. It was found that the administration of AET and MEA to the animals 10 to 15 min. before their decapitation sharply inhibited the thymidine phosphorylation in the thyroid and spleen extracts. Three hr. after the administration the inhibitory effect disappeared. The administration of the radiosensitizers 10 to 15 min. before decapitation also inhibited the thymidine phosphorylation but the inhibitory effect did not disappear three hr. later. Rats kept in an environment of 5% of oxygen and 95% nitrogen showed a marked depression of the spleen thymidine phosphorylation. The mechanism accounting for the inhibitory effect of aminothiols and of hypoxia was different. On the basis of the results obtained, when aminothiols were added to the incubation medium *in vitro,* it was inferred that the inhibitory effect of AET and MEA on thymidine phosphorylation in the spleen and thyroid *in vivo* was determined by their direct interference with the phosphorylation process. The depression of the phosphorylation process in the thyroid could be caused by the interaction of aminothiols with deoxyribonucleic acid.

A69-81288
EFFECT OF CHEMICAL PROTECTORS AND ETHYLENIMINE ON BACTERIA SURVIVAL AND ON THE VISCOELASTIC PROPERTIES OF DEOXYRIBONUCLEIC ACID ISOLATED FROM IRRADIATED BACTERIA [DEISTVIE KHIMICHESKIKH PROTEKTOROV I ETILENIMINA NA VYZHIVAEMOST' BAKTERII I ELASTOVIAZKOSTNYE SVOISTVA DNK, VYDELENNOI IZ OBLUCHENNYKH BAKTERII].
Ia. L. Shekhtman and I. V. Breiksh (USSR, Acad. of Sci., Inst. of Biol. Physics, Pushchino-na-Oke).
Radiobiologiia, vol. 8, Nov.–Dec. 1968, p. 806–810. 13 refs. In Russian.

A correlation was found between the survival of *Escherichia coli* B and the change in the viscoelasticity of DNA isolated after gamma irradiation of the bacteria in the presence of different chemical radioprotectors such as: cystophos (beta-aminoethylthiophosphate), inositol, glycerol, alcohol and glucose, as well as under the effect of the alkylating agent ethylenimine.

A69-81289
CHANGES IN THE RAT INTESTINAL ENTEROCHROMAFFIN CELLS IN THE EARLY POSTRADIATION PERIOD [IZMENENIIA ENTEROKHROMAFFINNYKH KLETOK KISHECHNIKA U KRYS V RANNIE SROKI POSLE OBLUCHENIIA].
G. G. Pankratova and G. A. Chernov (USSR, Min. of Health, Inst. of Biophysics, Moscow).
Radiobiologiia, vol. 8, Nov.–Dec. 1968, p. 822–824. 13 refs. In Russian.

Experiments were conducted on 120 white male rats exposed to acute whole body gamma irradiation in doses of 300, 900 and 3,000 r. Following irradiation the animals were sacrificed at predetermined times (1, 4, 6, 12 and 24 hr.). It was found that irradiation doses of 600 and 900 r. produced in the animals a temporary (up to 12 hr.) reduction of the enterochromaffin cells (Kulchitsky's cells) in the intestinal mucosa. After 12 hr. the cell count and their granulation returned to normal. Irradiation in sublethal doses (330 r.) did not cause changes in the enterochromaffin cells. The most marked alterations and cell destruction were observed with irradiation doses of 3,000 r.

A69-81290
THE INFLUENCE OF THE INCUBATION TEMPERATURE ON THE SURVIVAL OF E. COLI B EXPOSED TO GAMMA RAYS [O PRIRODE VLIIANIIA TEMPERATURY INKUBATSII NA VYZHIVAEMOST' E. COLI B, OBLUCHENNYKH GAMMA-LUCHAMI].
M. N. Miasnik and V. I. Korogodin (USSR, Acad. of Med. Sci., Inst. of Med. Radiol., Obninsk).
Radiobiologiia, vol. 8, Nov.–Dec. 1968, p. 830–837. 22 refs. In Russian.

The survival of *Escherichia coli* B possessing the genome F^+ diminished with the decrease of incubation temperature from 45 to 19°C. This effect was more pronounced after exposure of the cells to gamma irradiation. The kinetics of the temperature influence on the survival of irradiated and non-irradiated cells was identical, and in both cases this influence was related with the formation of filaments. Similar correlation between temperature and survival was not observed with the bacteria *E. coli* B/r.

A69-81291
IDENTIFICATION OF CHIMERISM IN GUINEA PIGS [IDENTIFIKATSIIA KHIMERIZMA MORSKIKH SVINOK].
D. R. Kaulen and M. A. Tatushina (USSR, Acad. of Med. Sci., N. F. Gamalei Inst. of Epidemiol. and Mikrobiol., Moscow).
Radiobiologiia, vol. 8, Nov.–Dec. 1968, p. 838–842. 11 refs. In Russian.

Chimerism was studied in guinea pigs exposed to gamma irradiation in doses of 625 r. and treated with homologous bone marrow transplantation. The identification of the donors cells in the recipient organism was done by the kariotypic analysis method of the bone marrow radiochimeras. When the donors were females, the recipients were males. In the two to three mo. following the irradiation 40% of the exposed guinea pigs survived, (males treated with transplantation of $150 \cdot 10^6$ female bone marrow cells). In the period of 12 days to six mo. following irradiation and transplantation of hematopoietic tissues in 92% of the cases the chimerism was incomplete and contained an average of 60% of the donor cells. No significant immunological reactions usually observed in experiments with mice were noted. This fact was cause to infer the development of reciprocal tolerance between donors and recipient cells. Comparative analysis showed that the immunological reactivity of the radiation chimeras a month after irradiation was conditioned by the functioning of the donor cells.

A69-81292
EFFECT OF IRRADIATION ON THE EXCRETION OF DEOXYCYTIDINE AND THYMIDINE IN MONKEYS [VLIIANIE OBLUCHENIIA NA EKSKRETSIIU DEZOKSITSITIDNA I TIMIDINA U OBEZ'IAN].
O. Ia. Tereshchenko and M. P. Tarakanova (USSR, Min. of Health, Inst. of Biophysics, Moscow).
Radiobiologiia, vol. 8, Nov.–Dec. 1968, p. 863–866. 10 refs. In Russian.

For further interpretation of the mechanism of the post-irradiation destruction of radiosensitive tissues and for the elaboration of diagnostic tests, it was important to know the mechanisms of post-irradiation excretion of deoxynucleosides in man and other primates. The results of experiments on rhesus monkeys were presented. It was determined that the urine of normal rhesus monkeys contained approximately 0.09 mkg./ml. of deoxycytidine and 0.04 mkg./ml. of thymidine. During the 24 hr. following irradiation in minimum lethal doses the excretion of both nucleosides increases two to four times, and remained at that level for several days. The administration of the radiomimetic substance cyclophosphane (0.066 g./kg. body weight) also caused an increase in the deoxycytidine excretion.

A69-81293
EFFECT OF SOME RADIOPROTECTIVE SUBSTANCES ON THE SENSITIVITY OF IRRADIATED ANIMALS TO BACTERIAL ENDOTOXINS [VLIIANIE NEKOTORYKH RADIOZASHCHITNYKH VESHCHESTV NA CHUVSTVITEL'NOST' OBLUCHENNYKH ZHIVOTNYKH K BAKTERIAL'NYM ENDOTOKSINAM].
Iu. I. Pustovalov and V. I. Zheludov (USSR, Min. of Health, Central Sci.-Res. Roentgen-Radiol. Inst., Leningrad).
Radiobiologiia, vol. 8, Nov.–Dec. 1968, p. 876–879. 19 refs. In Russian.

An investigation was done of the effects of cystaphos (*beta-aminoethylthiophosphoric acid*), *aminoethylisothiuronium* (AET 5-methoxytryptamine (5-MT), and a mixture of cystaphos and 5-MT administered to mice before exposure to radiation on the sensitivity to the endotoxin of *Salmonella paratyphi* B-42. The experiments were conducted on 500 radioprotected irradiated and non-irradiated white mice with a $LD_{50/1}$. The sensitivity of the irradiated mice to the bacterial endotoxins was decreased 15 to 20 times by the radioprotectors in comparison with non-protected control animals. The sensitivity of the pretreated animals to the bacterial endotoxins was four to five times higher than in the non-irradiated mice and remained at that level till the end of the autoinfectious period.

A69-81294
EFFECT OF RADIOTOXINS ISOLATED FROM THE LIVER OF GAMMA IRRADIATED RATS, ON THE SUBSTRATE AND HORMONAL INDUCTION OF TRYPTOPHAN PYRROLASE [O VLIIANII RADIOTOKSINOV IZ PECHENI KRYS, PODVERGNUTYKH GAMMA-OBLUCHENIIU, NA SUBSTRATNUIU I GORMONAL'NUIU INDUKTSIIU TRIPTOFANPIRROLAZY].
S. K. Mel'nikova, N. E. Lebedeva, and A. M. Kuzin (USSR, Acad. of Sci., Inst. of Biol. Physics, Dept. of Radiobiol., Pushchino-na-Oke).
Radiobiologiaa, vol. 8, Nov.–Dec. 1968, p. 880–882. In Russian.

The effect of toxic substances accumulating during irradiation on the substrate and hormonal induction of tryptophan pyrrolase was investigated in rats. It was found that the inhibition of the adaptation reaction to the administration of tryptophan reached 60% four days after the administration of the radiotoxins and returned to normal in eight days. Gamma irradiation in doses of 500 r. induced an analogous inhibition in the substrate induction in the same period of time. The activation of the enzyme caused by hydrocortisone was not depressed by the radiotoxins or direct irradiation of the animal with doses of 1,000 r. It was inferred that the toxic substances resulting from gamma irradiation played an essential role in the radiation produced disturbances in the substrate induction of tryptophan pyrrolase.

A69-81295
APPLICATION OF COMBINED CHEMICAL PROTECTORS AND LOCAL HYPOXIA IN THE PROPHYLAXIS OF RADIATION SICKNESS [KOMBINIROVANNOE PRIMENENIE KHIMICHESKIKH PROTEKTOROV I MESTNOI GIPOKSII V PROFILAKTIKE LUCHEVOI BOLEZNI].
L. F. Semenov and V. S. Barkaia (USSR, Acad. of Med. Sci., Inst. of Exptl. Pathol. and Therapy, Sukhumi).
Radiobiologiia, vol. 8, Nov.–Dec., 1968, p. 917–919. In Russian.

Experiments were conducted on 1,140 mice to study the effect of local hypoxia on the course of radiation sickness and the potentialities of the combined utilization of local hypoxia and chemical protectors in radiation injuries prophylaxis. The mice were exposed to gamma irradiation at a dose rate of 60 to 70 r./min. The application of a rubber band 10 to 15 min. before irradiation to the mouse limb significantly reduced the radiation sickness damage caused by doses of 920 r., but was less efficient after exposure to 1,050 r., and completely inefficient with doses of 1,125 r. The combination of cystamine (175 mg./kg.) and local hypoxia markedly reduced the aftereffects of radiation sickness following doses of 1,050 r. and 1,125 r. However, the administration of 5-methoxytryptamine (50 mg./kg.) in combination with local hypoxia did not enhance the radioprotective action.

A69-81296
THERMOLYTIC AND THERMORECEPTOR FUNCTIONS OF THE SKIN IN COOLING TESTS [O TEPLOOBMENNOI I TERMORETSEPTORNOI FUNKTSII KOZHI PRI EKSTREMAL'NYKH KHOLODOVYKH VOZDEISTVIIAKH].
I. I. Tikhomirov (Inst. of Phys. Cult., Dept. of Hyg., Moscow USSR).
Gigiena i Sanitariia, no. 12, Dec. 1968, p. 22–26. 12 refs. In Russian.

Long-term and systematic bathing in ice water is an extremely intensive irritant causing body hardening. On studying the fuctional mobility of the thermoreceptors the author found that at a comfortable environmental temperature the quantity of active receptors in persons, bathing in winter, is much smaller than in those of the control group. Such a state of the skin thermoreceptor apparatus provides a larger physiological reserve of the sensory organ. No significant difference could be detected between the two observed groups of persons in respect to the level of the skin temperature and the mobility of vascular reactions at local cooling. This testifies to different length adaptation shifts in the activity of various systems of the body.

A69-81297
TIME ESTIMATION IN EXPERIMENTAL CHAMBER CONDITIONS [OTSENKA VREMENI V USLOVIIAKH KAMERNYKH EKSPERIMENTOV].
B. A. Dushkov and F. P. Kosmolinskii.
Voprosy Psikhologii, no. 6, Nov.–Dec. 1968, p. 107–111. 17 refs. In Russian.

In connection with the perspective of long-time space flights, the problem of psychophysiology of time perception are of great theoretical and practical interest. It was established in experiments on subjects placed into hermo- and thermo-chambers that under the influence of a number of situational factors (relative isolation, change in day-night rhythm, increased air temperature) a change takes place in the reproduction of time intervals—namely, their shortening from the fixed magnitude by 30 to 50%. When the alteration of sleep and wakefulness periods was increased in experiments, in was found that the rhythm of activity markedly increased, though the necessary scope of work was the same. The changes found in time feeling and rhythm of activity depending upon situational factors should be taken into account when working out the optimum conditions of work and rest for cosmonauts.

A69-81298
THE EFFECTS OF HIGH-FREQUENCY VIBRATION ON SOME PHYSIOLOGICAL FUNCTIONS OF THE HUMAN ORGANISM [VOZDEISTVIE VYSOKOCHASTOTNOI VIBRATSII NA NEKOTORYE FIZIOLOGICHESKIE FUNKTSII ORGANIZMA CHELOVEKA].

N. N. Malinskaia, T. G. Podgornaia, R. Z. Pozdniakova, and E. I. Denisov (USSR, Acad. of Med. Sci., Inst. of Labor Hyg. and Occupational Diseases, Moscow).

Gigiena Truda i Professional'nye Zabolevaniia, no. 8, Aug. 1968, p. 30–35. 6 refs. In Russian.

Results of an investigation of the physiological functional shifts occurring in the organism of workers in the course of a working day under the effect of high-frequency vibration generated by rotary grinding tools are presented. The orientation and magnitude of such shifts (according to peripheral circulation characteristics and vibration sensitivity thresholds) differ depending upon the length of service involving one operation of vibrating tools and the intensity of vibration pathology. The biphasic vascular reaction of the healthy workers was not found in operators with a fairly long service record; and those exhibiting manifestations of the vibration disease lacked the first (constriction) phase and demonstrated a low initial level of the vascular blood supply intensity. It is suggested that a feebly marked or lacking biphasic nature of the vascular reaction and a permanent rise of the vibration sensitivity threshold by more than 10 db. be regarded as early signs of vibration pathology.

A69-81299
COMBINED ACTION OF TOXIC SUBSTANCES AND PHYSICAL EFFORT ON THE PERFORMANCE CAPACITY AND ENERGETIC PROCESSES IN THE MUSCLES AND THE LIVER OF ALBINO MICE [O KOMBINIROVANNOM DEISTVII TOKSICHESKIKH VESHCHESTV I FIZICHESKOI NAGRUZKI NA RABOTOSPOSOBNOST' I ENERGETICHESKIE PROTESSY V MYSHTSAKH I PECHENI BELYKH MYSHEI].

L. L. Braginskaia and V. A. Poliańskii (Inst. of Hyg. and Prof. Diseases, Ufa, USSR).

Gigiena Truda i Professional'nye Zabolevaniia, no. 8, Aug. 1968, p. 46–50. 15 refs. In Russian.

The effect of physical work and chronic poisoning with low concentrations of hydrocarbons and hydrogen sulfide was studied in albino mice. The animals were made to run in mechanically rotated drum cages. Poisoning in conjunction with physical effort was carried on for nine mo., six hr. per day, the poison concentration in the chamber was 0.1 mg./l. During these tests note was taken of a much greater decline of muscular strength, static and dynamic performance, endurance capacity, a drop of the glycogen level and a rise in the amount of lactic acid in the muscles and liver, an increase break-up and upset synthesis of macroergic phosphorous compounds, such as adenosine-triphosphoric and creatinine-phosphoric acids.

A69-81300
CEREBRAL DISORDERS IN DECOMPRESSION SICKNESS [TSEREBRAL'NYE RASSTROISTVA PRI DEKOMPRESSIONNOI BOLEZNI].

M. P. Elinskii and I. V. Rogozina (S. M. Kirov Mil.-Med. Acad., Leningrad, USSR).

Gigiena Truda i Professional'nye Zabolevannia, no. 9, Sep. 1968, p. 16–20. 10 refs. In Russian.

The investigation covered the case histories of 32 divers with sustained cerebral forms of decompression sickness, and made possible the disclosure a great diversity of variants in brain lesion, both in relation to its severity and clinical manifestations. General weakness, adynarnia, loss of, or confused consciousness, cephalalgia, vertigo and vision disturbances are among early symptoms of upset cerebral circulation. Of a more frequent occurrence was a Meniere-like syndrome, pointing to the lesion of the stem portion of the brain. Forme fruste of decompression sickness renders difficult both the diagnosis and expert evaluation of the capacity for work. These forms, however, are sometimes followed by the development of persistent cerebral disorders. An early recognition of brain lesions and timely re-compression prevent the onset of grave consequences.

A69-81301
SOME INDICATORS OF THE FECUNDITY IN FEMALE MICE IRRADIATED WITH 10 CM. LONG WAVES [NEKOTORYE POKAZATELI PLODOVITOSTI SAMOK MYSHEI, OBLUCHENNYKH 10-SANTIMETROVYMI VOLNAMI].

A. N. Bereznitskaia (USSR, Acad. of Med. Sci., Inst. of Labor Hyg. and Occupational Diseases, Moscow).

Gigiena Truda i Professional'nye Zabolevaniia, no. 9, Sep. 1968, p. 33–37. In Russian.

Chronic irradiation of female mice with 10 cm. waves of 10 $mW./cm.^2$ intensity was found to bring about certain changes in the course of estrus cycle finding their expression in an increased duration of normal cycle at the expense of prolonged diestrus and metaestrus stages. A partial sterility of irradiated females was observed. The progeny of female mice irradiated prior to conception, and especially before and during gestation proved to be defective with instances of stillbirth and a considerable proportion of postnatal lethality. The offssprings of irradiated females showed retarded weight and body size gain as against controls and developed at a slower rate.

A69-81302
MORPHOLOGICAL CHANGES IN EXPERIMENTAL ANIMALS UNDER THE EFFECT OF ELECTROMAGNETIC FIELDS IN THE RANGE OF SHORT AND ULTRA-SHORT WAVE BANDS [MORFOLOGICHESKIE IZMENENIIA U EKSPERIMENTAL'NYKH ZHIVOTNYKH PRI VOZDEISTVII ELEKTROMAGNITNYKH POLEI DIAPAZONA KOROTKIKH I UL'TRAKOROTKIKH VOLN].

M. S. Tolgskaia and P. P. Fukalova (USSR, Acad. of Med. Sci., Inst. of Labor Hyg. and Occupational Diseases, Moscow).

Gigiena Truda i Professional'nye Zabolevaniia, no. 9, Sep. 1968, p. 37–40. 7 refs. In Russian.

Organs and tissues of albino rats were exposed to a five-mo.-long irradiation with ultra-short and short waves (with a frequency of 69.7 and 14.9 megacycles) and with intensity producing no thermal action (150 and 2250 v./m., respectively). Morphological investigations uncovered in these organs and tissues slight vascular disorders and compensatory-proliferative processes in the internal organs, changes in the receptor and inter-receptor system and insignificantly pronounced dystrophic alterations of the brain cells. Note was taken of a similar biological orientation of the action produced by ultra-short waves with less pronounced changes in the short-wave band.

A69-81303

THE EFFECT OF PANGAMIC ACID UPON BIOCHEMICAL CHANGES IN THE BLOOD AND TISSUES OF AN AGING ORGANISM DURING MUSCULAR EFFORTS AND AT THE TIME OF REST [VLIIANIE PANGAMOVOI KISLOTY NA BIOKHIMICHESKIE IZMENENIIA V KROVI I TKANIAKH STAREIUSHCHEGO ORGANIZMA PRI MYSHECHNOI DEIATEL'NOSTI I V PERIODE OTDYKHA].

A. F. Krasnova (Sci.-Res. Inst. of Phys. Cult., Biochem. Sect., Leningrad, USSR)

Voprosy Pitaniia, no. 6, Nov.–Dec. 1968, p. 71–2. 22 refs. In Russian.

Investigations showed that introduction of pangamic acid to old rats results in an increased level of basic sources of energy actuating the muscles, such as creatine-phosphate and glycogen in the skeletal muscle and the myocardium, and glycogen in the liver. Along with this the activity of oxidating enzymes such as cytochromoxidase and succinate-dehydrogenase increased. A prolonged performance in vitaminized animals was attended by a certain economy in the expenditure of the power sources and maintenance of a higher level of oxidative enzyme activity, as contrasted against the animals receiving no vitamin. With this, restitution processes at the time of rest proceeded in vitaminized animals much quicker. Observations over middle-aged individuals demonstrated that an additional ingestion of vitamin B15 contributed to a greater adaptation of the organism to muscular activity and to an accelerated restitution during the period of rest.

A69-81304

THE EFFECT OF COBALT AND COPPER SALTS IN TOXIC ACTION OF LEAD ON THE ANIMAL ORGANISM [O VLIIANII SOLEI KOBAL'TA I MEDI PRI TOKSICHESKOM VOZDEISTVII SVINTSA NA ORGANIZM ZHIVOTNYKH].

P. A. Chaika (Kiev. Med. Inst., Dept. of Gen. Hyg., UkrSSR).

Voprosy Pitaniia, no. 6, Nov.–Dec. 1968, p. 29–33. 19 refs. In Russian.

In experiments on albino male rats a study was made of the protective action exercised by cobaltous chloride (0.8 mg./kg.) and copper chloride (0.3 mg./kg.) in chronic poisoning of the animals with lead aerosols (0.004 mg./kg.) and enterally (10 mg./kg. body weight). Cobalt was found to preclude the development of anemia caused by lead poisoning with copper contributing to its emergence. Cobalt also abolished the effect of lead inhibiting the growth of the animal.

A69-81305

EFFECT OF FATIGUE ON THE ACTIVITY OF TRYPTOPHAN PYRROLASE, PHOSPHOPROTEIN PHOSPHATASE AND PYROPHOSPHATASE IN THE TISSUES OF WHITE RATS [VLIIANIE UTOMLENIIA NA AKTIVNOST' TRIPTOFANPIRROLAZY, FOSFOPROTEINFOSFATAZY I PIROFOSFATAZY TKANEI BELYKH KRYS].

I. G. Aslanian, G. K. Parsadanian, and L. V. Sarkisian (Armianskaia SSR, Acad. of Sci., Inst. of Biochem., Erevan).

Ukrains'kyi Biokhimichnyi Zhurnal, vol. 40, no. 6, 1968, p. 601–603. 13 refs. In Russian.

Fatigue was induced in white rats by forcing them to swim carrying a load for 30 min. The intensive work increased the activity of the tryptophan pyrrolase in the liver by 84%; no marked changes were noted in the kidneys. The pyrophosphatase activity was increased in the liver and the kidneys during fatigue, but no changes were noted in the brain. It was found that the phosphoprotein phosphate activity in the liver of fatigued rats was approximately 30% higher than normal the increase in the kidneys was less marked. An opposite effect was observed in the phosphoprotein phosphatase activity in the myocardium as the activity of this enzyme decreased in the fatigued animals. The possibility of hormone induction of tryptophan pyrrolase during fatigue was discussed. The changes occurring in the phosphoprotein phosphatase and pyrophosphatase activity were connected with a greater utilization of macroergic compounds usually observed in tired animals.

A69-81306

CHARACTERISTIC OF OXYGEN REGIME IN ORGANISMS OF TEENAGERS AND YOUTHS DURING PHYSICAL LOADING [DO KHARAKTERYSTYKY KYSNEVYKH REZHYMIV ORHANIZMU PIDLITKIV I IUNAKIV PRY FIZYCHNOMU NAVANTAZHENNI].

V. S. Mishchenko (UkrSSR, Acad. of Sci., O. O. Bohomol'ts Inst. of Physiol., Kiev).

Fiziolohichnyi Zhurnal, vol. 14, Nov.–Dec. 1968, p. 750–759. 42 refs. In Ukrainian.

Data are presented on changes in external respiration, hemodynamics, oxygen transporting function of blood in teenagers and youths at the age of 13 to 16 in physical loading (rowing) from the view point of their role in providing the transportation of adequate quantities of O_2 (with corresponding tension) to the working tissues. The changes are considered in oxygen requirement, consumption debt and their interrelations. The data are presented on the change of the whole oxygen regime of the person. It is found out that the ability to perform a greater volume of work for a shorter period of time in overcoming the rowing distance increases with age. An increase in oxygen requirement, consumption and debt is observed as well as the decrease of the ratio of O_2 consumption to O_2 requirement.

A69-81307

SOME INDICES OF HEMODYNAMICS IN MOUNTAIN-SKIERS UNDER CONDITIONS OF MIDDLE-MOUNTAINS ALTITUDES [DEIAKI POKAZNYKY HEMODYNAMIKY U HIRS'KOLYZHNYKIV V UMOVAKH SEREDN'OHIR'IA].

I. V. Sokolov (UkrSSR, Acad. of Sci., O. O. Bohomol'ts Inst. of Physiol. and Kiev Inst. of Physiol. Cult.).

Fiziolohichnyi Zhurnal, vol. 14, Nov.–Dec. 1968, p. 760–767. 24 refs. In Ukrainian.

The results are given of investigation of some hermodynamics indices in mountain-skiers under conditions of middle-mountain-skiers altitudes. On the third and tenth days of staying in mountains the change in hemodynamics indices during 100 m. race had almost no influence on the race results, which gives the possibility to suppose that an altitude of 2000 m. does not affect essentially the high-speed work for a short period of time. The 1000 m. race for more than three min. on the third and even tenth days of staying at an altitude of 2000 m. and with worse showed results and had a considerable influence on the cardiovascular system. The refreshment period was prolonged in comparison with that under the normal atmospheric pressure. During the period of acclimatization to 2000 m. the training in mountain skiing could be conducted on short sections of mountain tracks using the repeated method of trainings, and only on the tenth to 14th days at an altitude to 2000 m was it possible to pass on to a more serious training phase.

A69-81308
INDICES OF EXTERNAL RESPIRATION, OXYGENTRANSPORTING FUNCTION OF BLOOD AND CHARACTERISTIC OF OXYGEN REGIMES IN ORGANISM OF HEAVY ATHLETES [POKAZNYKY ZOVNISHN'OHO DYKHANNIA, KYSEN'TRANSPORTNOI FUNKTSII KROVI I KHARAKTERYSTYKA KYSNEVYKH REZHYMIV ORHANIZMU VAZHKOATLETIV].

Iu. V. Stepanov (UkrSSR, Acad. of Sci., O. O. Bohomol'ts Inst. of Physiol., Kiev).

Fiziolohichnyi Zhurnal, vol. 14, Nov.–Dec. 1968, p. 768–773. 14 refs. In Ukrainian.

During physical exercise the change in the indices of external respiration, hemodynamics, oxygen capacity, oxygen content and blood saturation with oxygen are discussed. Also presented are the data of the change in the whole oxygen regime of heavy athlete organism at rest, and under conditions of basic metabolism in comparison with the sportsmen engaged in cyclic sports (cyclists). Middle aged athletes were examined. The data obtained permitted drawing a conclusion that the heavy athletes was distinguished by a less oxygen consumption, less values of minute tidal volume and tidal volume, greater physiological dead respiratory space. As a result of this a lower ratio of alveolar ventilation to the minute tidal volume was found. Statistically authentic differences in such indices as oxygen capacity of blood, O_2 content in arterial blood and arterial blood saturation with O_2 were not found. The intensity of oxygen coming to the lungs, alveolas, its transport and consumption were less in heavy athletes. Only the venous blood transports more O_2 to the lungs. The pO_2 cascades are almost the same and only pO_2 of the mixed venous blood in weight-lifters proves to be higher.

A69-81309
INVESTIGATION OF RESISTANCE OF SOME INVERTEBRATE SPECIES TO THE EXPLOSIVE DECOMPRESSION AND LOW END PRESSURE [DOSLIDZHENNIA REZYSTENTNOSTI DEIAKYKH VYDIV BEZKHREBETNYKH TVARYN DO VYBUKHOVOI DEKOMPRESII TA NYZ'KOHO KINTSEVOHO TYSKU].

V. Ia. Lukhanin (UkrSSR, Acad. of Sci., O. O. Bohomol'ts Inst. of Physiol., Kiev).

Fiziolohichnyi Zhurnal, vol. 14, Nov.–Dec. 1968, p. 791–797. 11 refs. In Ukrainian.

The resistance of some species of invertebrates (infusoria, hydra, slugs, worms) was investigated to the explosive decompression and the subsequent exposure to the drop of pressure under conditions of decompression chamber. The pressures of 50, 20 or one to two mm.Hg were used as the finite quantities of pressure. The invertebrates were examined by single decompression as well. The effect was also investigated on the resistance of different speeds of recompression: for 1, 5, 10, 20, 40 and 60 sec. The experiments were conducted with some of the invertebrates in water, and with other ones both in water, and in air. More than 500 experiments were made with these invertebrates. In most cases ten animals were used in each experiment. The invertebrates which were in water always endured 12 hr. of exposure. In the experiments with invertebrates in the air, the duration of their survival decreases mainly when the rarefaction degree increases. The applied speeds and values of the explosive decompression did not affect on the resistance of the invertebrates to the low pressure. Hypoxia (anoxia) is the main factor which causes the death of the animals. In the experiments where the end pressure of one to two mm. Hg was used, freezing of the invertebrates was the main factor causing death.

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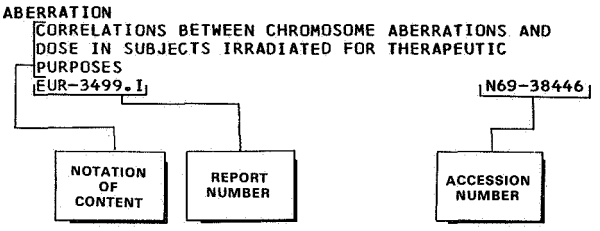

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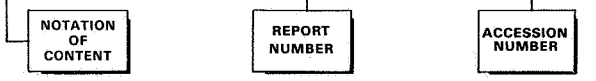

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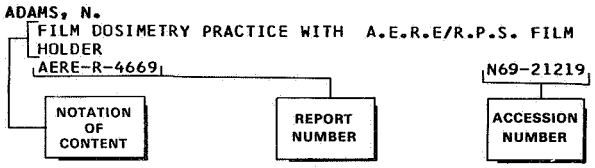

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