



AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

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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 March, 1969.



Scientific and Technical Information Division

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WASHINGTON, D.C.

APRIL 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.

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

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- b. AIAA entries identified by their *IAA* accession numbers (A69-10000 series); and
- c. LC entries identified by a number in the A69-80000 series.

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

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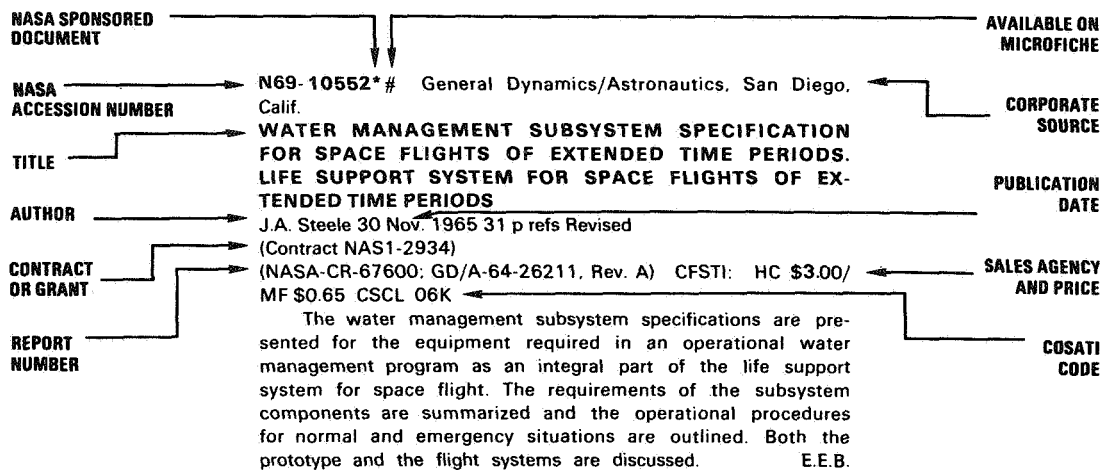
LC Entries

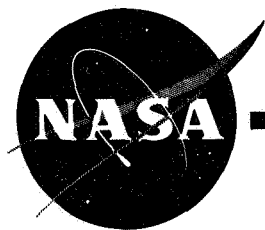
Articles listed are available in the journals in which they appeared. They may be borrowed or consulted in libraries maintaining sets of these journals. In some instances, reprints may be available from the journal offices.

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TYPICAL CITATION AND ABSTRACT





AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography

APRIL 1969

STAR ENTRIES

N69-15032# Cornell Univ., Ithaca, N. Y.
[PHOTOSYNTHETIC ENERGY CONVERSION] Annual
Progress Report, Sep. 1–Aug. 31, 1968
Roderick K. Clayton Aug. 1968 10 p refs
(Contract AT(30-1)-3759)
(NYO-3759-5) Avail: CFSTI

The photosynthetic bacterium, *Rhodospseudomonas spheroides*, was used for studies on isolation and characterization of photochemical reaction centers. Light-induced absorption difference spectra of reaction centers showed reversible effects. Architecture of reaction centers was determined from the polarization of P870 fluorescence. Fluorescence of reaction centers was studied in relation to their photochemical activity. The high concentration of photoreactive material in the reaction centers allows measurement of the photosynthetic electron spin resonance signal with unusually high signal to noise ratio and affords an accurate correlation with the photochemical events inferred from optical absorbance measurements. Kinetics and thermodynamics of excitation transfer among light harvesting pigments of photosynthetic bacteria were studied. Delayed fluorescence and chemiluminescence in photosynthetic tissues of spinach chloroplasts were studied. NSA

N69-15038# Little (Arthur D.), Inc., Cambridge, Mass.
MACROMOLECULE HYDRATION AND THE EFFECTS OF
SOLUTES ON THE CLOUD POINT OF AQUEOUS SOLUTIONS
OF POLYVINYL METHYL ETHER: A POSSIBLE MODEL FOR
PROTEIN DENATURATION AND TEMPERATURE CONTROL
IN HOMEOTHERMIC ANIMALS
R. H. Horne, J. P. Almeida, A. F. Day, and N.-T. Yu 30 Aug. 1968
43 p refs
(Contract Nonr-4424(00))
(AD-674115; TR-36) Avail:CFSTI CSCL 6/1

The effect of strong, neutral, 1:1 electrolytes; MGS04; area-tetraalkylammonium salts, sucrose and alcohols in the cloud point temperature of aqueous solutions of polyvinyl methyl ether have been examined and are interpreted in terms of (1) the two types of water structure, coulombic and hydrophobic, comprising the hydration sheath of polymer, (2) the selective exclusion of solute from the polymer's hydration sheath, and (3) the solute's stabilization or destabilization of the polymer's hydration sheath. The last two of these processes are related to the viscosity B-coefficient of the solute ions. The behavior of the polymer exhibits both similarities to and differences from proteins, and caution must be exercised in

the use of the cloud point phenomenon as a model of protein denaturation. The solute effects suggest a possible experimental test of the hypothesis that the thermal destruction of a biopolymer's hydration sheath might provide the basis of temperature control in homeothermic animals.
Author (TAB)

N69-15087# Federal Aviation Agency, Washington, D. C.
CIRCADIAN RHYTHMS: SELECTED REFERENCES
Louise Annus Heller Jul. 1968 86 p refs /ts Bibliographic List
No. 15
(AD-674862) Avail: CFSTI CSCL 6/16

Contents: Ecological Factors; Psychological Factors; Physiological Factors—Body Chemistry, Respiration, Alimentation, Heart-Rate, Temperature and other Somatic Responses; Work-Rest Cycle; Long Distance Flights; Medical Aspects; Animal and Plant Studies.
Author (TAB)

N69-15101 California Univ., Los Angeles.
BIOTELEMETRY APPLIED TO THE MEASUREMENT OF
BLOOD PRESSURE
Leslie Cromwell (Ph.D. Thesis) 1961 155 p
Avail: Univ. Microfilms: HC \$7.20/Microfilm \$3.00 Order No.
68-7458

The approach was to apply the ideas of an engineering systems design to biological phenomenon. This involved the consideration of many sub-systems, and then integrating these into a complete system to continuously monitor blood pressure. The sub-systems involved: A method of sensing blood pressure and heart rate, amplifying the data and transmitting it; a method of receiving the data by a radio link; methods of displaying and recording the data; and methods of interpreting and processing the data. Each of these were designed to comply with high bio-metrical standards. The dog itself was considered as a sub-system, and the engineering of methods of implantation inside the aorta, and means of protection for the dog and equipment are an integral part of the study.
Dissert. Abstr.

N69-15210# Naval Medical Research Inst., Bethesda, Md.
BIOCHEMICAL APPROACH TO STRESS PROBLEMS
Julius Sendroy, Jr. 18 Sep. 1968 21 p Presented at the Ann.
Meeting of the Am. Assoc. of Clin. Chemists, Washington, 22 Aug.
1968
(AD-677278; Rept-18) Avail:CFSTI CSCL 6/19

Consideration is given to the meaning of, and variation in, stress and an attempt is made to arrive at an acceptable biomedical definition of stress. Attention is called to the mission, activities and responsibilities of the Bureau of Medicine and Surgery of the Department of the Navy, and emphasis is laid on the fact that most of these have to do with the physical and mental health of personnel under quite stressful conditions of environmental and/or operational origin. Many physical, physiological and psychological stresses are encountered in Navy and/or military service and give rise to unique problems which are the subjects or research in the

N69-15225

Navy's Biomedical Laboratories. Responses to stress, regulated by physiological systems, may be studied as biochemical manifestations of the organism's reaction to changes in internal and external environment. In the consideration of disease as a form of stress, the role of the clinical chemist should be viewed as that of a biochemist rather than of a specialist isolated in the clinical laboratory.

Author (TAB)

N69-15225# Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
RELATIVE BIOLOGICAL EFFICIENCY OF 592 MeV PROTONS. ANALYSIS OF THE BIOLOGICAL EFFECT OF SECONDARY RADIATION [EFFICACITE BIOLOGIQUE RELATIVE DES PROTONS DE 592 MeV. ANALYSE DE L'EFFET BIOLOGIQUE DU AUX RAYONNEMENTS SECONDAIRES]

Gerard Legeay and Johan Baarli (European Organ. for Nucl. Res.)
 Jun. 1968 29 p refs In FRENCH
 (CEA-R-3447) Avail: CFSTI

The relative biological efficiency (RBE) of high energy protons is of importance because of their effects in the field of radio-protection around large accelerators and during space-flights. The nature of the interactions between 592 MeV protons and biological tissues makes it necessary to take into consideration the contribution of secondary radiation to the biological effect. Since it is not possible to obtain from a synchrotron a beam having a sufficiently large cross-section to irradiate large animals, one has to resort to certain devices concerning the mode of exposure when small laboratory animals are used. By irradiating rats individually and in groups, and by using the lethal test as a function of time, the authors show that the value of the RBE is different for animals of the same species having the same biological parameters. Thus there appears an increase in the biological effect due to secondary radiation produced in nuclear cascades which develop in a large volume, for example that of a human being.

Author (NSA)

N69-15227*# Baylor Univ., Houston, Tex. Psychophysiology Lab.
HEART RATE RESPONSE TO SOUND AND LIGHT

Robert Roessler, Forrest Collins, and Neil R. Burch [1967] 30 p refs
 (Grants NGR-44-003-031; AF-AFOSR-727-65; NIH G-MH-13630; PHS-G-FR-00254)
 (NASA-CR-98918; AD-677608; AFOSR-68-2167) Avail: CFSTI
 CACL 05J

The heart rate (hr) response to five intensities of sound was examined in 18 subjects and to five intensities of light in 12 subjects. Each subject was tested on four occasions at monthly intervals. After covariance adjustment, significant acceleration to sound was found within the first 5 beats after stimulus onset but no significant deceleration occurred. There were no differences between testings. Individuals' hr acceleration was reliable over testings and differing experimental contexts. No habituation occurred and no consistent relationship between HR response and ego strength was found. There was no significant HR response to light stimulation. The results were discussed in relation to Graham and Clifton's (1966) hypotheses concerning the relationship of the HR response to the orienting reflex (OR).

Author (TAB)

N69-15277# Union Carbide Corp., Oak Ridge, Tenn. Nuclear Div.

FRACTIONATION OF SUSPENDED AND COLLOIDAL PARTICLES IN NATURAL WATER

William T. Lammers 10 Oct. 1968 42 p refs
 (Contract W-7405-ENG-26)
 (K-1749) Avail: CFSTI

Feasibility studies were conducted in the Biophysical Limnology Laboratory on the use of centrifugal techniques for isolating

insoluble materials from samples of natural water. The isolated particulate fractions were then used in studies encompassing several areas of water pollution with particular emphasis on the characterization of different groups of isolated particles. These characterizations were confined to the physical, chemical, and biological properties of suspended and colloidal particles which influence their separation, concentration, and analysis. Systems and techniques were developed for separating these materials into relatively pure particulate groups and for making reliable analytical determinations. A discussion of particle characterization methods and the instruments, techniques, and calculations used in isolating the different particulate groups for study are presented.

Author (NSA)

N69-15286 California Univ., Berkeley.

A TREATISE IN ORGANIC GEOCHEMISTRY

Eugene Desmond McCarthy (Ph.D. Thesis) 1967 312 p

Avail: Univ. Microfilms: HC \$14.20/Microfilm \$4.00 Order No. 68-5780

This treatise has concerned itself with a study of the major problems in organic geochemistry and how they relate to the more fundamental scientific questions of chemical evolution and the origin of life. The significant advances in organic geochemistry, which have been brought about within the last fifteen years, have been achieved as a result of development of analytical techniques capable of handling microgram quantities of organic material—in particular, gas-liquid chromatography and mass spectrometry. Almost all of the analytical techniques of modern organic chemistry have been utilized in the structural identification of the organic components isolated from a series of crude oils and sediments. Since the major part of the work has concentrated on the hydrocarbons, there has been a particular emphasis on capillary gas chromatography and mass spectrometry.

Dissert. Abstr.

N69-15324# Rochester Univ., N. Y. Dept. of Radiation Biology and Biophysics.

CHARGE ON LATEX PARTICLES AEROSOLIZED FROM SUSPENSIONS AND THEIR NEUTRALIZATION IN A TRITIUM DE-IONIZER

An-Liang Soong (M.S. Thesis) 30 Sep. 1968 52 p refs
 (Contract W-7401-ENG-49)
 (UR-49-1000) Avail: CFSTI

The charge distribution on insoluble particles produced by atomization of a suspension was measured. The degree to which the charges have been neutralized by passage through a tritium deionizer was determined.

NSA

N69-15332# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.

EXDOSE: A COMPUTER PROGRAM FOR CALCULATING THE EXTERNAL GAMMA DOSE FROM AIRBORNE FISSION PRODUCTS

M. M. Hendrickson Sep. 1968 124 p refs
 (Contract AT(45-1)-1830)
 (BNWL-811) Avail: CFSTI

The EXDOSE program calculates the external γ radiation dose to the whole-body of man from a half-infinite cloud of fission products. It is designed primarily for estimating accident consequences. The code calculates a fission product inventory according to specified input parameters. Any fraction of these fission products may then be released to the atmosphere at a desired rate. The subsequent downwind dispersion and resulting dose to individuals is then calculated.

Author (NSA)

N69-15347 *# National Aeronautics and Space Administration, Washington, D. C.

THE EFFECT OF ENVIRONMENT ON THE GROWTH OF TADPOLES [UEBER DEN EINFLUSS DES LEBENSRAUMES AUF DAS WACHSTUM DER KAULQUAPPEN]

F. Bilski Dec. 1968 17 p refs Transl. into ENGLISH from Arch. Ges. Physiol. (Berlin), v. 188, 1921 p 254-272 (NASA-TT-F-11947) Avail: CFSTI CSCL 06F

The manner in which growth is influenced by the available living space is investigated using Bufo tadpoles as subjects. Weight increase was the criterion of growth. The author finds a direct relationship between the number of tadpoles, the size of the breeding vessel, and the weight that the animals reach. Author

N69-15349 *# Techtran Corp., Glen Burnie, Md.

BIOCHEMICAL STUDIES ON PROTEINOID (POLYANHYDRO- α -AMINO ACIDS) [BIOCHEMISCHE UNTERSUCHUNGEN AN PROTEINOIDEN (POLYANHYDRO- α -AMINOSAUREN)]

G. Krampitz et al Washington NASA Jan. 1969 14 p refs

Transl. into ENGLISH from German Rept. BMwF-FBW-68-30 (Contract NASw-1695)

(NASA-TT-F-12090) Avail: CFSTI CSCL 06A
At 1000°C all amino acids present in biological proteins are formed from methane, ammonia, and water vapor. Heating of all 18 amino acids to 170 to 180°C leads to polypeptides. Molecular weight, properties of proteinoids, formation of morphological structures, and reproducibility of results are discussed. Amino acids do not assume random distribution in combination with peptides. Use as nutrient. Radioactivity distribution and structure of proteinoids are presented graphically. Author

N69-15350 *# Techtran Corp., Glen Burnie, Md.

THE HISTOCHEMISTRY OF CERTAIN ENERGY-EXCHANGE ENZYMES IN THE INDUCED FORMATION OF SILICOTIC CONNECTIVE TISSUE [GISTOKHIMIYA NEKOTORYKH FERMENTOV ENERGETICHESKOGO OBMENA V PROTSESE EKSPERIMENTAL'NOGO OBRAZOVANIYA SILIKOTICHESKOY SOYEDINITEL'NOY TKANI]

I. M. Shnaydman Washington NASA Jan. 1969 10 p refs Transl. into ENGLISH from Arkh. Patol. (Moscow), v. 27, 1965 p 34-41

(Contract NASw-1695) (NASA-TT-F-12088) Avail: CFSTI CSCL 06A

During the early stages of development of silicosis (1 to 3 weeks following endotracheal administration of quartz dust), high activity of oxidation-reduction enzymes in the connective tissue cells of the forming silicotic nodules was noted. The activity was most marked in the case of NPN-N-nitrotetrazolium blue reductase and the nitrotetrazolium blue reductases (of lactic acid, α -glycerophosphate and malic acid), and also in the case of cytochrome oxidase. Less activity was noted in the case of the nitrotetrazolium blue reductases (of isocitric and succinic acid); and least activity in the case of nitrotetrazolium blue the reductases of glucose-6-phosphate and TPN-N-nitrotetrazolium blue. With the development of silicotic nodules, activity of the oxidation-reduction enzymes in silicotic connective tissue fell off progressively, and disappeared in most nodules during the period from three and one half to 5 months following the experiments. Author

N69-15351 *# Techtran Corp., Glen Burnie, Md.

PHYSIOLOGICAL REACTIONS AND POSSIBLE MEANS OF PROTECTION DURING LONG TERM EXPOSURE TO WEIGHTLESS CONDITIONS [FIZIOLICHESKIYE REAKTSII I VOZMOZHNIYE SREDSTVA ZASHCHITY PRI DLITEL'NOM PREBYVANII V USLOVIYAKH NEVESOMOSTI]

B. B. Yegorov Washington NASA Jan. 1969 7 p Transl. into ENGLISH from Russian Presented at the 3d Intern. Symp. on the Basic Environ. Probl. of Man in Space, Geneva, 15-19 Nov. 1968 (Contract NASw-1695) (NASA-TT-F-12095) Avail: CFSTI CSCL 06S

The results of investigations are given dealing with the possibilities of normalizing certain physiological processes that change during weightlessness, thus decreasing the body tolerances to accelerations. The data presented cover the application of muscle bioelectro-stimulation to normalize afferent impulses, to increase the energy load of the muscular tissue and to develop "the physiological anti-acceleration suit". In the experiments the mineral metabolism was stabilized with the aid of alternating gradient hypoxia. It is suggested that hyperoxic and hypercapnic gas mixtures be used as a method of increasing the body tolerance to accelerations. Author

N69-15372 *# Systems Technology, Inc., Hawthorne, Calif.

MEASUREMENT OF PILOT DESCRIBING FUNCTIONS IN SINGLE-CONTROLLER MULTILoop TASKS

Robert L. Stapleford, Samuel J. Craig, and Jean A. Tennant Washington NASA Jan. 1969 109 p refs (Contract NAS2-3144)

(NASA-CR-1238; TR-167-1) Avail: CFSTI CSCL 05H
Problems of measuring pilot describing functions in multiloop tasks with one controller (i.e., where the pilot is controlling two, or more, response variables with a single manipulator) are considered. Both direct and implicit measurement techniques were considered and tested experimentally. The experimental task used was attitude and altitude control with elevator of an aircraft in a simulated landing approach. Experimental results show that the measurement of multiloop describing functions is feasible, although the techniques are considerably more complex than those required for single-loop compensatory tasks. However, there are fundamental limitations on the accuracy of some of the results. These are discussed in detail. The experimental data also provide a spot check on the existing multiloop pilot model. The results support the current model and, in particular, show that the inner-loop (attitude) closure is quite similar to that for single-loop attitude tracking. Author

N69-15406 # Air Force Systems Command, Wright-Patterson AFB, Ohio, Foreign Technology Div.

WE STILL HAVE FOURTEEN MINUTES TO SPARE: THE STORY OF SPACE EQUIPMENT TEST PERSONNEL

N. Mel'nikov 19 Dec. 1967 8 p Transl. into ENGLISH from Krasnaya Zvezda (Moscow), 20 Nov. 1966 p 2 and 22 Nov. 1966 p 2

(AD-678437; FTD-HT-23-1379-67) Avail: CFSTI CSCL 5/9

The report tells the story of two space test pilots named only as Bogdan and Sergey. The first tested Voskhod ships and the later tested Vostoks. According to Bogdan, his duties consisted of testing the performance of space ships on the ground as well as their landing capabilities. The latter test was known as check-out test (kontrolnyy eksperiment). Bogdan also revealed that prior to the Voskhod series the astronauts had to land separately from the ship. Author (TAB)

N69-15446 # European Organization for Nuclear Research, Geneva (Switzerland).

RADIONUCLIDES INDUCED IN BONE BY 600 MeV PROTONS

Antonio Pasinetti and Felix Hoffmann Apr. 1968 64 p refs Supported in part by Natl. Res. Council of Italy (CERN/HER/AP-2-68) Avail: CFSTI

Experimental data concerning radioisotopes induced in bone by 600 MeV protons are presented. Tables giving the dose.

N69-15448

flux of irradiating particles, induced activation, disintegration rate, irradiation time, and energy of incident particles are given for the isotopes ^7Be , ^{11}C , ^{22}Na , and ^{24}Na . One series of tables includes data resulting from constant time of irradiation; another series includes data resulting from irradiation with constant flux of particles. The radioisotopes found in bone from γ counts after irradiation with high-energy protons were ^7Be , ^{11}C , ^{18}F , ^{28}Mg , ^{13}N , ^{22}Na , ^{24}Na , and ^{31}Si ; those found from β counts were ^{11}C , ^{18}F , ^{43}K , ^{28}Mg , ^{13}N , ^{24}Na , ^{32}P , ^{33}P , ^{35}S , and ^{31}Si . Tables are presented on the chemical composition of bone in standard man and on cross-sections for protons with kinetic energy of 600 MeV. NSA

N69-15448# Kansas State Univ., Manhattan. Inst. for Environmental Research.

PERFORMANCE AND LIFE SUPPORT IN ALTERED ENVIRONMENTS Interim Scientific Report, 1 Sep. 1967-1 Jul. 1968

Ralph G. Nevins 1 Aug. 1968 23 p refs
(Contract F44620-68-C-0020)
(AD-677679; AFOSR-68-2096) Avail: CFSTI CSCL 6/11

The three most significant scientific or technological accomplishments are as follows: (a) Systems Analysis of Optimization of Life-supported Systems; (b) Biological Rhythms; (c) Cooling Hood for Hot-Humid Environment. Author (TAB)

N69-15489# Department of National Health and Welfare, Ottawa (Ontario). Radiation Protection Div.

DATA FROM RADIATION PROTECTION PROGRAMS. VOLUME 6, NUMBER 1

Jan. 1968 33 p refs
(NP-17444-Vol-6-No-1) Avail: Issuing Activity

The problems involved in the application of international standards to radiation protection activities is reviewed in a general way. Solutions are not offered, rather the recommendations of the ICRP are examined in view of the Canadian situation in relation to nuclear activities. The areas discussed in the report include; the problem safety regulations for nuclear personnel, licensing of radioisotopes, public health action levels, population doses and dose apportionment, and the problem of medical exposure. Data are also presented in tabular form on the results of the Canadian fallout surveillance program. NSA

N69-15528# Joint Publications Research Service, Washington, D. C.

USSR NATIONAL RADIATION AND ORGANISM CONFERENCE

G. Khadzhidekov 6 Jan. 1969 7 p Transl. into ENGLISH from *Rentgenol. Radiol. (Sofia)*, Apr. 1968 p 204-206 (JPRS-47186) Avail: CFSTI

A summary review of the radiation and organism conference held in the U.S.S.R. is presented. A total of 127 papers were presented in two sections, the experimental and clinical. The papers presented in the experimental section were on the following problems: (1) total radioactivity of the organism and its surrounding environment; (2) reaction of the organism to the action of ionizing radiations; (3) radiosensitivity and radioresistance; (4) radiation genetics; and (5) the problem of postradiation effect. Papers in the clinical section were grouped around the following: new methods of roentgen diagnosis; computer diagnosis and automation in medicine and biology; radioisotopic diagnosis and radiation load; urgent problems in scanning; and problems in radiation therapy. B.P.

N69-15550# Pisa Univ. (Italy). Istituto di Fisiologia.
COMPARATIVE NEUROPHYSIOLOGY OF THE VISUAL SYSTEM Final Scientific Report, 15 Sep. 1967-14 Sep. 1968

Giuseppe Moruzzi 14 Sep. 1968 19 p refs
(Contract F61052-68-C-0024)
(AD-677305; AFOSR-68-2317) Avail: CFSTI CSCL 6/3

The following themes have been investigated under the research on Comparative Neurophysiology of the Visual System: (1) Peripheral inhibition of flashing in fireflies (Brunelli, Buonamici and Magni, in part with the collaboration of Viola, Istituto di Patologia Generale, University of Pisa). (2) Modulation of the retinal dark discharge from the pigeon eyes (Brunelli, Buonamici and Magni). (3) Spatial interaction in the visual system (Cervetto and Maffei; Fiorentini and Maffei; Maffei). (4) Sympathetic influences on the retinal dark discharge (Berlucchi, Marzi and Mascetti). (5) Visuo-cortical lesions and interhemispheric transfer of visual information (Berlucchi and Mascetti). (6) Role of visual cortex and midbrain in visual learning and memory (Berlucchi and Sprague: in collaboration with the Department of Anatomy of the University of Pennsylvania). Author (TAB)

N69-15595# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE MECHANISM OF THE EFFECT OF BERYLLIUM ON THE ORGANISM

O. G. Alekseyeva et al 3 Jan. 1968 7 p refs Transl. into ENGLISH from *Farmakol. i Toksikol. (Moscow)*, no. 3, 1966 p 353-355

(AD-678338; FTD-HT-23-1163-67) Avail: CFSTI CSCL 6/20
The mechanism of the effect of beryllium on the organism is summed up as follows: (1) Even in a complex with homologous protein beryllium (chloride, sulfate or oxide) does not evoke the formation of humoral antibodies or allergy of the anaphylactic shock type. (2) Subcutaneous injection of soluble beryllium salts leads to the development of an inflammatory reaction after 1-2 days; repeated injections can amplify its manifestation. The complex of beryllium plus protein has less expressed primary toxic effect than beryllium alone. Author (TAB)

N69-15596# Techtran Corp., Glen Burnie, Md.
SOME COMPENSATION REACTIONS DURING EXTENDED WEIGHTLESSNESS [NEKOTORYYE KOMPENSATSIONNYE REAKTSII V DLITEL'NOM SOSTOYANII NEVESOMOSTI]

Yu. Valyavski Washington NASA Jan. 1969 8 p Transl. into ENGLISH from Russian Presented at the 3d Intern. Symp. on the Basic Environ. Probl. of Man in Space, Geneva, 15-19 Nov. 1968 (Contract NASw-1695)
(NASA-TT-F-12094) Avail: CFSTI CSCL 06S

The compensatory reactions arising in the human body in response to extended weightlessness are listed. Circulatory, hemodynamic, immunological, metabolic, nervous, and emotional reactions are discussed. It is pointed out that the reactions to weightlessness are difficult to distinguish from the accompanying reactions to hypokinesia and the emotional factors. Author

N69-15615# Joint Publications Research Service, Washington, D. C.

WATER-SALT METABOLISM DURING SPACEFLIGHT [VODNO-SOLEVOY OBMEN PRI KOSMICHESKIKH POLETAKH]

I. S. Balakhovskiy 21 Nov. 1968 19 p refs Transl. into ENGLISH from Russian Presented at the 19th Congr. of the Intern. Aeron. Federation, Oct. 1968
(JPRS-46926) Avail: CFSTI

Weight loss by astronauts during space flight is discussed in relation to water-salt metabolism. Weight loss statistics of both Soviet and American astronauts are presented, as well as physiological data from blood and urine analysis. It is shown that weight losses indicated in these statistics can be chiefly attributed to elimination of water. Author

N69-15629*# National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

POTENTIAL PROBLEMS RELATED TO WEIGHTLESSNESS AND ARTIFICIAL GRAVITY

Ralph W. Stone, Jr. and William M. Piland Washington Jan. 1969 60 p refs

(NASA-TN-D-4980) Avail: CFSTI CSCL 06S

A study has been made of many publications to provide planners of future space missions with a summary of the pertinent problems associated with the weightless environment of space. Based on this study, a review is presented of the possible adverse effects of weightlessness on the astronaut's physiological processes and his performance in space. Techniques and devices which are potentially capable of counteracting the adverse effects of weightlessness are discussed. These counteractive measures include lower-body negative pressure devices, pressure cuffs, anti-g suits, the cardiovascular conditioning suit, exercise apparatus, and artificial gravity. The impact of additional weight and crew involvement in the inclusion of these devices on a particular mission is also discussed. The effects of these devices range from minor increases in launch weight and crew activity to significant vehicle-configuration complexity and astronaut involvement. Results are presented of research on the therapeutic value of the counteractive devices for weightlessness. Where an insufficient assessment of these devices exists, further research is recommended which could influence a decision on their use. Primarily, it is important to determine whether the effects of simulated weightlessness are progressive beyond that which has been experienced to date or whether the effects plateau at a specific level of physiological adaptation.

Author

N69-15690*# Naval Aerospace Medical Inst., Pensacola, Fla.

RAPID VESTIBULAR ADAPTATION IN A ROTATING ENVIRONMENT BY MEANS OF CONTROLLED HEAD MOVEMENTS

Ashton Graybiel and Charles D. Wood 9 Dec. 1968 18 p refs (NASA Order R-93; Proj. MR005.04-0021.159)

(NASA-CR-99043; NAMI-1053) Avail: CFSTI CSCL 06S

Two attempts to telescope, in time, vestibular adaptation in a slow rotation room (SRR) were made to determine the easiest and quickest means of preventing the appearance of SRR sickness at a terminal velocity of 10 rpm. Three subjects in each experiment were exposed to unit increases in rotational velocity at which time they made several hundred experimenter-directed head movements. Prior to cessation of rotation standardized tasks were performed to determine the degree of transfer of adaptation acquired from the "directed" movements. The results demonstrate that the process of homeostatic adaptation can be greatly speeded up through experimental control of head movements although a large number of "limited" head motions must be made to ensure transfer of adaptation to general activities. Some idea was gained regarding the number and excursion of head movements required at each unit increase in rpm for adaptation and overadaptation at terminal velocity.

Author

N69-15733# Los Alamos Scientific Lab., N. Mex.

LIQUEFIED HYDROGEN SAFETY—A REVIEW

F. J. Edeskuty and Roy Reider [1968] 12 p refs Presented at 10th Liquid Propulsion Symp., Las Vegas, Nev.

(Contract W-7405-ENG-36)

(LA-DC-9569; CONF-681102-1) Avail: CFSTI

The accident experience and accident potential in the use of liquefied hydrogen is examined with respect to cold damage to tissue, asphyxiation, hydrogen/air (O₂) mixtures, material properties, air and moisture condensation and pressure buildup. The control of liquefied hydrogen safety problems is reviewed in: facility design which includes site selection, materials of construction, hydrogen, disposal, pressure relief (storage, insulation space, and experimental volumes) and control of spills; safe procedures which include standard operating procedures, safety training and education,

emergency procedures, control of ignition sources; and operating principles such as hydrogen monitoring, storage above atmospheric pressure, purging (before and after operations), inerting, leak control, chilldown procedures, venting procedures.

Author (NSA)

N69-15776# Ionics, Inc., Cambridge, Mass.

AN ELECTROCHEMICAL CARBON DIOXIDE REDUCTION-OXYGEN GENERATION SYSTEM HAVING ONLY LIQUID WASTE PRODUCTS Final Report, May 1967-Mar. 1968

Floyd H. Meller Apr. 1968 43 p refs

(Contract N00014-66-C-0139)

(AD-678427) Avail: CFSTI CSCL 13/10

The electrochemical reduction of carbon dioxide has been investigated as a means of simplifying the disposal of carbon dioxide and hydrogen from a submarine atmospheric regeneration unit. Ejection of these materials as organic liquid wastes is preferable to the compression and gas phase discharge systems in current use. This investigation comprises phase II of the problem of developing an electrochemical cell to accomplish the desired reduction reactions. Conceptually, the cell consists of an anode at which water is electrolyzed to oxygen, a cathode at which carbon dioxide is reduced, and an electrolyte path between the two. A two stage reduction is required to balance the system metabolically consisting of the following general progression: Co₂ yields HCOOH yields HCHO or CH₃OH. Four cathode materials were found to catalyze the CO₂ reduction. They are mercury, gallium, indium and the quaternary alloy Cerrolow 136. The latter material is most effective when used in the liquid phase. The reduction of HCOOH is accomplished to a limited degree on tin or Cerrolow 136.

Author (TAB)

N69-15782*# California Univ., Los Angeles. Space Biology Lab.

SUMMER INSTITUTE IN SPACE BIOLOGY Final Report, Apr. 1-Nov. 30, 1968

J. D. French and W. R. Adey 30 Nov. 1968 168 p refs

(Contract NSR-05-007-089)

(NASA-CR-99076) Avail: CFSTI CSCL 06C

The Space Biology Laboratory conducted its third Summer Institute in Space Biology during 1968. The five week program of lectures, discussions and field trips was for selected undergraduate students with backgrounds in life and physical sciences. The Institute included lectures by teaching and research faculty from the University of Southern California and Harbor General Hospital, as well as from the UCLA School of Medicine, and the Life Sciences Division and Biosatellite group at Ames Research Center. The curriculum provided a survey of physiological functions liable to modification in the space environment, including effects of weightlessness on cardiovascular and renal reflexes and on body fluid distribution; the effects of confinement on metabolic functions; and modifications of cyclic mechanisms in sleep, body temperature control and endocrine functions. Central nervous functions were discussed in relation to the stresses of acceleration and vibration, effects of weightlessness on visual and vestibular components of motor performance, and the possible effects of the space environment on psychic functions. Lectures were supplemented by trips to Ames Research Center, the Space Cabin Simulator at Douglas, and the Navy's Sealab 3 Project. Details on participating students, faculty, curriculum, syllabus, and special reports are included.

A.L.

N69-15792# Joint Publications Research Service, Washington, D. C.

CONTROL PROCESSES IN THE RESPIRATORY SYSTEM

N. V. Zavalishen et al *In its* Adjustment of Adaptive Systems Invest. 23 Dec. 1968 p 17-37 refs (See N69-15790 05-10)

Avail: CFSTI

N69-15797

The results of experimental checking of two alternate hypotheses recording the control of the respiratory parameters of living organisms are presented. It is shown that the observed experimental facts can only be explained from the point of view of the functional control hypothesis. Author

N69-15797# Avco-Everett Research Lab., Everett, Mass.
AN EXPERIMENTAL PREPARATION FOR THE STUDY OF THROMBOSIS ON ARTIFICIAL SURFACES UNDER CONTROLLED FLOW CONDITIONS

H. E. Petschek, D. Adamis, and Arthur Kantrowitz Sep. 1968
70 p refs

(Contract PH-43-67-1120)

(Avco-Everett Res. Rept-314) Avail: Issuing Activity

An experimental preparation has been developed in which thrombus formation on artificial surfaces can be observed over a range of controlled blood flow conditions. Virgin blood, i.e., blood with no previous surface contact or activation, forms a stagnation point flow on the underside of a microscope cover slip. Direct observation of individual platelet settling, the existence of fibers, and the formation of large scale platelet aggregates are possible without interruption of blood flow. A theoretical discussion of the effect of flow on various parameters which may be relevant to thrombus formation such as diffusion towards the surface, residence time near the surface, and stresses leading to detachment of material from the surface is presented. Preliminary results on glass indicate a one minute conditioning time before platelets settle followed by rapid attachment of platelets at a rate apparently limited by diffusion. The surface saturates with a monolayer of platelets until after 6-10 minutes large aggregates begin to form. Author

N69-15806# Joint Publications Research Service, Washington, D. C.

NEURON SENSITIVITY

M. L. Bykhovskiy et al *In its Develop. in Autom. Control and Neuron-Sensitivity* 13 Jan. 1969 p 20-32 refs (See N69-15804 05-10)

Avail: CFSTI

The sensitivity of a neuron to variation of its parameters is investigated using a mathematical model of a neuron described by the system of Hodgkin-Huxley-Frankenhaeuser equations. The sensitivity equations are solved and analyzed for various types of excitation. Author

N69-15822# Howard Univ., Washington, D. C. Dept. of Biochemistry.

CHEMICAL EFFECTS OF IONIZING RADIATIONS ON THE INDIVIDUAL AMINO ACIDS WITHIN INTACT AND PURE PROTEIN MOLECULES Annual Progress Report, 1968-1969

Felix Friedberg 30 Oct. 1968 14 p refs

(Contract AT(30-1)-2735)

(NYO-2735-9) Avail: CFSTI

Exposure of lyophilized native ribonuclease or lysozyme in vacuo to about 30 Mrads caused aggregation of the protein molecules. There was no evidence of extensive degradation of these globular molecules. 5 M Guanidine HCl did not disassemble the aggregated material. If the S-carboxymethylated form of ribonuclease or lysozyme was exposed to gamma rays, there was also no indication of marked degradation of the polypeptide chain and again the molecules were prone to aggregate. On the other hand, lathyritic collagen exhibited a definite lowering of molecular weight, under the same conditions. Author (NSA)

N69-15848# Aztec School of Languages, Inc., Acton, Mass. Research Translation Div.

SOME DATA ON THERMAL REGULATION IN MUSCARDINUS AVELLANARUS: CHANGE OF RESPIRATION CHARACTER AND BODY TEMPERATURE DURING DORMANCY AND ACTIVITY [NEKOTORYYE DANNYYE O TERMOREGULYATSII U ORESHNIKOVY SONI (MUSCARDINUM AVELLANARIUS).

IZMENENIYE KHARAKTERA DYKHANIYA I TEMPERATURA TELA VO VREMYA SPYACHKI I BODRSTVOVANIYA]

A. G. Tomilin Washington NASA Jan. 1969 15 p refs Transl. into ENGLISH from Zool. Zh. (Moscow), v. 37, no. 1, 1958 p 120-130

(Contract NASw-1692)

(NASA-TT-F-12042) Avail: CFSTI CSCL 06P

The number of respiratory movements in the active *Muscardinus avellanarus* at a body temperature of 34.5° to 36° reaches 160 to 280 per minute in males, and 172 to 200 in females. During dormancy, the respiration undergoes drastic alterations: the number of respiratory movements decreases, and respiratory pauses of different durations arise (with a maximum up to 11 min). These pauses divide separate series of respiratory acts. The body temperature changes which are observed during dormancy are connected with a drop in the environmental temperature, and thus the number of respiratory movements increases, while the average duration of respiratory pauses decreases. When the environmental temperature drops to -5.5°, the animal awakes, and its body temperature attains the norm of an active one, i.e., 34.5°-36°. The body temperature of a hibernating animal increases with a rise in the environmental temperature, and the number of respiratory movements between pauses decreases, while the duration of the respiratory pauses increases. Author

N69-15896# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DISCUSSION OF THE BACILLUS FUNICULARIUS N.SP., AND A FEW REMARKS ABOUT THE GALLIONELLA FERRU GINEA EHRENBURG

A. J. Kluyver et al 1968 10 p refs Transl. into ENGLISH from Dutch

(Contract NAS7-100)

(NASA-CR-99110) Avail: CFSTI CSCL 20M

The bacteria strain, *bacillus funicularius* n.sp., was investigated. The colonies were prepared from the classical Beijerinck formula which contained in addition to tap water agar, 2% glucose, 2% whiting, and 0.1% K₂HPO₄. This plate was inoculated with a liquid culture medium which contained the same nutrients and which had been previously infected with garden earth and incubated at 30°C for two days. An entangled fiber complex, surrounded by a thick mucous sheath, resulted. No cellular structure was observed in the fibers, and they were apparently filled with a homogeneous protoplasm from which several fine kernels distinctly protruded at various places. Further investigation with a potassium iodide treatment demonstrated that the fibers were composed of numerous cells which were 4 to 6μ long containing an abundance of glycogen. The physiological nature of the strain was studied as well as its behavior in other nutrient media, viz., wort agar, pea leaf agar, peptone agar, etc. B.P.

N69-15898# Techtran Corp., Glen Burnie, Md.

THE PROBLEM OF SLEEP AND ITS LIMITATIONS IN PROLONGED SPACE FLIGHTS [PROBLEMA SNA I YEGO OGRANICHENIY PRIMENITEL 'NO KOSMICHESKIM POLETAM BOL 'SHOY PRODOLZHITEL 'NOSTI]

V. P. Zukhar Washington NASA Jan. 1969 9 p refs Transl. into ENGLISH from Russian Presented at the 3d Intern. Symp. on the Basic Environ. Problems of Man in Space, Geneva, 15-19 Nov. 1968

(Contract NASw-1695)

(NASA-TT-F-12096) Avail: CFSTI CSCL 06S

The principal space flight factors which may alter the sleep structure of man and influence sleep durations and phase correlations are: weightlessness and subsequent changes in information reaching the central nervous system; hypokinesia and hypodynamic consequences of weightlessness and the limited volume of spacecraft; nervous and emotional stress resulting from the danger, responsibility and loneliness of space flight; sensual

deprivation, activity limitation and monotonous surroundings; changes in circadian rhythm, illumination levels, air temperature, noise background, etc. Data are presented from sleep investigations under conditions simulating space flight, as well as some physiological methods for controlling the type of sleep. A comparative evaluation is performed for various methods of organizing sleep and rest of astronauts during long space flights. Author

N69-15903*# Techtran Corp., Glen Burnie, Md.
INVESTIGATION OF THE INDUCTION OF DORSIVENTRALITY IN THE INCUBATING BODY EMBRYOS OF MARCHANTIAS. PART 3: LIGHT AS THE INDUCER OF DORSIVENTRALITY [UNTERSUCHUNGEN UBER DIE INDUKTION DER DORSIVENTRALITÄT BEI DEN BRUTKORPERKEIMLINGEEN DER MARCHANTIEEN. 3. DAS LICHT ALS INDUKTOR DER DORSIVENTRALITÄT]

Hans Fitting Washington NASA Jan. 1969 62 p refs Transl. into ENGLISH from Jahrb. Fur Wiss. Botan. (Germany), v. 85, 1937 p 169-242

(Contract NASw-1695)

(NASA-TT-F-12050) Avail: CFSTI CSCL 06S

In earlier experiments, the induction effect of gravity on dorsiventrality in marchantias in darkness was proven. In further experiments using artificial light in a black room, between 4 and 5 hours photostimulation was found to be sufficient for induction. The different effects of light in summer and winter are analyzed. Mood factors influencing development of the embryo are shown to be light and heat alone. Author

N69-15913# Naval Personnel Research Activity, San Diego, Calif.

TWO TRACK TRAINING FOR AVIONICS FUNDAMENTALS

Kirk A. Johnson and Phyllis A. Salop Sep. 1968 43 p refs (AD-678348; STB-69-1) Avail: CFSTI CSCL 5/9

An experimental two track training system, developed for use in the Avionics Fundamentals course, was evaluated against the conventional one track training system. The conventional course lasted 16 weeks. The two track system consisted of a regular track that was identical to the conventional 16-week course and an accelerated track that lasted 10 weeks. Students were graded on a scale with a maximum of 99, an (average) of 75, and a minimum passing grade of 63. Students in the two track system made grades that were, roughly, one point lower than those made by students in the one track system. This difference decreased to, roughly, half a point in subsequent courses. The two track system provided a reduction in training time of 1.38 weeks per student. This amounts to a savings of approximately 181 student man years per year.

Author (TAB)

N69-15944*# Emory Univ., Atlanta, Ga.
[RADIATION MEASUREMENT OF RADIOBIOLOGICAL HAZARDS OF MEN IN SPACE] Annual Report, 1 Oct. 1967-30 Sep. 1968

Norman A. Baily 30 Sep. 1968 99 p refs (Grant NGR-11-001-026)

(NASA-CR-99036) AVAIL: CFSTI CSCL 06R

Experiments were conducted to test the Blunck-Leisegang theory of the statistical distributions of small energy losses for pathlengths corresponding to those of biological interest. Preliminary results were obtained at 600 MeV. The Blunck-Leisegang correction was applied to the Vavilov distribution of energy losses in order to compare experimental data with a theoretical curve. The comparison shows some discrepancies between theory and experiment out in the high energy tail regions of the distributions. Several possible reasons for this discrepancy are examined. Consideration is also given to experimental pulse height spectra

distortions due to the effect of pulse pile-up. It is concluded that the predictions of the pile-up magnitude and the shape of the distorted spectrum are reasonable, and that these methods may be used to evaluate the effects of pile-up on experimental proton energy deposition spectra. Data outlines are included on the results of either animal or cellular radiation studies using protons as the source of incident radiation. M.G.J.

N69-15954# Joint Publications Research Service, Washington, D. C.

ANALYSIS OF PHYSIOLOGICAL MECHANISMS AND WAYS OF DEVELOPING THE ELECTROANESTHESIA METHOD

K. A. Ivanov-Muromskiy et al 27 Dec. 1968 9 p refs Transl. into ENGLISH from Modelirovanie v Biol. i Med. (Kiev), no. 3, 1968 p 97-103

(JPRS-45145) Avail: CFSTI

Observations on the neurophysiological mechanisms underlying electroanesthesia, a technique which has been effectively used in the treatment of acute radiation sickness, are presented. The importance of viewing the changes that take place at the systematic, as well as the molecular level, is emphasized. Soviet research has indicated that the three phase course of electroanesthesia in the integral organism is analogous to the states of anodic depression, catelectronic syndrome, and cathodic depression. Autocorrelation and cross correlation methods, as well as the periodogram converted to the spectral, were used to demonstrate these conclusions. The systematic reaction was also studied from the standpoint of modern neurophysiology and biocybernetics to distinguish between the fundamental and secondary formations. A.C.R.

N69-15971# Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Centre d'Etudes Nucleaires.

NEW METHOD FOR STUDYING THE EFFICIENCY OF CHELATING AGENTS OF THE POLYAMINE ACID SERIES FOR INTERNAL DECONTAMINATION [METHODE NOUVELLE D'ETUDE DE L'EFFICACITE DES CHELATEURS DE LA SERIE DES ACIDES POLYAMINES POUR LA DECONTAMINATION INTERNE]

Jacques Lafuma, Jean-Claude Nenot, and Michele Morin Jun. 1968 21 p refs In FRENCH

(CEA-R-3519; EUR-3864.F) Avail: Issuing Activity

We followed the biological fate of a complex formed on one side with either a rare earth (¹⁴⁴Ce) or a transuranium element (²³⁹Pu), and on the other side with a chelating agent of the polyamino acid series. This method allowed study of the in vivo stability of the various complexes and their comparison; the stability of the complexes as a function of the isotope-chelating agent weight relationships; and the metabolism of the chelating agents resulting in stable complexes, i.e. DTPA and TTHA. This simple method brought out the higher efficiency of DTPA in chelating rare earths and plutonium and for therapeutic purposes.

Author (NSA)

N69-15981# Japan Broadcasting Corp., Tokyo. Technical Research Labs.

A MODEL OF RETINAL NEURAL NETWORKS AND ITS SPATIO-TEMPORAL CHARACTERISTICS

Minoru Yasuda and Kenji Hiwatashi Jan. 1968 23 p refs *Its Ser. No. 116*

(PB-179450) Avail: CFSTI CSCL 06D

A model of neural networks in the vertebrate retina based upon neurophysiological data was constructed. Its spatio-temporal characteristics were calculated with a digital computer, and compared with psychophysical data in human vision. This model consists of three neuron layers: input (receptor cell) layer, intermediate layer, and output (ganglion cell) layer. They are connected with

each other in series (temporally) and in parallel (spatially), so that receptive fields are constructed. An analysis of these networks was carried out with matrix calculus in parallel connections and Mikusinski's operational calculus in series connections. Input-output relations for simple spatio-temporal input stimuli were obtained. The results have a good quantitative agreement with the fundamental psychophysical data of Mach and Broca-Sulzer phenomena, and spatial and temporal frequency responses of the human vision, if a time constant and a threshold level of inhibitory connections are higher than that of excitatory connections in the intermediate stage. Author (USGRDR)

N69-16052# Joint Publications Research Service, Washington, D. C.

POSSIBLE PATTERNS OF VESTIBULAR REACTIONS IN WEIGHTLESSNESS

Ye. M. Yuganov et al 6 Jan. 1969 9 p refs Transl. into ENGLISH from Zh. Ushnykh, Nosovykh i Gorlovnykh Boleznay (Kiev), Sep.-Oct. 1968 p 57-62 (JPRS-47189) Avail: CFSTI

Vestibular functions and the otolithic apparatus were studied during brief periods of weightlessness in a flying laboratory to determine the causes for the decline in performance due to vestibulosensory and autonomic reactions. The durations of post-rotation nystagmus, counterrotation illusion, and latency of rocking illusion were analyzed, and the nature and intensity of the vestibuloautonomic reactions to angular and Coriolis accelerations were determined. Recordings were made by tachy-oscillograms, kinetocardiograms, electrocardiograms, and pulse measurements from the femoral and radial arteries. Data were obtained which are indicative of the minimum, mean, lateral, pulse, and final systolic pressure, rate of propagation of the pulse wave, duration of the various phases of the cardiac cycle, and general peripheral resistance of the blood vessels. K.W.

N69-16078# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE EFFECT OF ULTRAVIOLET LIGHT ON COLORLESS FLAGELLATES

M. M. Kamshilov 18 Jan. 1968 65 p refs Transl. into ENGLISH from Tr. Inst. Biol. Vnutr. Vod. Akad. Nauk SSSR (Moscow), no. 9, 12, 1965 p 255-299 (AD-678460; FTD-HT-23-1482-67) Avail: CFSTI CSCL 6/13

Present-day lower organisms - naked colorless flagellates are capable of withstanding doses of shortwave ultraviolet radiation close in intensity to the intensity of the suns ultraviolet radiation which reached the surface in the preoxygen period of the earths existence. These data make it possible to answer one of the most important objections to photosynthesis in ultraviolet rays. The continuous link of the photosynthesis of the first organisms with the help of UV-photons with the abiogenic photosynthesis of organic compounds turns out to be entirely possible. Life as a cyclic process of the use in portions of the energy of the electron excitation of molecules by light photons will inevitably develop under conditions different from those of the earth, in readying the soil for the development of living creatures with their relatively closed internal metabolism, with the capacity for adaptation and progressive evolution. Author (TAB)

N69-16090# Joint Publications Research Service, Washington, D. C.

CYBERNETICS AND REGULATION THEORY

N. N. Krasovskiy 24 Dec. 1968 17 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 182, no. 6, 1968 p 1287-1289 (JPRS-47132) Avail: CFSTI

Conflicting problems of target approach at a given point in time were examined. It was discovered that the extremal aiming rule, based on the extremal points of the domain of accessibility of the pursued and pursuing motions, and modified from the point of view of generalized differential contingency equations, insures a saddle point for the game in the case under consideration. A thermodynamic adaptation model for application to automata theory is described by which the broad class of processes designated by the terms training, adaptation, etc., can be interpreted as relaxation processes in some physical system with a defined spectrum of energy levels in contact with a thermostat. An experiment on the mechanisms of habit using cats was conducted to study the possibility of switching external environments when developing a habit. The idea that an increase in excitability before habit formation and the habit itself reflect the development of negative training is contradicted. Habit formation in one analyzer should be considered as a protective process permitting the brain to avoid harmful effects of the external environment by switching attention to other analyzers. A.C.R.

N69-16095# Sloan-Kettering Inst. for Cancer Research, New York.

BIOLOGICAL EFFECTS OF RADIATION AND RELATED BIOCHEMICAL AND PHYSICAL STUDIES. PROPOSAL NO. 4: CYCLOTRON FACILITY AND RADIONUCLIDE PRODUCTION Progress Report, 1 May 1967-1 May 1968

John S. Laughlin, Roy S. Tilbury, and James P. Mamacos 30 Sep. 1968 40 p refs (Contract AT(30-1)-910) (NYO-910-72) Avail: CFSTI

The design, operation, and performance characteristics of the multi-particle cyclotron at the Sloan-Kettering Institute for Cancer Research are discussed. The experimental facilities including targets and scattering chambers are described. The use of the cyclotron for production of radioisotopes, radioactive gases, and carbon-11-labeled organic compounds is examined. NSA

N69-16102*# Public Health Service, Phoenix, Ariz. Planetary Quarantine Unit.

SERVICES PROVIDED IN SUPPORT OF THE PLANETARY QUARANTINE REQUIREMENTS OF NASA Progress Report, Oct. 1-Dec. 31, 1968

N. Petersen Jan. 1969 20 p (NASA Order R-137)

(NASA-CR-99221; PR-24) Avail: CFSTI CSCL 06M

Summary data are presented on the experiments undertaken to evaluate the vacuum probe as a surface sampler for microbial contamination, to determine dry heat resistances of bacterial spores, and to assess the level of microbial contamination on the Apollo spacecraft. Graphs and tables are included to show: (1) comparative dry heat survivor curves of spore isolates, CK-4 and G-2, sporulated on TAM and recovered with TSA and supplemented TSA; (2) comparative dry heat survivor curves of spore isolate G-2 sporulated on AK #2 and recovered with TSA and supplemented TSA; (3) survival of various bacterial populations exposed to filtration, drying, and airflow; (4) comparative recovery of spores by TSA and TSA supplemented with 0.2% yeast extract and 0.1% soluble starch; (5) microbial contamination detected on Apollo command modules (cm), the interior surfaces of the instrument unit, the Saturn S-4B, and the lunar modules(um); (6) levels of microbial contamination detected on the exterior surfaces of the LM ascent and descent stages; (7) mold contamination detected on surfaces of the Apollo cm and lm; (8) types of aerobic mesophilic microorganisms isolated from the Apollo CM and LM; and (9) effect of extended incubation on recovery of molds from space hardware surfaces. M.G.J.

N69-16103*# National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.

I-123 PRODUCTION BY THE Sb-121 (α , 2n) I-123 METHOD

Vincent J. Sodd (Natl. Center for Radiological Health, Cincinnati, Ohio) and James W. Blue Washington 1969 17 p refs (NASA-TM-X-52534) Avail: CFSTI CSCL 07E

A cyclotron technique is described for producing high purity ^{123}I using the $^{121}\text{Sb}(\alpha, 2n)^{123}\text{I}$ method. This isotope is considered as an ideal radioisotope of iodine for low exposure in vivo measurements, and the reasons for this judgement are discussed along with the theoretical considerations. Details are given on the chemical procedures used to isolate the iodine products, and on those used to recover the enriched target material for subsequent use. Some typical decay spectra of an iodine fraction which was chemically separated by distillation are depicted. The yield of radioiodine products isolated from a 50 mg ^{121}Sb target bombarded for a total charge of 0.37 coulombs is tabulated. Also shown for each product are its half-life, the energy of the gamma ray peak used in the spectral analysis, and the abundance value of that gamma ray used in the yield calculations. M.G.J.

N69-16111*# Massachusetts Inst. of Tech., Cambridge. Engineering Projects Lab.

MEASUREMENT AND DISPLAY OF CONTROL INFORMATION: REMOTE MANIPULATION AND MANUAL CONTROL Progress Report, 1 Oct. 1967-30 Sep. 1968

Thomas B. Sheridan and William R. Ferrell 30 Sep. 1968 24 p refs

(Grant NGR-22-009-002)

(NASA-CR-99230; DSR-70283-7; DSR-70283-8) Avail: CFSTI CSCL 06B

A unifying theme for half of the effort was remote manipulation, or how man can extend his hands arbitrarily in space to accomplish useful work such as exploration, maintenance, and assembly in spite of transmission delay, limited bandwidth, and noise in the telemetry loop. Beginning with an experimental study of the effects of transmission delay, it is concluded that any good solution will involve utilizing man as an intermittent supervisory controller of a remote computer, which in turn controls the mechanical hand on a fast time scale with respect to inputs from its own sensors and a slower time scale based on commands from the human supervisor. The other half of the effort has dealt with a variety of control problems of both discrete and continuous sorts. An investigation of the human operator as a time-optimal bang-bang state regulator of second order systems is being completed. Work has been completed on a theoretical study interrelating two and three time scale preview control with optimal (Weiner-Hopf) control. Author

N69-16169 Minnesota Univ., Minneapolis.

ELECTRON MICROSCOPY OF THE CENTRAL NERVOUS SYSTEM: EXAMINATION OF SELECTED STRUCTURES, THEIR RELATIONSHIP TO FUNCTIONAL MODELS AND TO PROBLEMS OF PREPARATION ARTIFACT

Charles Homer Good (Ph.D. Thesis) 1967 557 p

Avail: Univ. Microfilms: HC \$25.20/Microfilm \$7.10 Order No. 68-7318

Improvement of methods for the electron microscopic (EM) study of the central nervous system (CNS) are needed. Inconsistencies in the EM description of the neuroglia, and slight relationship to neurohistology, neurochemistry and electro-physiology are noted in the EM literature. Perfusion of the rat CNS was done with glutaraldehyde as a killing agent and primary fixative. This fixative was compared at the macroscopic, light microscopic and EM level with OsO_4 and formalin perfused tissue, and with immersion fixed tissue. Secondary fixation was with OsO_4 . Embedding was done in Vestopal. Methods for selecting small CNS loci were devised. Observations were made which are of interest to and suggest directions for EM investigation related to neuropathology, neurochemistry, electrophysiology and psychobiology. Criteria for the EM identification of the neuroglial cell types is emphasized. Dissert. Abstr.

N69-16189 Michigan Univ., Ann Arbor.

THE BEHAVIOR OF ADAPTIVE SYSTEMS WHICH EMPLOY GENETIC AND CORRELATION ALGORITHMS

John Daniel Bagley (Ph.D. Thesis) 1967 185 p

Avail: Univ. Microfilms: HC \$8.40/Microfilm \$3.00 Order No 68-7556

A framework or paradigm which encompasses much of the work that has been accomplished in the field of adaptive systems is developed. This paradigm effectively separates the learning algorithm from the heuristic aspects which lie in a meta-environment. A concept of meta-environmental depth which is intended to reflect the degree of interaction among the parameters of the meta-environment is defined. An example of meta-environment which includes the game of Hexapawn and show how its depth can be made to depend upon the strategy chosen by a fixed opponent is presented. The effects of a limited range of variation of the control coefficients upon the optimizing behavior of the genetic adaptor are determined. In general, the results obtained have implications for two general areas, the theory and practice of problem solving and the theory of natural genetic systems. Dissert. Abstr.

N69-16204# Human Engineering Labs., Aberdeen Proving Ground, Md.

SHORT-TERM MEMORY: AN ANNOTATED BIBLIOGRAPHY

Dennis F. Fisher and Harry F. Wiggins Aug. 1968 152 p

(AD-678546) Avail: CFSTI CSCL 5/10

The bibliography is an annotated compilation of 435 references dealing with short-term memory. The period of time from 1959 to June 1968 (present) has accounted for the majority of research in this area, and in accord with this, most of the references included herein are from this period. The included references are arranged in alphabetical order by author. An alphabetical index of pertinent parameters of investigation as well as topics of interest is also provided. Author (TAB)

N69-16212*# Michigan Univ., Ann Arbor.

A STUDY OF HUMAN OPERATOR PERFORMANCE USING REGRESSION ANALYSIS

August Llewellyn Burgett Washington NASA Jan. 1969 192 p refs

(Contract NASr-54(06))

(NASA-CR-1259) Avail: CFSTI CSCL 05I

The regression analysis technique is used to analyze the performance of human operators in low order compensatory manual control systems. This study is based on two experiments in which the subjects controlled single and double integrator dynamical systems with an input which was low frequency noise. In modeling the human operator system the crossover model is used. This model expresses the entire forward-loop of the compensatory control system as a series of operators: a gain K , a time-delay τ , and a single integration. The study takes the form of obtaining estimates of the parameters K and τ for twenty-five 20-second intervals for each day of testing. From an analysis of these parameter values, inferences are made about the performance of the human operators. Author

N69-16219# Dunlap and Associates, Inc., Santa Monica, Calif. Western Div.

ADAPTIVE TECHNIQUES FOR SYNTHETIC FLIGHT TRAINING SYSTEMS Technical Report, Jan.-Aug. 1968

Charles R. Kelley and Michael J. Wargo Orlando, Fla. Naval Training Device Center Oct. 1968 50 p refs

(Contract N61339-68-C-0136)

(AD-678536; NAVTRADEVEN-68-C-0136-1) Avail: CFSTI CSCL 14/2

The report is concerned with the application of adaptive training techniques to Synthetic Flight Training Systems (SFTS) in general, and to the 2B24 SFTS in particular. The report is divided

into four major sections. The first section discusses the basic elements* for any adaptive training system, which are: valid and reliable performance measures; one or more system, task, or environment variables that directly affect task difficulty; and, an adaptive logic which automatically adjusts task difficulty on the basis of the relation of measured performance to a preset criterion of performance. The second section of the report is addressed to the major problem areas associated with application of adaptive principles to the SFTS: selection of valid and reliable performance measures and the combining of performance measurements in several degrees of freedom to provide for a single continuum of adaptation. Specific suggestions for the application of adaptive techniques to the 2B24 SFTS are detailed in the third section of the report. The fourth and final section is concerned with an experimental program for the determination of the 2B24 SFTS adaptive training parameters. Author (TAB)

N69-16247# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EFFECT OF TOTAL VERTICAL VIBRATION ON FUNCTIONAL STATE OF THE VESTIBULAR APPARATUS IN GUINEA PIGS

Z. I. Apanasenko 8 Feb. 1968 12 p Transl. into ENGLISH from the book "Vliyaniye Ioniziruyushchikh Izlucheniy i Dinamicheskikh Faktorov na Funktsii Tsentral'noy Nervnoy Sistemy. Voprosy Kosmicheskoy Fiziologii" Moscow, Izd. AN SSSR, 1964 p 76-84 (AD-678782; FTD-HT-23-1474-67) Avail: CFSTI CSCL 6/16

Twice-repeated exposure to vibration (15 min each time) causes a statistically reliable increase in spontaneous electric activity of the hind leg muscles at relative rest in guinea pigs. Such vibration will also activate the response to adequate stimulation of the vestibular apparatus, as recorded by an electromyograph. The latency of reaction is reduced, while the aftereffect is prolonged. These changes persist through a 5-7 day period following vibration. No statistically reliable changes are noted affecting the general condition of the animal or the peripheral blood composition. Author (TAB)

N69-16257# Harvard Univ., Cambridge, Mass. Computing Center.
SOME FACTORS IN THE DESIGN OF SYSTEMS FOR COMPUTER ASSISTED INSTRUCTION

Lawrence M. Stolorow 1 May 1968 49 p refs Presented at the NATO Conf. on Major Trends in Programmed Learning Research, Nice, 13-17 May 1968

(Contract N00014-67-A-0298-0003)
(AD-678740; TR-7) Avail: CFSTI CSCL 5/9

The digital computer is a significant tool for explicating and guiding the instructional process. Today it is most useful to develop formalized and testable conceptions of instruction, but in practice it is being used more to implement instruction. The potential contribution of a CAI system as a catalyst in the process of formalizing instruction and in testing the validity of conceptions of instruction has been underestimated. An argument is made for the development and testing of teaching models that are prescriptive as well as descriptive. The most useful form of description to be used for the rules of instruction is the contingency statement. Sets of rules are combined to define teaching strategies. An urgent research problem is the identification of useful variables to include in both the if and then statements of teaching rules. Based upon previous research, the idiographic model uses variables relating to student characteristics as one component of useful if statements. Another component comes from the learning task. Five modes of instruction are described for the then statement. Author (TAB)

N69-16259# Yeshiva Univ., New York. Graduate School of Humanities and Social Sciences.

SUPPRESSION AND FUSION IN STEREOPSIS Annual Report

Lloyd Kaufman Aug. 1968 48 p refs

(Contract DADA17-67-C-7162)

(AD-679217) Avail: CFSTI CSCL 6/16

Contents: Amplitude modulation of brain waves; The waveform and spectrum of the high-frequency visual evoked response. TAB

N69-16266# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE POWERFUL LILLIPUTIAN

L. Shuvatov 8 Dec. 1967 9 p Transl. into ENGLISH from Pravda (Moscow), no. 285, 12 Oct. 1966 p 3

(AD-678622; FTD-HT-23-1161-67) Avail: CFSTI CSCL 6/3

A microminiaturized biotelemetric complex for studying animals in their natural environment has been developed. Among the devices included in the complex are sonic and ultrasonic receivers to register various signals of cardiovascular, respiratory, and neuromuscular activity. TAB

N69-16275 Michigan Univ., Ann Arbor.

PROPRIOCEPTIVE CUES AND THEIR INFLUENCE ON OPERATOR PERFORMANCE IN MANUAL CONTROL

James Herman Herzog (Ph.D. Thesis) 1967 177 p

Avail: Univ. Microfilms: HC \$8.20/Microfilm \$3.00 Order No. 68-7626

Control engineers and psychologists have jointly participated in research intended to investigate the unique characteristics of control systems which contain a human operator. A class of tracking problems known as compensatory tracking is of special interest due to its similarity to manual control problems such as flying an aircraft. The neuromuscular control system of the human upper limb was investigated as an auxiliary source of sensory information. Analysis of a functional block diagram of the human operator indicated that a control system with interesting characteristics could be devised if the control stick were constructed to be a mechanical analog of the plant being controlled. This is called the matched manipulator control technique. The torque applied by the operator to the control stick was sensed and used as the control input to the plant. For stable plants the plant output and the control stick position were placed in correspondence. This correspondence allowed the physiological force and position feedback paths of the upper limb to furnish information to the operator concerning the state of the plant. Dissert. Abstr.

N69-16285# Human Engineering Labs., Aberdeen Proving Ground, Md.

NIGHT FLIGHT VISION. 2. PSYCHOPHYSICAL COMPARISONS OF THREE COLORS OF COCKPIT LIGHTING

Robert W. Bauer Oct. 1968 15 p

(AD-678560; HEL-TM-13-68) Avail: CFSTI CSCL 1/3

Three different spectral distributions of cockpit display lighting were investigated as to their effects on dark adaptation and visual acuity during night flight. These distributions were instrument and panel lighting red, tungsten (clear) white, and Air Force (lunar) blue-white. Cockpit-lighting brightness (photopic luminance), color and color combinations with the addition of indicator lights were controlled, and effects on dark adaptation and distant visual acuity outside the cockpit were measured. Interactions among lighting colors, photopic and scotopic visual acuities, and luminance thresholds for objects of different sizes were shown. Results were discussed in relation to the literature on dark adaptation and night vision in flight. Author (TAB)

N69-16286# Human Engineering Labs., Aberdeen Proving Ground, Md.

NIGHT FLIGHT VISION. 1. RESEARCH PROBLEMS AND METHODS

Robert W. Bauer Oct. 1968 24 p refs
(AD-678561; HEL-TM-12-68) Avail: CFSTI CSDL 5/5

Review of the literature in aviation and in vision, and consideration of photometric methods available, raise a number of fundamental questions about cockpit lighting. Dark adaptation and acuity must be examined in relation to the total cockpit light flux, the ambient illumination outside the cockpit, and the spectral composition of the light flux. Furthermore, the aircraft mission requirements must be incorporated into design decisions. The program of research recommended has a character consistent with that proposed by Bartelt, Twist and Lazo (1966). Photopic and scotopic luminance, photometric and radiometric methods, color coding and contrast, and acuity at low luminances are reviewed. Analytic methods are described, and areas requiring fundamental human factors research are indicated. Author (TAB)

N69-16332# Joint Publications Research Service, Washington, D. C.

SPACE BIOLOGY AND MEDICINE, VOLUME 2, NUMBER 5, 1968

14 Jan. 1969 151 p refs Transl. into ENGLISH from Kosmich. Biol. i Med. (Moscow), v. 2, no. 5 1968
(JPRS-47249) Avail: CFSTI

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2. PATHOMORPHOLOGICAL PECULIARITIES OF RADIATION DISEASE IN ANIMALS IRRADIATED BY HIGH-ENERGY PROTONS V. V. Shikhodyrov et al p 10-14 refs (See N69-16334 06-04)

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11. DYNAMICS OF FORMANTS IN THE SPEECH SPECTRUM AS AN OBJECTIVE INDICATOR FOR DISCRIMINATING POSITIVE AND NEGATIVE EMOTIONS A. G. Tishchenko p 70-78 refs

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17. AUTOMATIC PROCESSING OF AN ECG (ELECTROCARDIOGRAM) REGISTERED DURING SPACE FLIGHT V. A. Krylov et al p 122-130 refs (See N69-16349 06-04)

18. BIOCHEMICAL INDICES OF THE REACTION OF FLIERS TO COMPLEX FLIGHT CONDITIONS I. G. Dlusskaya et al p 131-137 refs (See N69-16350 06-05)

N69-16333# Joint Publications Research Service, Washington, D. C.

EXPERIMENTAL VERIFICATION OF ADMISSIBLE RADIATION DOSES DURING PROLONGED SPACE MISSIONS (CHRONIC EXPERIMENTS ON DOGS)

Yu. G. Grigoryev et al *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 1-9 refs (See N69-16332 06-04)
Avail: CFSTI

A chronic experiment was carried out for the purpose of determining the admissible radiation doses during space missions. The experiment involved 150 dogs divided into several groups which were exposed to chronic irradiation in doses of 25 to 150 rem per year or to chronic irradiation aggravated by acute irradiation in doses of 10-50 rem. The results accumulated during the first year of exposure are presented. Regular examinations of the animals involving clinical, morphological, physiological, immunological and biochemical tests suggests that a year-long exposure of animals to irradiation at the stipulated doses has produced no significant pathological changes in their bodies. Author

N69-16334# Joint Publications Research Service, Washington, D. C.

PATHOMORPHOLOGICAL PECULIARITIES OF RADIATION DISEASE IN ANIMALS IRRADIATED BY HIGH-ENERGY PROTONS

V. V. Shikhodyrov et al *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 10-14 refs (See N69-16332 06-04)
Avail: CFSTI

Test dogs were irradiated with 126- and 510-MeV protons, being exposed to single and repeated irradiations with doses of 250 and 700 rad. Certain peculiarities in the pathomorphological picture of the radiation disease were found. They included hemorrhagic diathesis and disorders of the hemopoietic and nervous systems. Changes developing at long intervals after the occurrence of the disease was detected. Author

N69-16335# Joint Publications Research Service, Washington, D. C.

CHANGES IN THE RADIATION EFFECT IN PLANTS EXPOSED TO SPACECRAFT FACTORS

D. F. Gertsuskiy et al *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 15-18 refs (See N69-16332 06-04)
Avail: CFSTI

N69-16336

This paper presents data indicating changes in the ascorbic acid content in an onion set induced by subjecting the bulbs to gamma irradiation or by spaceflight factors. Exposure of plants to low doses of ionizing radiation and spaceflight factors imparted separately resulted in an increase in the vitamin C content in the onion top. In the case of a cumulative effect of these stress agents spaceflight factors reduced the stimulating effect of radiation and reduced the ascorbic acid content. Author

N69-16336# Joint Publications Research Service, Washington, D. C.

RADIOSENSITIVITY OF POTATOES TO GAMMA-RAY AND PROTON IRRADIATION IMPARTED TO TUBERS AND EYES BEFORE PLANTING

Yu. I. Shaydorov et al *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 19-26 refs (See N69-16332 06-04)
Avail: CFSTI

This paper gives the results of a study of the effect of preplanting irradiation of potato tubers and eyes (isolated with a small endosperm portion) with Co⁶⁰ gamma rays and 620-MeV protons on plant growth and development. The effect of irradiation on the eyes was found to be lower than on the tubers, the inhibitory effect of proton radiation being greater than that of gamma rays. Author

N69-16337# Joint Publications Research Service, Washington, D. C.

EFFECT OF HIGH OXYGEN CONCENTRATIONS ON THE ANIMAL BODY

N. A. Agadzhan et al *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 27-34 refs (See N69-16332 06-04)
Avail: CFSTI

Experiments were performed on white rats and mice to study the effect of an artificial atmosphere (53% O₂ at 760 mm Hg) on external respiration, pulmonary gas exchange, tolerance to acute hypoxia, oxidative phosphorylation in cerebral tissues, immunological indices and morphological structure of their internal organs. Certain changes in these parameters were detected. The functional indices returned to normal levels during the aftereffect period. Author

N69-16338# Joint Publications Research Service, Washington, D. C.

HISTOLOGICAL STUDY OF THE INTERNAL ORGANS OF MICE EXPOSED TO A HYPEROXIC ATMOSPHERE FOR 20 DAYS

V. V. Portugalov et al *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 35-39 refs (See N69-16332 06-04)
Avail: CFSTI

Histological methods were applied to study the lungs, heart, liver, kidneys, spleen, testes, thymus and inguinal lymph nodes of mice that were exposed for 20 days in an atmosphere with a total pressure of 760 mm Hg and a partial pressure of 304 mm Hg. No significant changes were observed in the lungs, heart, kidneys and testes. In the liver there was a moderate proliferation of histiocyte and myeloid elements around vessels. In the lymphoid organs there was an increased lysis of lymphocytes and appearance of a large number of macrophages which could phagocytize nuclear detritus. These lesions were observed in light centers of lymphoid follicles of the spleen, lymph nodes and thymic cortex. In the red pulp of the spleen there was a pronounced proliferation of reticular cells and blasts. Author

N69-16339# Joint Publications Research Service, Washington, D. C.

ELECTRON MICROSCOPE OBSERVATIONS OF CHANGES IN THE LUNGS OF RATS AFTER REPEATED EXPOSURE TO PURE OXYGEN

V. N. Vinogradov et al *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 40-45 refs (See N69-16332 06-04)
Avail: CFSTI

It was demonstrated that the average life expectancy of rats exposed to a pure oxygen atmosphere after eight repeated exposures to pure oxygen at normal pressure at intervals of two or three days was similar to that of control animals (50% of which died on the third day). After four exposures of 48 hours duration with five-day intervals the resistance of rats to pure oxygen significantly increased (50% of the animals died on the tenth day). The authors conclude that the animals develop their tolerance to toxic oxygen exposure not as a result of physiological adaptation but due to pathological reconstruction of the blood-air barrier which involves thickening of the septal spaces of endothelial and alveolar cells and narrowing of capillary space, which impairs oxygen diffusion. Author

N69-16340# Joint Publications Research Service, Washington, D. C.

EFFECT OF HIGH OXYGEN CONCENTRATIONS ON THE INDUCED POTENTIAL OF THE CORTICAL OPTIC ZONE AND SOME SUBCORTICAL ZONES

V. Kalyuzhnyy *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 46-56 refs (See N69-16332 06-04)
Avail: CFSTI

Unanesthetized rabbits exposed to 96% O₂ at atmospheric pressure exhibited a three-stage change in potential induced by a light flash: (1) an increase in the secondary discharge (1st-2nd day); (2) replacement of the secondary discharge by unstable fluctuations, the primary response being maintained (2nd-3rd day); and (3) disappearance of the induced potential, accompanied by a gradual increase in excitation of the subcortical non-specific system. Animals exposed to 53% O₂ exhibited: (1) an increase in the secondary discharge (2nd-5th day); (2) elongation of the slow negative surface wave (6th-8th day); and (3) maintenance of the primary response to the induced potential (9th-10th day), accompanied by an initial excitation and a decrease in the subcortical nonspecific system. Author

N69-16341# Joint Publications Research Service, Washington, D. C.

CHANGES IN THE INTESTINAL MICROFLORA OF RATS CAUSED BY PROTEIN-FREE DIETS

N. N. Lizko et al *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 57-62 refs (See N69-16332 06-04)
Avail: CFSTI

It has been established that white rats maintained on protein-free diets exhibited changes in the composition of intestinal microflora which involved a decrease of lactic acid bacteria and an increase in spore-forming bacteria. Subsequent feeding of the test animals with diets containing various proteins (18%) resulted in normalization of the composition of intestinal microflora. Author

N69-16342# Joint Publications Research Service, Washington, D. C.

ROLE OF THE THYROID GLAND IN CHANGES IN THE RESISTANCE AND MYOGLOBIN CONTENT OF SKELETAL MUSCLES OF "LOWLAND" AND HIGH-ALTITUDE ACCLIMATIZED WHITE RATS

A. B. Botombekova *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 63-69 refs (See N69-16332 06-04)
 Avail: CFSTI

The role of the thyroid gland in the development of adaptation processes at the tissue level was studied during the acclimatization of animals to altitude (Tuya-Ashu Pass, 3,200 m). The resistance of skeletal muscles in *in vitro* experiments and their myoglobin content was studied. The red blood picture was also examined. A thyroidectomy was shown to increase the resistance of skeletal muscles. This is considered a passive reaction due to a reduced basal metabolism. The myoglobin content was found to decrease. The altitude adaptation of test animals was accompanied by a further increase in the resistance of skeletal muscles caused by an increased myoglobin content. This indicates that a thyroidectomy does not impair the formation of active adaptive reactions at the tissue and cell levels during the altitude adaptation of animals.

Author

N69-16343# Joint Publications Research Service, Washington, D. C.

DYNAMICS OF FORMANTS IN THE SPEECH SPECTRUM AS AN OBJECTIVE INDICATOR FOR DISCRIMINATING POSITIVE AND NEGATIVE EMOTIONS

A. G. Tishchenko *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 70-78 refs (See N69-16332 06-04)

Avail: CFSTI

A thorough study of the formant structure of the sounds "o, u, yu, a", in whose formation the lips are involved, is an aid not only in revealing emotional stress but also for discriminating positive and negative emotions. During a negative emotion the first formant increases with an increase in emotional stress, the second varies in its character and the third decreases. All the formants increase in the case of a positive emotion. The pattern of the dynamics of formants is in good agreement with the acoustic theory of speech formation. Studies of the dynamics of formants in the speech spectrum in relation to autonomic indices provide a valuable method for evaluating emotional stress in pilots and cosmonauts.

Author

N69-16344# Joint Publications Research Service, Washington, D. C.

CHANGES IN CARDIAC ACTIVITY DURING PROLONGED HYPOKINESIA (DATA FROM VECTOR ANALYSIS)

B. A. Korolov *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 79-85 refs (See N69-16332 06-04)

Avail: CFSTI

It is known that long-persisting hypokinesia causes certain changes in the electrocardiogram: a decreased amplitude of the R and T waves, an inversion of the ST segment and T wave and an increased U wave. For the purpose of determining the nature of the changes the integral QRS and T vectors and the ventricular gradient in the frontal plane were studied for healthy male test subjects restricted to 70-day bed confinement. The changes in vectors, ventricular gradient and angular distances were less in test subjects who regularly performed physical exercises during the bed-rest experiment. The vector analysis revealed that the secondary nature of the changes in the electrocardiogram appear to be related to variations in myocardial metabolism.

Author

N69-16345# Joint Publications Research Service, Washington, D. C.

EFFECT OF PROLONGED BEDREST ON CEREBAL BIOPOTENTIAL OF HEALTHY SUBJECTS

B. N. Petukhov et al *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 86-94 refs (See N69-16332 06-04)

Avail: CFSTI

A 62-day bedrest experiment was conducted with six healthy male test subjects; three of these performed physical exercises of a

known force. The test subjects underwent electroencephalographic studies. The results are presented in relation to the determination of cortical responses to indifferent stimuli and changes in the frequency and amplitude of potentials. At later stages in the experiment there was a gradual shift of cortical responses toward a slow frequency and rate of formation. These changes give evidence of an increasing predominance of the inhibition process induced by bedrest. It was noted that the changes were more distinct in subjects performing no physical exercises.

Author

N69-16346# Joint Publications Research Service, Washington, D. C.

USE OF MEASURED CORIOLIS ACCELERATIONS IN VESTIBULOMETRY

R. R. Galle et al *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 95-104 refs (See N69-16332 06-04)

Avail: CFSTI

A new method for examining the vestibular function is described. The method is based on the use of Coriolis accelerations of a known increasing magnitude as a stimulus. The accelerations develop while the test subject, bent forward at 60-70°, straightens up, the chair rotating at velocities of 15, 30, 60 and 120°/sec and the Coriolis accelerations being 0.1, 0.2, 0.4 and 0.8 m/sec² respectively. The method makes it possible to construct curves of vestibular analyzer excitability which help to evaluate its functional state. Results of examinations of 20 male test subjects ages 24-37 made using this method are presented. It is emphasized that the described method has certain advantages over currently used tests, including Coriolis accelerations as a stimulus. It is recommended that the method be used as a vestibular test in special examinations.

Author

N69-16347# Joint Publications Research Service, Washington, D. C.

BIOMECHANICS OF THE RESPIRATORY ACT DURING LONG-TERM ACCELERATIONS (AN X-RAY STUDY)

K. I. Murakhovskiy *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 105-114 refs (See N69-16332 06-04)

Avail: CFSTI

Using X-ray studies it was found that exposure of man to long-term accelerations of different directions results in peculiar changes of the topographic and anatomic relationships of thoracic organs. These changes play an important role in determining disorders in the biomechanics of the respiratory act. Among them the most important are deformations of the rib cage of the thorax and changes in the configuration and level of the diaphragm. The principal changes in the biomechanics of the respiratory act involve the following events. During exposure to relatively low accelerations (pelvis-to-head accelerations of 4 g and back-to-chest accelerations of 6 g) the respiratory amplitude of the diaphragm and ribs increases in comparison with the initial level (up to 50%). During exposure to accelerations of greater magnitude these indices show a relative and then an absolute decrease.

Author

N69-16348# Joint Publications Research Service, Washington, D. C.

USE OF HIGH TEMPERATURES AS A FUNCTIONAL DIAGNOSTIC TEST

A. N. Azhayev et al *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 115-121 refs (See N69-16332 06-04)

Avail: CFSTI

Various high temperatures have been used as a provocative test during the training of cosmonauts. Thermal studies were performed on test subjects wearing special suits which reduced the thermal stress, making it nonuniform. The purpose of the

N69-16349

experiments was to select the temperature level that could help to reveal physiological changes and shorten the test. Experiments were performed on unclothed test subjects in a thermal chamber at temperatures of 40, 60, 70 and 80°C. Heat exchange, cardiovascular system indices and biochemical indices of the blood and urine were analyzed. The results demonstrated that relatively slow (40-60 min) and distinct changes in physiological functions occurred at 60°C; this temperature can be recommended as a provocative thermal test. Mechanocardiographic examinations and biochemical analyses of the blood and urine are sufficiently informative to be used in the evaluation of the tolerance of cosmonauts to high temperatures. Author

N69-16349# Joint Publications Research Service, Washington, D. C.

AUTOMATIC PROCESSING OF AN ECG (ELECTROCARDIOGRAM) REGISTERED DURING SPACE FLIGHT

V. A. Krylov et al *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 122-130 refs (See N69-16332 06-04)
Avail: CFSTI

It is shown that the currently used methods of discriminating ECG shapes by comparing the record with standard curves and subsequent processing on computers requires high-capacity memory units and much computation time. For this reason a method of extreme formalization has been proposed. The method makes it possible to represent the ECG shape as the sum total of figures corresponding to positive and negative extrema as well as to the isoline. In this case each standard curve is described by one number placed in one computer cell; this provides a significant expansion of the memory. The method can be recommended for automatic ECG processing on computers as well as for logical reduction of the information to be transmitted by narrow-band channels. Algorithms for automatic ECG processing are presented. Author

N69-16350# Joint Publications Research Service, Washington, D. C.

BIOCHEMICAL INDICES OF THE REACTION OF FLIERS TO COMPLEX FLIGHT CONDITIONS

I. G. Dlusskaya et al *In its Space Biol. and Med.*, Vol. 2, No. 5, 1968 14 Jan. 1969 p 131-137 refs (See N69-16332 06-04)
Avail: CFSTI

This paper presents the results of a biochemical examination of fliers with various flight backgrounds under flight conditions complicated by the failure of the automatic pilot. The flights were made in the company of an instructor who shut off the automatic pilot. The flier performing the mission was not told of the impending shutdown and was suddenly forced, after clarifying the reason, to take the proper measures independently for eliminating the "failure". We investigated the biochemical indices which might be expected to exhibit the greatest shifts. Author

N69-16427# Johns Hopkins Univ., Baltimore, Md. EFFECT OF HYPOXIA ON LEARNED AND MOTOR RESPONSES: PHARMACOTHERAPEUTIC APPROACHES TO HYPOXIA

Stephen A. Weinstein and Zoltan Annau Nov. 1968 38 p
(Contract DA-49-193-MD-2726)
(AD-679226) Avail: CFSTI CACL 6/5

Several types of investigations were carried on which can be categorized as follows: (1) The effects of carbon dioxide and/or carbonic anhydrase inhibition on performance and neural reactivity in low oxygen environments. (2) The effects of carbon dioxide and/or carbonic anhydrase inhibition on blood gases and acid-base balance in low oxygen environments. (3) The effects of motivation on performance in low oxygen environments. (4) The effects of

past experience in low oxygen upon performance in subsequent exposures. (5) The effects of schedules of reinforcement on performance in low oxygen. (6) The conditionability of the deleterious effects of hypoxia, i.e. the association of previously neutral environmental stimuli with the deleterious effects of hypoxia. Author (TAB)

N69-16470# Naval Aerospace Medical Inst., Pensacola, Fla. Medical Center.

STRUCTURAL ELEMENTS IN THE CONCEPT OF MOTION SICKNESS

Ashton Graybiel 16 Dec. 1968 41 p refs
(NASA Order R-93)
(NASA-CR-99279; NAMI-1055) Avail: CFSTI CACL 06S

A slow rotation room in a laboratory environment provides an excellent instrument for the study of motion sickness because the experimenter can control not only the stressful Coriolis accelerations, but also other important procedural and environmental variables. By exploiting this control, combined with the judicious selection of experimental subjects, it was possible to confirm many previous findings and demonstrate that manifestations of disturbances in the vestibular system fall into two distinct categories. In the first category are reflex phenomena evoked by Coriolis accelerations when the head is rotated out of the plane of the room's rotation, and revealed through systems which, under natural stimulus conditions, have functional articulations with vestibular receiving areas. Included here are a characteristic sensation of tumbling or rotation, the Coriolis oculogyral illusion, nystagmus, dizziness, and neuromuscular incoordination. The symptomatology in the second category comprises an epiphenomenon super-imposed on any manifestation of the first, when the unusual vestibular activity, presumably through facilitatory-inhibitory processes, irradiates to cells or cell assemblies not normally stimulated. Author

N69-16506# Bellcomm, Inc., Washington, D. C.

PROBLEMS IN RADIATION DOSE CALCULATIONS IN SPACECRAFT. PART 1: ELECTRONS

J. S. Ingley 23 Aug. 1968 45 p refs
(Contract NASw-417)

(NASA-CR-99263; TM-68-1011-3) Avail: CFSTI CACL 06R

The problem of calculating the radiation dose in earth orbit produced by energetic electrons and their associated bremsstrahlung is considered. Two methods of electron dose calculation are described, and areas where improvement could be made in either input data or calculational techniques are pointed out. It is concluded that bremsstrahlung calculations are sufficiently accurate for present purposes but that additional Monte Carlo calculations of electron penetration of thick shields (thickness greater than 70% of the electron range) are needed for accurate electron dose calculations. For the 250 nautical mile orbit phase of Apollo Mission E, present calculations predict an electron dose of 2.2 rad/day in the lunar module and .012 rad/day in the command module. This assumes the predicted decay rate of the artificially injected Starfish electrons is correct. These doses are approximately a factor of two higher than results obtained with earlier Monte Carlo transmission data. Author

N69-16536# Michigan Univ., Ann Arbor. Human Performance Center.

A BIBLIOGRAPHY OF RESEARCH ON BEHAVIORAL DECISION PROCESSES TO 1968

Ward Edwards Jan. 1969 99 p refs
(Grant NGR-23-005-171; Proj. 08901)

(NASA-CR-99268; Memo-7; Rept-08901-1-M) Avail: CFSTI CACL 05J

An extensive bibliography of 1393 references related to research on human behavioral decision processes up to 1968 is presented. This is an up-date of a similar document compiled in 1964 by the same author.
A.L.

N69-16537 *# National Aeronautics and Space Administration, Washington, D. C.

AEROSPACE MEDICINE AND BIOLOGY A CONTINUING BIBLIOGRAPHY WITH INDEXES

Dec. 1968 187 p refs

(NASA-SP-7011(57)) Avail: CFSTI CSCL 06

The abstracts and annotated indexes were selected from those introduced into the NASA Information System during November 1968. The references were previously announced by the Library of Congress, the American Institute of Aeronautics and Astronautics, and NASA. Emphasis is placed on the biological, physiological, psychological, and environmental effects to which man is subjected during the following simulated or actual flight in the earth's atmosphere or in interplanetary space.
A.L.

N69-16568 *# John B. Pierce Foundation of Connecticut, New Haven.

EXPANSION OF A MATHEMATICAL MODEL OF THERMOREGULATION TO INCLUDE HIGH METABOLIC RATES Final Report, Jun. 19, 1967-Jun. 18, 1968

J. A. J. Stolwijk and D. J. Cunningham Jun. 1968 133 p refs (Contract NAS9-7140)

(NASA-CR-92443; FR-A) Avail: CFSTI CSCL 06P

A program combining experimental and mathematical modelling was undertaken in order to extend the basic mathematical model for human thermoregulation. Exercise experiments at different levels of stress and at different ambient temperatures were used to establish steady state responses and to provide relevant physiological data for both behavioral and automatic reactions to thermal stress.
G.G.

N69-16591 # Oak Ridge National Lab., Tenn.

MEASUREMENT OF ABSORBED RADIATION ON SPACE FLIGHTS

B. M. Makhmudov [1968] 8 p refs Transl. into ENGLISH from Vestn. Mosk. Univ., Ser. III: Fiz.-Astron. (Moscow), v. 23, no. 2, Mar.-Apr. 1968 p 11-16

(ORNL-TR-2031) Avail: CFSTI

The results of various experiments to measure the absorbed dose of cosmic radiation during the flight of earth satellites and manned spaceships are presented and briefly discussed. NSA

N69-16592 # Japan Broadcasting Corp., Tokyo.

SIMULATION OF THE NEURAL RESPONSE IN THE PERIPHERAL AUDITORY SYSTEM

Hisao Sakai and Kengo Oggshi Feb. 1968 8 p refs /ts Note 117

(PB-179451) Avail: CFSTI CSCL 06D

Response area, inhibitory area, and the phenomenon of masking in the peripheral auditory system was simulated by computer model of the basilar membrane and the nervous connection.
Author (USGRDR)

N69-16600 # Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

STUDYING THE RELIABILITY OF OPERATION OF THE HUMAN OPERATOR IN AUTOMATED SYSTEMS

V. D. Nebylitsyn 7 Dec. 1967 13 p refs Transl. into ENGLISH from Vopr. Psikhologii (Moscow), no. 6, 1961 p 9-18 (AD-678779; FTD-HT-23-1455-67) Avail: CFSTI CSCL 5/8

Discussed in this paper are a number of problems related to the general theory of reliability of performance of human operator in the systems of automatic control. The author gives definitions of reliability and failure, considers the problem of relationship between reliability and efficiency, dwells on the part played by the extreme conditions and on the qualitative evaluation of reliability. The dependence of such reliability characteristics as prolonged endurance, resistance to disturbances, and switching-over ability, etc. upon the properties of the nervous system of the individual are dealt with in detail. The author stresses the necessity of exercising control over reliability while the operator is engaged in the fulfillment of his functions. TAB

N69-16622 # Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DETECTION OF POLYCYCLIC AROMATIC HYDROCARBONS IN ATMOSPHERIC AIR POLLUTION AND OTHER OBJECTS WITH THE AID OF QUASILINE FLUORESCENCE SPECTRA

P. P. Dikun /n its J. of Appl. Spectry. 17 Jan. 1968 p 83-91 refs (See N69-16610 06-34)

Avail: CFSTI

An investigation of urban air pollution was made with the aid of column and thin layer chromatography and spectral analysis using quasiline fluorescence spectra. Nine substances, including three compounds possessing very high carcinogenic activity, were detected in atmospheric contaminations. A comparison of possibilities of polycyclic aromatic hydrocarbon analysis is made with the help of the absorption and quasiline spectra. Author

N69-16651 *# Michigan Univ., Ann Arbor. Psychology Dept.

THE ELUSIVE TRADEOFF: SPEED VERSUS ACCURACY IN CHOICE REACTION TASKS WITH CONTINUOUS COST FOR TIME

Richard Gavin Swensson Dec. 1968 97 p refs

(Grant NGR-23-005-171)

(NASA-CR-73604; REPT-08773-33-T; TR-13) Avail: CFSTI CSCL 05H

Human capability to trade accuracy for increased speed of performance underlies all predictions of recently developed random walk models for choice reaction time. The five experiments reported here attempted to discover the conditions necessary for a speed-accuracy tradeoff. All used a PDP-1 computer to present one of the two equiprobable stimuli and the subject's feedback on a cathode ray tube display. The subjects' entire payoff depended on both their accuracy and response time on each trial. Cost for response time was proportional to that time. Session-to-session changes in the payoff difference between a correct response and an error varied the relative attractiveness of speed and accuracy. Reaction times for errors were faster than for correct responses, both in response to easily discriminable stimuli and for the faster, less accurate performance found with difficult stimulus discriminations. Author

N69-16657 *# Children's Hospital Medical Center of Northern Calif., Oakland. Bruce Lyon Memorial Research Lab.

DIETARY FACTORS AFFECTING EXOGENOUS AND ENDOGENOUS SOURCES OF FAT AND CARBOHYDRATE FOR ENERGY PRODUCTION AND SYNTHESIS Semiannual Progress Report, Jul. 1-Dec. 30, 1968

S. Abraham and John C. Bartley Dec. 1968 16 p ref

(Grant NGR-05-059-001)

(NASA-CR-99220) Avail: CFSTI CSCL 06A

Dietary experiments confirm previous findings that enzymatic differences occur in rats fed two different diets for a long period.

N69-16660

When compared to the activity of rats fed the high carbohydrate diet, the activities of hepatic glucose-6-P dehydrogenase, 6-P-gluconate dehydrogenase, citrate lyase, and total hexokinase were lower in rats fed a diet containing 45% fat. When the activities of these enzymes were measured in adipose tissue, similar differences were observed except that malic enzyme was much lower in the fat-fed animals while the total hexokinase activity was the same for both dietary groups. Tabulated data are included on the composition of isocaloric diets; the metabolic activity of liver and adipose tissue before and after a 7-day fast of rats fed a diet containing heptadecanoic acid as the sole source of fat; fatty acid composition of liver, adipose tissue, and carcass before and after a 7-day fast of rats fed a diet containing C₁₇ fatty acids; and concentration of plasma glucose and free fatty acids and of hepatic glycogen before and after a 7-day fast of rats fed a diet containing heptadecanoic acid as the sole source of fat. M.G.J.

N69-16660# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

MATERIALS OF THE CONFERENCE ON COSMIC BIOLOGY AND MEDICINE (SELECTED ARTICLES)

15 Mar. 1968 13 p Transl. into ENGLISH from Russian Conf. held in Moscow, 10-12 Nov. 1964

(AD-679371; FTD-HT-23-1392-67) Avail: CFSTI CSCL 6/11

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1. DESICCATION OF AIR IN LIFE SAVING SYSTEMS OF HERMETIC CABINS N. P. Perfil'yev et al p 1-4 (See N69-16661 06-05)

2. ON THE POSSIBILITY OF UTILIZING SEMI-FUNCTIONAL PROPERTIES OF ZEOLITES IN PHYSICO-CHEMICAL AIR REGENERATION SYSTEMS V. K. Cherkasov et al p 5-8 (See N69-16662 06-05)

N69-16661# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DESICCATION OF AIR IN LIFE SAVING SYSTEMS OF HERMETIC CABINS

N. P. Perfil'yev et al *In its Mater. of the Conf. on Cosmic Biol. and Med.* 15 Mar. 1968 p 1-4 (See N69-16660 06-05)

Avail: CFSTI

Desiccation of air in life preservation systems of hermetic cabins on cosmic ships is discussed. Ways of removing carbon dioxide and other harmful agents are proposed. The use of hydrophobic zeolites for carbon dioxide absorption is considered for possible application in future air moisture desiccators. Author

N69-16662# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE POSSIBILITY OF UTILIZING SEMI-FUNCTIONAL PROPERTIES OF ZEOLITES IN PHYSICO-CHEMICAL AIR REGENERATION SYSTEMS

V. K. Cherkasov et al *In its Mater. of the Conf. on Cosmic Biol. and Med.* 15 Mar. 1968 p 5-8 (See N69-16660 06-05)

Avail: CFSTI

In physical-chemical air regeneration system proposed for manned spaceflight, CO₂ is removed from cabin air by adsorption on zeolite. The CO₂ then undergoes vacuum desorption from the zeolite and passes through a CO₂ collector to the catalytic reactor, where it is reduced with hydrogen from the electrolyzer to water and methane. The water returns to the electrolyzer and is broken down into oxygen (used for human respiration) and hydrogen. The disadvantages are the difficulties of creating a vacuum on board a spacecraft and the additional electrical energy required to operate the CO₂ collector. Specially treated B-zeolite can be used in such a system for both sorption and catalysis, retaining its properties

through a number of cycles. Cabin air is purified by passing through a B-zeolite adsorber. Hydrogen derived from electrolysis is then passed through zeolite in a second adsorber, simultaneously desorbing CO₂ and reducing it to water and methane. The water is electrolyzed as in the first system. Temperature regulation is very important for the successful operation of this system, since a 7° to 12°C temperature variation alters the gas conversion level by 10-15%. Author

N69-16677# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

MATRIX METHOD OF PATTERN RECOGNITION AND CERTAIN PROBLEMS IN THE CONSTRUCTION OF STANDARDS

V. Yu. Trakhtman *In its Self Teaching Autom. Systems* 13 Feb. 1968 p 1-9 refs (See N69-16676 06-08)

Avail: CFSTI

The matrix method of recognizing images examined in this article is based on the idea of processing the descriptions of objects by statistical methods. The basic characteristics of the method are as follows: (1) the criterion of recognition by common metric characters, i.e., the mutual differences between isolated points of space; (2) class standards are selected by the principle of isometric invariance; (3) Boolean space is used. By applying the algorithm of the measurement of common metric characters in Boolean space it is possible to realize machine recognition since here the statistic itself is used as the standard and the signs of recognition remain non-isolated in the standard. In this case the specific character of the objects determines the selection of the element of description. Nevertheless, further processing, even up to construction of the standards, is completely unified. Small experiments on recognizing hand-written letters and sounds of Russian speech were carried out by this method. These experiments confirmed the initial premises and will be continued on an expanded scale. Author

N69-16684# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SPACE BIOLOGY

O. G. Gazenko 12 Jan. 1968 21 p Transl. into ENGLISH from the book "Razvitie Biologii v SSSR" Moscow, Izd. AN SSSR, 1967 p 613-631

(AD-679418; FTD-HT-23-1626-67) Avail: CFSTI CSCL 6/3

Space biology is defined as an independent area of biology dealing with three basic problems: The characteristics of the vital activity and behavior of terrestrial organisms in outer space or on rockets; The presence distribution, characteristics and evolution of living matter, possibly from another planet, in the universe; and the biological principles and methods for constructing an artificial environment in spaceships. This survey outlines the progress of Soviet space biology and notes important directions for its further development. Author (TAB)

N69-16690*# Minnesota Univ., Minneapolis. Coll. of Medical Sciences.

DEVELOPMENT AND EVALUATION OF AN IMPEDANCE CARDIOGRAPHIC SYSTEM TO MEASURE CARDIAC OUTPUT AND OTHER CARDIAC PARAMETERS, JULY 1, 1967-JUNE 30, 1968

W. G. Kubicek, D. A. Witsoe, and R. P. Patterson Jun. 1968 147 p refs

(Contract NAS9-4500)

(NASA-CR-92462) Avail: CFSTI CSCL 06B

A four-electrode impedance cardiograph was developed to provide a simple, bloodless method of monitoring various parameters of cardiac function without penetrating the skin. To evaluate the device, a comparison study was conducted of

simultaneous cardiac output determinations by the impedance method and indicator dilution or Fick techniques. Composite graphs of all data submitted from nine laboratories show the absolute values of cardiac output, (CO), and a plot of corrected impedance-derived CO values plotted against the original values by a standard method. Studies were also conducted to determine the validity of the transthoracic impedance method for measuring CO, and to determine its usefulness in examining the response of the cardiovascular system to a standardized postural stress. The CO was determined by the impedance and dye dilution techniques. A high correlation of absolute values for stroke volume (SV) and CO was obtained. Design criteria are given for an inflight prototype and clinical laboratory impedance electrode-cable harness system. Also included is the digital computer program for computing SV and CO from thoracic impedance changes during the cardiac cycle. M.G.J.

N69-16876# Indiana Univ., Bloomington. Div. of Optometry.
EXTRAHOPTERAL DISTANCE PERCEPTION IN TRACKING PERFORMANCE Final Report
Rogers W. Reading Sep. 1968 104 p refs
(Contract DA-49-193-MD-2706)
(AD-679173) Avail: CFSTI CSCL 5/10

Extrahopteral stereopsis is the binocular perception of depth that arises from objects located at relatively large distances from the hopter. The study is concerned with the question of whether extrahopteral stereopsis clues of disparity magnitudes comparable to those prevailing in common vehicle operating conditions can provide feedback useful in compensating for interference in a tracking task. The results, while inconsistent, suggest only a slight apparent superiority for conditions which allow judgments to be based on extrahopteral stereopsis. Supplementary investigations on the same subjects indicate that feedback from other clues may have been as good as or better than that provided by extrahopteral stereopsis and that estimations of the actual distances of objects located extrahopterally showed consistent errors sufficient in magnitude to have rendered extrahopteral clues ineffective. Author (TAB)

N69-16885# Naval Submarine Medical Center, Groton, Conn. Research Lab.
THE USE OF CIRCUMAURAL EARPHONES IN AUDIOMETRY

J. Donald Harris Jul. 1968 28 p refs
(AD-678918; SMRL-540) Avail: CFSTI CSCL 9/1

Four circumaural muffs were compared with the phone/cushion device now standard for audiometry, the Willson Sound-Barrier, the Maico Auraldome, and 2 versions of the Tracor Otocup. Psychoacoustic loudness balancing by normal subjects was performed, and physical measurements by probe-tube microphone and by flat-plate coupler. Neither physical method was related closely enough at 4 + kHz to the fundamental loudness balancing to serve as an independent calibration system for all circumaural muffs. Author (TAB)

N69-16893*# Techtran Corp., Glen Burnie, Md.
REACTIVITY OF THE ORGANISM DURING LONG DURATION SPACE FLIGHTS [REAKTIVNOSTI ORGANIZMA V USLOVIYAKH DLITELINYKH KOSMICHESKIKH POLETOV]

P. V. Vasilyev Washington NASA Jan. 1969 7 p refs Transl. into ENGLISH from Russian Presented at 3d Intern. Symp. on the Basic Environ. Probl. of Man in Space, Geneva, 15-19 Nov. 1968 (Contract NASw-1695)
(NASA-TT-F-12097) Avail: CFSTI CSCL 06S

It has been established that weightlessness and hypodynamia produce certain changes in the function of circulation, respiration, excretion, the analyzer and regulatory systems as well as in various

metabolic processes. The reorganization of these systems leads to changes in total reactivity closely related to body resistance. This paper presents an analysis of the literature data and authors' findings, indicating that weightlessness and hypodynamia result in reduced orthostatic and vestibular tolerance, increased susceptibility to infection, decreased resistance to acceleration and physical exertion, and altered reactivity to drugs. Author

N69-16916*# California Univ., Davis. Human Performance Lab.
THE EFFECT OF NINE DAYS OF RECUMBENCY, WITH AND WITHOUT EXERCISE, ON THE REDISTRIBUTION OF BODY FLUIDS AND ELECTROLYTES, RENAL FUNCTION AND METABOLISM

E. N. Bernauer and W. C. Adams Nov. 1968 177 p refs
(Grant NGR-05-004-021)

(NASA-CR-73664) Avail: CFSTI CSCL 06S

A 27 day experiment was designed to study the effects of 9 days of recumbency on the physiological systems related to the redistribution of body fluids, renal function, electrolyte exchange, and metabolism. An effort was made to explore the mechanisms of the pathophysiological changes of these systems which are seen in recumbency, relate them to weightlessness, and to predict the efficacy of procedures employed for future application to space flight. The role of the standardized efficacy bouts of exercise was studied for its effects in attenuating the alterations of the affected physiological systems during bed rest. Ten days of equilibration on a low residue diet of controlled water, electrolyte, and caloric content preceded the 9 days of recumbency. During the bed rest period, four young adult males rode on a bicycle ergometer in the supine position twice daily for 30 minutes, while four other male subjects remained inactive. Position and activity were maintained during the bed rest period. A 7 day ambulatory recovery period, in which pre-bed rest activity patterns were resumed, with ad libitum dietary intake (recorded for each subject), followed bed rest. Measurements taken during the 10 day equilibration period served as baseline comparisons for those taken during bed rest and recovery. Author

N69-16920# Human Engineering Labs., Aberdeen Proving Ground, Md.

CHRONIC FREE OPERANT AVOIDANCE AS A PSYCHOLOGICAL STRESS: A RE-EVALUATION

Murry D. Levine, Thomas P. Gordon, William J. Johnson, and Robert M. Rose Sep. 1968 23 p refs

(AD-679153; HEL-TM-10-68) Avail: CFSTI CSCL 5/10

Rhesus monkeys were maintained for 30 days on a modified free operant avoidance schedule in order to evaluate this paradigm as a chronic stress. Subjects were run in four groups to assess the separate contributions of human contact, intersubject interaction and chair restraint. Urinary 17-hydroxycorticosteroid levels and gastrointestinal ulcers were used as stress measures. Chronic exposure to this paradigm did not necessarily produce a stressed organism or gastrointestinal pathology. The adrenal corticosteroids did, however, provide a sensitive, objective index of emotionality. Author (TAB)

N69-16944# Army Medical Research Lab., Fort Knox, Ky.
DESCRIPTION OF OPTOKINETIC DEVICE

James W. Wolfe, Joseph R. Nall, and Cosmo D. Pupura Jun. 1, 1968 16 p
(AD-679030; USAMRL-783) Avail: CFSTI CSCL 20/6

An optokinetic drum capable of providing moving visual stimuli from 6 deg/sec to 120 deg/sec has been constructed. The main drive is provided by a Vickers hydraulic transmission. Control of drum velocity varies from an error of 15% at 2 RPM to .7% at velocities of 6 RPM and above. In addition, it is possible to accelerate the device on a linear ramp quite accurately. The device

N69-16948

provides a wide choice of stimulus presentations and can be used for a number of experiments related to oculomotor function.

Author (TAB)

N69-16948*# Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.

LITHIUM PEROXIDE TEST PROGRAM Final Report

R. A. Baum, Jr., T. E. Fitzsimmons, and K. J. Dresser 6 Jan. 1969 129 p refs

(Contract NAS9-8159)

(NASA-CR-92490; SVHSER-5243) Avail: CFSTI CSCL 06K

The use of lithium peroxide to control carbon dioxide and supply oxygen for an advanced portable life support system was experimentally evaluated. Tests were conducted to generate system design data and to evaluate the effects of chemical bulk density, catalyst addition, bed temperature and geometry, and quantity of lithium peroxide on performance. Lithium peroxide was investigated in form of low and high bulk density granules, both catalyzed with 2% nickel sulfate (to promote oxygen release) and uncatalyzed. The catalyzed, low bulk density material performed best. The most critical operating parameter was bed temperature. Due to the high level of carbon dioxide and water vapor fed to the canister, temperatures in excess of 600°F were measured. High bed temperatures deter carbon dioxide removal but enhance oxygen evolution due to thermal decomposition. The results show that a carbon dioxide control and oxygen supply system utilizing lithium peroxide offers both a suit-mounted and vehicle weight-and-volume advantage over other systems. A weight and volume comparison of this system is made with the lithium hydroxide/oxygen system.

K.W.

N69-16975*# Melpar, Inc., Falls Church, Va.

THE DESIGN AND DEVELOPMENT OF A LOW TEMPERATURE BALLOON BATTERY Phase 1 Final Report, 22 May-5 Aug. 1968

5 Aug. 1968 38 p refs

(Contract NAS5-11557)

(NASA-CR-73711) Avail: CFSTI CSCL 10C

Solar energy transmission measurements of various plastic films used as solar energy collecting arrays are investigated. Heat losses were estimated and a design was evolved, serving as solar energy transmitting and heat insulating array. This array or enclosure was tested using several solar thermal storage materials of the heat of fusion type. The battery temperature was stabilized in the presence of solar heat during the daytime, using the stored heat during nights. An array of 8 air-spaced Teflon FEP film transmits 68% solar radiation, while its heat insulating value is $U = 0.15$ or better. Heat storage materials were tested, melting around -23°C and -25°C. These have been subjected to simulated night-time tests, indicating that the desired battery temperature (-30°C) can be maintained for more than 12 hours. Compared with water-ice a volume reduction of 70% is indicated, while the weight reduction is approximately 40%.

Author

N69-16977# Joint Publications Research Service, Washington, D. C.

ASYMPTOTIC PROPERTIES AND APPROXIMATION OF STOCHASTIC TRAINING MODELS

Ye. S. Usachev *In its* Cybernetics and Regulation Theory 16 Dec. 1968 p 1-5 refs (See N69-16976 06-19)

Avail: CFSTI

Theorems are derived for examining the asymptotic properties of stochastic training models. Simple training procedures consisting of a number of sequential experiments are analyzed based on a behavioristic model.

A.C.R.

N69-16985# Stanford Univ., Calif. Dept. of Computer Science. **SOME PHILOSOPHICAL PROBLEMS FROM THE STANDPOINT OF ARTIFICIAL INTELLIGENCE**

John McCarthy and Patrick Hayes Nov. 1968 51 p refs

(Contract ARPA SD-183)

(AD-678878; AI-M-73) Avail: CFSTI CSCL 6/4

A computer program capable of acting intelligently in the world must have a general representation of the world in terms of which its inputs are interpreted. Designing such a program requires commitments about what knowledge is and how it is obtained. Thus some of the major traditional problems of philosophy arise in artificial intelligence. The first part of the paper begins with a philosophical point of view that seems to arise naturally once we take seriously the idea of actually making an intelligent machine. A proposed resolution of the problem of free will in a deterministic universe and of counterfactual conditional sentences is presented. The second part is mainly concerned with formalisms within which it can be proved that a strategy will achieve a goal. A method is given of constructing a sentence of first order logic which will be true in all models of certain axioms if and only if a certain strategy will achieve a certain goal.

Author (TAB)

N69-16990*# College of the Virgin Islands.

RESEARCH IN THE OPTIMIZATION OF SEPARATOR SUB-SYSTEMS FOR GC/MS LIFE DETECTION INSTRUMENTATION Annual Report, 15 Nov. 1967-15 Dec. 1968

15 Dec. 1968 24 p

(Grant NGR-52-083-002)

(NASA-CR-73751) Avail: CFSTI CSCL 06B

The investigation of designs and the procurement of a gas chromatograph/mass spectrometer are reported. Calibration was done in the 0.1, 1.0, and 10.0 ugm regions of ethyl laurate and xylene. The Lipsky separator was assembled, and initial tests were begun.

N.E.N.

N69-16997*# Fairchild Hiller Corp., Germantown, Md. Space and Electronics Systems Div.

POSITIVE DEPLOYABLE SOLAR ARRAY DEVELOPMENT PROGRAM—PHASE 3 Final Report

Jul. 1968 90 p refs

(Contract NAS5-9658)

(NASA-CR-73736; REPT-815-00101-FR) Avail: CFSTI CSCL 10B

Flight qualification data are presented on a prototype deployable solar array (DSA) unit consisting of two flexible, back-to-back substrates mounted on synchronized rollers. The optimum modular array design was achieved by considering the combinations of materials used in the prototype, and evaluating the resultant designs through analysis and development tests. The module consists of solar cells, coverglasses, substrate, electrical wiring, and mechanical interface. The criteria for each are stated, and test details are given. The problems involved in redesigning the extension linkage of the prototype deployment mechanism to facilitate assembly and replacement are discussed. Tests were also conducted to determine the natural frequency of the DSA in each of the following modes: normal to substrate, parallel to substrate, and torsional (about the central axis of the scissors assembly). Various methods of simultaneously deploying two arrays were studied, along with methods of orienting flexible arrays.

M.G.J.

N69-17003# Pittsburgh Univ., Pa.

EFFECTS OF CERTAIN COMPOUNDS ON ANIMALS SUBJECTED TO SIMULATED HIGH ALTITUDE Annual Summary Report, 1 Oct. 1967-30 Oct. 1968

Joseph P. Buckley and Herbert Barry, III Oct. 1968 22 p refs

(Contract DADA17-67-C-7089)

(AD-678639; ASR-2) Avail: CFSTI CSCL 6/15

It has been previously reported that N-beta-phenethyl-biguanide (phenformin) protected both anesthetized and unanesthetized rats from the lethal effects of severe hypoxia. Data in these studies indicated that phenformin HCl protected the rats by preventing cardiovascular collapse and central depression and simultaneously producing marked respiratory stimulation accompanied by arterial PCO₂ and pH significantly lower and arterial PO₂ significantly higher than that found in untreated animals. In the present studies, hexamethonium abolished the pressor response of phenformin HCl in cats providing additional evidence that one of the actions of phenformin HCl is facilitation of ganglionic activity. Phenformin HCl, 75 mg/kg, orally, markedly improved the lever press shock-avoidance performance of rats tested at altitudes between 18,000 and 24,000 feet. Altitudes in excess of 21,000 feet produced a much greater detrimental effect on learning than on performance and phenformin HCl did not improve the ability of the experimental animals to learn a relatively simple avoidance program at elevated altitudes ranging from 18,000 to 24,000 feet. The compound did increase the spontaneous activities of animals subjected to a simulated altitude of 21,000 feet whereas it produced a slight sedative effect on animals at normal atmospheric pressures. Phenformin HCl, 75 mg/kg, orally, did alleviate certain detrimental effects of hypoxia of high altitude in rats but did not appear to enhance the ability of these animals to learn at elevated altitudes.

Author (TAB)

N69-17010# Aerospace Medical Lab., (Clinical), Lackland AFB, Texas. Wilford Hall USAF Hospital.

AN EVALUATION OF A NEW TOTAL BODY ERGOMETER, AUGUST 1967-FEBRUARY 1968

George O. Gey, John W. Ord, and William E. Thornton Aug. 1968 14 p Submitted for publication
(AD-679150; AMLC-TR-68-12) Avail: CFSTI CSCL 6/14

Prolonged space flight will depend upon the availability of some means of exercise that will maintain cardiopulmonary reserves and prevent loss of regional muscle strength. This exercise must be compatible with a weightless environment, the confinement of a space craft, and the personal equipment of its occupants. In order to satisfy these requirements, a total body ergometer was designed which consisted of a horizontal bar that could be moved vertically. The bar was connected to coiled springs and weighted inertial wheels by chain pulleys. Twelve subjects were exercised on the ergometer for three to five minute periods and allowed to rest for five to ten minutes between exercise periods. The bar was moved at a rate of four second cycles. The load was increased progressively by 10 pounds for each period. All subjects were evaluated by treadmill runs for three minutes and they were allowed ten minute rest periods between runs. The bar was moved at a rate of four second cycles. Speed and grade of the treadmill were increased in accordance with the response of the subjects.

Author (TAB)

N69-17025# Techtran Corp., Glen Burnie, Md.

HISTOCHEMICAL STUDY OF OXIDATIVE ENZYMES IN THE LUNGS OF ALBINO RATS [GISTOKHIMICHESKOYE IZUCHENIYE NABORA OKISLITEL'NYKH FERMENTOV V LEGKIKH BELYKH KRYS]

I. M. Shnaydman Washington NASA Feb. 1969 5 p refs
Transl. into ENGLISH from Arkh. Anat., Gistol. i Embriol. (Moscow), v. 49, no. 12, 1965 p 71-73
(Contract NASw-1695)

(NASA-TT-F-12103) Avail: CFSTI CSCL 06A

The activities of various oxidative-reductive enzymes in normal white rats were found to vary in different structures of a pulmonary tissue. Enzyme activity was high in the epithelium of the mucous membrane and of the bronchial glands, histiocytes, and fibroblasts of the inter-alveolar septa; marked, in the cartilage cells, lymphoid tissue; moderate, in the muscles of the bronchial and

vascular walls; low, in the endothelium of the vessels. Enzyme activity, in decreasing order, was as follows: DPN-H-diaphorase, nitro-TB-reductase of isocitric acid, glutamic acid, cytochrome oxidase, nitro-TB-reductase of succinic acid, glucose-6-phosphate and TPN-H-diaphorase. No essential age or sex differences were observed.

Author

N69-17034# Illinois Univ., Urbana. Biological Computer Lab.

AUTOMATIC DETERMINATION OF INVARIANCE

John Schill 1 Dec. 1968 64 p refs
(Grant NGR-14-005-111; Contract AF 33(615)-3890; Grant AF-AFOSR-7-67)

(NASA-CR-73733; BCL-7.4) Avail: CFSTI CSCL 05G

A method for determining significant patterns for the identification of spoken words was developed. The method is based on the work of Gazdag and uses his concept of significant subsequences (SSS) which in turn is based on machine representation of spoken words. A system was assembled using an algorithm for ascertaining these SSS implemented on the ILLIAC II. This system consists of an encoder, a sampler for the encoder, and a digital computer. The spoken digits were recognized by this system using the concept of the SSS.

Author

N69-17037# Naval Ammunition Depot, Crane, Ind.

NASA SPACE CELL TEST PROGRAM Monthly Progress Report, 1-31 Dec. 1968

C. G. Lynch 31 Dec. 1968 17 p refs

(NASA Order W-11252-B)

(NASA-CR-99215) Avail: CFSTI CSCL 10C

The status of the spacecraft cell testing program is reported. Computer listings are included for each type of cell being tested and its test parameters, as well as those for which testing was completed. Symbolic terminology found in the listings is defined.

A.C.R.

N69-17074# Sandia Corp., Albuquerque, N. Mex. Planetary Quarantine Dept.

CONTAMINATION CONTROL HANDBOOK (PRELIMINARY COPY)

Aug. 1968 383 p refs Prepared for AEC Revised

(NASA Order H-13245A)

(NASA-CR-98238; SC-M-68-370) Avail: CFSTI CSCL 06M

This handbook is intended for use in the aerospace and allied industries. The book covers contamination control in product design, on surfaces, in gases and liquids, and in the atmosphere. Microbial contamination and its control are treated as well as effects of radiation, packaging procedures, handling and storage methods, personnel contaminants, and training of personnel. A glossary and bibliographies are included.

K.W.

N69-17085# Joint Publications Research Service, Washington, D. C.

PROBLEMS OF THE STUDY OF STRUCTURAL LEVELS OF BIOLOGICAL SYSTEMS

A. T. Shtalov *In its* Phil. Probl. of Forecasting and Organizing USSR Sci. 10 Jan. 1969 p 92-98 refs (See N69-17079 06-34)
Avail: CFSTI

An overview is presented on the various papers given at a conference on the methodological aspects of natural science problems. Emphasis was placed on the need for studying the theory of structural levels of development of biological systems, especially the specifics of biological structures, and forms of conversion from one level of their organization to another. Structural, functional, and cybernetic approaches to the problems were proposed.

M.G.J.

N69-17088

N69-17088# Bunker-Ramo Corp., Canoga Park, Calif. Systems Effectiveness Dept.

THE IMPACT OF MANPOWER REQUIREMENTS AND PERSONNEL RESOURCES DATA ON SYSTEM DESIGN Final Report, 1 Jun. 1967 -31 May 1968

David Meister, Dennis J. Sullivan, and William B. Askren (AMRL) Wright-Patterson AFB, Ohio AMRL Sep. 1968 224 p refs (Contract F33615-67-C-1650)

(AD-678864; AMRL-TR-68-44) Avail: CFSTI CSCL 5/1

The purpose of this study was to determine the effect on system design of using manpower requirements (MR) and personnel resources data (PRD) as design requirements. Equipment and personnel inputs, e.g., quantity and skill level of manning and task information, were presented incrementally to six design engineers in a simulation of the Phase 1A/1B development of the Titan 3 propellant transfer and pressurization subsystem. Subjects were required to create a complete subsystem design, including schematics, equipment descriptions, drawings and bills of material. Cost effectiveness measures were applied to the data. The results of the study indicate that if personnel factors are to be incorporated into design, it is necessary to supply PRD inputs as design requirements to the engineer in his initial statement of work. The analyses upon which MR and PRD inputs are based must be performed prior to the issuance of a Request for Proposal and not delegated to a development contractor. Author (TAB)

N69-17100# Aztec School of Languages, Inc., Acton, Mass. Research Translation Div.

FORMATION OF AMINO ACIDS AND PEPTIDES BY RADIATION [BILDUNG VON AMINOSAEUREN UND PEPTIDEN DURCH STRAHLUNG]

K. Dose et al Washington NASA Jan. 1969 9 p refs Transl. into ENGLISH from the German Rept. BMWF-FB-W-68-30 (Contract NASw-1692)

(NASA-TT-F-12089; BMWF-FB-W-68-30) Avail: CFSTI CSCL 06A

As part of an evaluation of the concept of chemical evolution of life, the composition of the primitive atmosphere of the earth and possible sources of energy are discussed. Examples and experimental data are presented of radiochemical reactions resulting in the formation of amino acids and fatty acids and in the polymerization or condensation of amino acids to peptides and proteins. Author

N69-17110# Library of Congress, Washington, D. C. Aerospace Technology Division.

BIONICS AND BIOCYBERNETICS Surveys of Foreign Scientific and Technical Literature

5 Dec. 1968 370 p refs

(ATD-68-77-108-4; ATD-WA-108) Avail: CFSTI

Abstracts are presented to give a retrospective coverage and to provide specialists in the biomedical community with some indication of the scope of the Soviet effort in bionics and biocybernetics. The data covers biological modeling of human sensory processes, infra-human sensory processes, sensory system, and physiologic functions; neurons in bionics and biocybernetics; problems of modeling higher nervous activity, and of transmission, processing, and encoding of information in living organisms; animal orientation, navigation, location, and communication; biopotentials and bioelectric control system studies; biological regulatory system; artificial intelligence (pattern recognition, learning programs, and special devices); and miscellaneous items related to bionic and biocybernetic studies. An author index is included. M.G.J.

N69-17141# National Bureau of Standards, Washington, D. C. **A SURVEY OF THERMODYNAMIC PROPERTIES OF THE COMPOUNDS OF THE ELEMENTS CHNOPS Progress Report, 1 Jul.-31 Dec. 1968**

George T. Armstrong and Eugene S. Domalski 20 Dec. 1968 41 p refs

(NASA Order R-138; NBS Proj. 316-11-0429; NBS Proj. 221-11-0429)

(NASA-CR-99222; NBS-9968; PR-15) Avail: CFSTI CSCL 06A

As part of a continuing effort comprised of gathering and evaluating data on, and selecting best values for organic compounds of biological interest, some selected heats of combustion and formation are presented for the following classes of compounds: amino acids, peptides, certain organic compounds of biological interest, other amino acids and related compounds, amino acid anhydrides, glyceryl esters, lactones, heterocyclic nitrogen compounds, and heterocyclic oxygen compounds. The selected values are tabulated for each class of compounds. The combustion data used in making a given selection are indicated. Author

N69-17158# Florida Univ., Gainesville. Coll. of Medicine. **VISUAL CELLULAR STIMULATION BY HIGH ENERGY QUANTA Technical Progress Report, 1 Dec. 1967 -1 Sep. 1968**

William W. Dawson 19 Aug. 1968 26 p refs

(Contract AT(40-1)-3599)

(ORO-3599-4) Avail: CFSTI

The responsiveness of visual system to ionizing radiations was studied. The popular hypothesis that X-rays stimulate the visual system by interacting directly with the photo chemical or indirectly through entoptic production of fluorescence was tested. The results were clear-cut and were described in a previous report. Analyses of the statistics were highly significant indicating that the hypotheses stated above should be rejected. That is, two alternative hypotheses may be generated: X-ray excitation of rhodopsin-bearing visual structures was by direct interaction with the nervous system or indirect interaction with neural structures through the production of free radicals. Ionizing rays or free radicals produced by them had slight effects upon photopigment concentration but these effects were secondary to physiological excitation produced at places other than the photopigment in receptive structures. Further, measurement of visual function indicated no pathology of a receptive nature where X-ray doses in the 12,000 R range were delivered. This suggested that mammalian eye X-ray pathology is dependent upon cellular metabolism rather than upon photochemical and neurological membrane or chemical structures. This assumes that current theory is correct for similarities in neutral membrane structure and photopigments between vertebrate and invertebrate species. Author (NSA)

N69-17169# Oak Ridge National Lab., Tenn. Office of Language Services.

ON SOME PROBLEMS OF RADIATION PROTECTION IN COSMIC FLIGHTS, PART 2 [UEBER EINIGE PROBLEME DES STRAHLENSCHUTZES BEI KOSMISCHEN FLUEGEN, 2]

H. Swart [1968] 12 p refs Transl. into ENGLISH from Mitt. der Deut. Astron. Raumfahrt (Ger.), v. 5, no. 1, 1967 p 23-32

(ORNL-TR-1814) Avail: CFSTI

Radiation protection in a charged particle environment on space missions is considered. Data are given on solar cosmic radiation, and event probability and intensity decay factors are analyzed. The total radiation dose due to solar radiation is considered, with special attention given to questions of proton dosages acceptable to manned space crews protected by various shielding systems. Dosage tables are included. Cosmic solar radiation, with the danger of attendant proton showers, is the principal danger in deep space. The extent and intensity of earth's radiation belts are reviewed, their relation to solar activity periodicity is analyzed, and

their contribution to the general radiological conditions is investigated. The screening effect of specific materials is mentioned. A brief discussion is given on artificially generated radiation belts.

NSA

N69-17186# Vermont Univ., Burlington.
HYPERBARIC EFFECTS OF HIGH PRESSURE EXPOSURES ON ENDOCRINE PHYSIOLOGY Technical Report, 15 Apr. 1967-30 Sep. 1968

George R. Howe 30 Sep. 1968 4 p
 (Contract N00014-67-A-0456)
 (AD-678655) Avail: CFSTI CSCL 6/16

Results of continuing research using sexually mature male and female rats of the Sprague Dawley strain are reported. A hyperbaric chamber was used, with a capacity of up to 10 atmospheres above atmospheric pressure under controlled conditions of temperature and humidity. Results of tests indicate that the effects of 6 atmospheres are nontoxic to both male and female rats, and that survival with a pressure of 7 atmospheres is more likely with male rats. Analysis of the results and a study of the conditions under which the testing was conducted indicated that toxicity was most probably due to increased PO₂, rather than increased PHe, or to increased pressure alone. It appeared that oxygen toxicity may exert some degree of prominence at a PO₂ near 220 mmHg, particularly after the survival of four males at 7 atmospheres for 96 hours using a gaseous mixture with a lower oxygen content.

A.C.R.

N69-17196# Joint Publications Research Service, Washington, D. C.

SPACE BIOLOGY AND MEDICINE

O. G. Gzenko *In its* USSR Achievements in Space Res. 24 Jan. 1969 p 365-422 refs (See N69-17187 06-34)

Avail: CFSTI

Unique features and interrelationships of the following basic aspects of space medicine are discussed: exophysiology, exobiology, ecology of closed systems (bioengineering), and medical problems of manned space flight. Results of biological research conducted on rockets and spaceships are tabulated, the results of which have great impact on the development of manned space flight systems. In particular, studies were made on the effects of weightlessness on cardiovascular, respiratory, and reproductive systems of dogs, guinea pigs, and rats, and the means of telemetering this information from the spacecraft to the earth. Medical research during manned flights is also summarized; experiments were conducted on radiation conditions, pressurized cabin environments, food and water supplies, and work and rest schedules. Detailed tests were also conducted on the response of the central nervous system and corresponding psychological factors.

A.C.R.

IAA ENTRIES

A69-15582 *

FAILURE OF BRAIN NOREPINEPHRINE DEPLETION TO EXTINGUISH THE DAILY RHYTHM IN HEPATIC TYROSINE TRANSAMINASE ACTIVITY.

R. J. Wurtman, W. J. Shoemaker, F. Larin, and M. Zigmond (Massachusetts Institute of Technology, Dept. of Nutrition and Food Science, Cambridge, Mass.).

Nature, vol. 219, Sept. 7, 1968, p. 1049, 1050. 16 refs.

NIH-supported research; Grant No. NGR-22-009-272.

Examination of the importance of brain norepinephrine in mediating the daily rhythmic changes in the activity of tyrosine transaminase in the livers of starved, adrenalectomized rats. Data are presented indicating that the daily rhythm in hepatic tyrosine transaminase activity is unrelated to the concentration of brain norepinephrine and is independent of the adrenal corticosterone rhythm. The data suggest a relationship between the adrenal rhythm and the activity of central noradrenergic neurones. F. R. L.

A69-15677

THE INFLUENCE OF HEMOGLOBIN DIFFUSION ON OXYGEN UPTAKE AND RELEASE BY RED CELLS.

W. Moll (Hannover, Medizinische Hochschule, Institut für Physiologie, Hanover, West Germany).

Respiration Physiology, vol. 6, Dec. 1968, p. 1-15. 29 refs.

Research supported by the Deutsche Forschungsgemeinschaft.

In order to evaluate the acceleration of oxygen uptake from and release by red cells through hemoglobin diffusion, the differential equations of simultaneous reaction and diffusion of both hemoglobin and oxygen were solved by the calculus of finite differences. The numerical results lead to the following conclusions. Hemoglobin diffusion does not accelerate the initial stage of oxygen uptake and release. It speeds up, however, the last two thirds of saturation change. The time needed for O₂ saturated red cells to release 80% of the oxygen at a constant surrounding O₂ tension of zero is shortened by 30% when hemoglobin diffusion occurs. The time needed for originally O₂ free red cells to reach 70% O₂ saturation at a constant surrounding O₂ tension of 100 mm Hg is shortened by 20-30% when the cell membrane is an insignificant diffusion barrier. At a lower surrounding O₂ tension, the acceleration of O₂ uptake by hemoglobin diffusion is increased. (Author)

A69-15751

FATTY ACIDS IN BLUE-GREEN ALGAE - POSSIBLE RELATION TO PHYLOGENETIC POSITION.

Raymond W. Holton (Tennessee, University, Dept. of Botany, Knoxville, Tenn.), Harry H. Blecker, and Timothy S. Stevens (Michigan, University, Flint College, Dept. of Chemistry, Flint, Mich.).

Science, vol. 160, May 3, 1968, p. 545-547. 27 refs.

Research supported by the University of Michigan; NSF Grant No. GB-4203.

Analyses of the lipids in five species of blue-green algae show that the fatty acids are largely the C₁₆ and C₁₈ acids. The only alga that could be grown heterotrophically, *Chlorogloea*, formed the triply unsaturated C₁₈ acid in the light but only the doubly unsaturated C₁₈ acid in the dark. Examination of these results and the results of others suggest that, except for one species, the more highly unsaturated acids are found in the morphologically more complex algae. The fatty acid compositions of blue-green algae are different from the fatty acid composition of the other prokaryotic organisms, the bacteria. It is speculated that the diversity of the patterns of fatty acid composition among the blue-green algae could be of phylogenetic significance. (Author)

A69-15802 *

A LEARNING MODEL OF BRAIN STEM RETICULAR FORMATION. W. L. Kilmer (Michigan State University, Dept. of Electrical Engineering, East Lansing, Mich.) and W. S. McCulloch (Massachusetts Institute of Technology, Cambridge, Mass.).

IN: INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, SYSTEMS SCIENCE AND CYBERNETICS CONFERENCE, SAN FRANCISCO, CALIF., OCTOBER 14-16, 1968, RECORD. [A69-15801 05-11]

New York, Institute of Electrical and Electronics Engineers, Inc., 1968, p. 109-111.

Research supported by the Teagle Foundation; NIH Grant No. NB-04985-03; Contracts No. AF 33(615)-1747; No. NSR-22-009-138; Grant No. AF AFOSR 1023-66.

Proposal of a set of nonlinear, probabilistic, hybrid computer concepts as guidelines for the operational schemata of the brain stem reticular formation. Using the smallest numbers and greatest simplifications possible, a reticular formation model, consisting of 12 anastomatically coupled modules stacked in columnar array, was constructed. A simulation test of its behavior shows that, despite its 1000 line complexity, it still behaves as an integral unit, rolling over from stable mode to stable mode as directed by its succession of input 84-tuples. The following design strategies are employed: modular focusing of input information, modular decoupling under input changes, and modular redundancy of potential command (modules with the most information have the most authority). These strategies were augmented to enable the model to condition, habituate, generalize, discriminate, predict, and generally follow a changing environment. P. v. T.

A69-15934

STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4).

Edited by P. H. A. Sneath (Leicester, University, Leicester, England).

Paris, COSPAR Secretariat, 1968. 302 p.

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THE VALUE OF AGREED STANDARDS OF STERILITY. C. -G. Hedén (Karolinska Institute; Medical Research Council, Stockholm, Sweden), p. 19-34. 8 refs. [See A69-15936 05-05]

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EFFICIENCY OF STERILANTS IN TERRESTRIAL AND EXTRATERRESTRIAL ENVIRONMENTS. S. D. Rubbo and J. F. Gardner (Melbourne, University, Melbourne, Australia), p. 37-50. 13 refs. [See A69-15937 05-05]

SOME OBSERVATIONS REGARDING FACTORS IMPORTANT IN DRY HEAT STERILIZATION. I. J. Pflug (Minnesota, University, Minneapolis, Minn.), p. 51-58. 9 refs. [See A69-15938 05-05]

PROTECTIVE MECHANISMS AFFECTING DRY-HEAT STERILIZATION. R. Angelotti (U. S. Public Health Service, Cincinnati, Ohio), p. 59-74. 21 refs. [See A69-15939 05-05]

ETHYLENE OXIDE STERILIZATION RATES AND PROTECTIVE INFLUENCES. R. K. Hoffman (U.S. Army, Fort Detrick, Md.), p. 75-86. 12 refs. [See A69-15940 05-04]

ESTIMATION OF MICROBIAL SURVIVAL IN HEAT STERILIZATION. S. Schalkowsky and R. Wiederkehr (Exotech, Inc., Washington, D. C.), p. 87-100. 14 refs. [See A69-15941 05-04]

THE AGE OF BACILLUS SUBTILIS SPORES AND THEIR RESISTANCE TO ETHYLENE OXIDE. M. Bomar (Universita 17. Listopadu, Prague, Czechoslovakia), p. 101-108.

DETERMINATION OF TERMINAL STERILIZATION PROCESS PARAMETERS. J. A. Stern and A. R. Hoffman (California Institute of Technology, Pasadena, Calif.), p. 109-120. 7 refs. [See A69-15942 05-05]

COMBINED STERILIZATION TECHNIQUES.

THE POSSIBILITY OF USING HYDROGEN PEROXIDE MIXED WITH A DETERGENT TO REDUCE MICROBIAL CONTAMINATION. V. I. Vashkov, E. N. Nikiforova, and Iu. F. Shumaeva (Academy of Sciences, Moscow, USSR), p. 123-126. [See A69-15943 05-05]

IMPARTING ANTIMICROBIAL PROPERTIES TO VARIOUS MATERIALS. V. I. Vashkov and G. V. Shcheglova (Academy of Sciences, Moscow, USSR), p. 127-131. [See A69-15944 05-05]

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STERILIZATION BY LOW TEMPERATURE STEAM AND FORMALDEHYDE UNDER SUB-ATMOSPHERIC PRESSURES AT 80°C. V. G. Alder (United Bristol Hospitals, Bristol, England), p. 141-155. 16 refs. [See A69-15946 05-05]

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SYNERGISM IN ETHYLENE OXIDE-METHYL BROMIDE STERILIZATION OF VERY DRY SPORE AND STAPHYLOCOCCAL POPULATIONS. J. B. Opfell, J. L. Shannon, and J. T. Brady (Philco-Ford Corp., Newport Beach, Calif.), p. 167.

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PLANETARY QUARANTINE - TECHNIQUES FOR THE PREVENTION OF CONTAMINATION OF THE PLANETS BY UNSTERILE SPACEFLIGHT HARDWARE. C. W. Craven (California Institute of Technology, Pasadena, Calif.) and R. P. Wolfson (General Electric Co., Valley Forge, Pa.), p. 171, 172.

TECHNIQUES FOR THE LIMITATION OF BIOLOGICAL LOADING OF SPACECRAFT BEFORE STERILIZATION. J. J. McDade (Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.), W. J. Whitfield, C. A. Trauth, Jr., and H. D. Sivinski (Sandia Corp., Albuquerque, N. Mex.), p. 173-206. 37 refs. [See A69-15948 05-05]

AN EXPERIMENT TO DETERMINE THE EFFECTS OF SOLID AND LIQUID ROCKET ENGINE COMBUSTION ON THE VIABILITY OF MICROORGANISMS. A. F. Obertra, J. R. Gillis, M. G. Koesterer, and R. P. Wolfson (General Electric Co., Philadelphia, Pa.), p. 207-232. 14 refs. [See A69-15949 05-05]

TECHNIQUE FOR STERILE INSERTION AND REPAIR OF SPACECRAFT. P. C. Trexler (Royal Veterinary College, London, England) and A. A. Rothstein (Martin Marietta Corp., Denver, Colo.), p. 233-238. 9 refs. [See A69-15950 05-05]

LABORATORY INVESTIGATIONS RELATED TO A SYSTEMS ANALYSIS APPROACH TO PLANETARY QUARANTINE.

R. L. Olson (Boeing Co., Seattle, Wash.) and R. H. Green (Boeing Co., Seattle, Wash.; California Institute of Technology, Pasadena, Calif.), p. 239, 240.

SAMPLING AND VERIFICATION TECHNIQUES.

PANSPERMIA REVISITED, OR HAVE WE ALREADY CONTAMINATED MARS? J. Hotchin (New York State, Dept. of Health, Albany, N. Y.), p. 243-254. 11 refs. [See A69-15951 05-05]

SAMPLING AND VERIFICATION IN LARGE-SCALE STERILIZATION PROCEDURES. J. H. Brewer (Becton and Dickinson Co., Rutherford, N. J.), p. 255-262. 7 refs. [See A69-15952 05-05]

CONTROL AND SAMPLING IN STERILE ROOMS. G. Sykes (Boots Pure Drug Co., Ltd., Nottingham, England), p. 263-268. 5 refs. [See A69-15953 05-05]

FACTORS INFLUENCING THE DETECTION AND ENUMERATION OF MICROBIAL CONTAMINANTS ON SPACE HARDWARE.

M. S. Favero (U. S. Public Health Service, Phoenix, Ariz.), p. 269-285. 12 refs. [See A69-15954 05-05]

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A69-15935 *#

THE IMPORTANCE OF STERILIZATION TECHNIQUES IN SPACE EXPLORATION.

Lawrence B. Hall (NASA, Washington, D. C.).

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05] Edited by P. H. A. Sneath.

Paris, COSPAR Secretariat, 1968, p. 3-18. 23 refs.

Summary of the present state of spacecraft sterilization to prevent viable terrestrial organisms from being transported to other planets. Mathematical models have been developed to define the scope and details of planetary quarantine. The COSPAR Resolution of 1964 provided a framework consisting essentially of three elements: a model of the principal parameters and their interrelation, agreements as to which parameters should serve as basic standards, and the selection of quantitative values for a chosen parameter. The possibility of contamination by nonlanding vehicles is considered. Microbial load estimation and control is discussed, as well as microbial survival and growth probabilities. G. R.

A69-15936

THE VALUE OF AGREED STANDARDS OF STERILITY.

Carl-Göran Hedén (Karolinska Institute; Medical Research Council, Stockholm, Sweden).

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05] Edited by P. H. A. Sneath.

Paris, COSPAR Secretariat, 1968, p. 19-34. 8 refs.

Description of methods and terminology to be used in the problem of preventing the introduction of terrestrial microorganisms onto other planets during space missions. A compilation of standard mathematical symbols, techniques, and nomenclature has been presented in the paper and is recommended for general use in connection with space probe sterilization. An attempt is made to provide the mathematical framework for evaluating the probability that a planet might be contaminated. Such an evaluation would have to be related to total number of missions from all nations assigning differing average contamination probabilities to landers and fly-bys. G. R.

A69-15937

EFFICIENCY OF STERILANTS IN TERRESTRIAL AND EXTRA-TERRESTRIAL ENVIRONMENTS.

Sydney D. Rubbo and Joan F. Gardner (Melbourne, University, School of Microbiology, Melbourne, Australia).

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05] Edited by P. H. A. Sneath.

Paris, COSPAR Secretariat, 1968, p. 37-50. 13 refs.

Evaluation of various methods of sterilization of spacecraft. Discussed are sterilization by dry heat, radiation, ethylene oxide, and liquid chemical agents such as isopropanol or formaldehyde in methanol. Glycol vapor used in connection with dry heat was found to increase sporicidal activity only slightly. An addition of methanol to ethylene oxide increased the effectiveness of the sterilization process. The disadvantage of liquid chemical agents is their unreliability on rough surfaces. In a discussion of the most suitable methods for spacecraft sterilization, it is pointed out that contamination of spacecraft components is largely caused by vegetative organisms from human sources. Therefore, both dry heat and ethylene oxide sterilization are recommended. G. R.

A69-15938

SOME OBSERVATIONS REGARDING FACTORS IMPORTANT IN DRY HEAT STERILIZATION.

I. J. Pflug (Minnesota, University, Minneapolis, Minn.).

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05] Edited by P. H. A. Sneath.

Paris, COSPAR Secretariat, 1968, p. 51-58. 9 refs.

Assessment of various factors governing dry heat destruction of microorganisms. Since the susceptibility of a spore to dry-heat destruction increases with decreasing water content within the spore, an attempt is made to ascertain how various environmental conditions would influence the escape of water from the spore. Three

basic cases are considered where the spore is surrounded by limited infinite, and zero gas volumes, respectively. It is shown that with a limited gas volume surrounding the spore a part of the water will leave the spore until a vapor pressure equilibrium is established.

G. R.

A69-15939 #

PROTECTIVE MECHANISMS AFFECTING DRY-HEAT STERILIZATION.

Robert Angelotti (U.S. Public Health Service, National Center for Urban and Industrial Health, Cincinnati, Ohio).

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05] Edited by P. H. A. Sneath.

Paris, COSPAR Secretariat, 1968, p. 59-74. 21 refs.

Discussion of research results concerning dry-heat sterilization, leading to recommendations for suitable sterilization of spacecraft. It is pointed out that the water content of microorganisms is the most important factor in dry-heat sterilization. It was found that spores with a water content corresponding to a water activity of 0.2 to 0.8 are more resistant than those with more or less water. The efficiency of sterilization therefore depends on the possibility of reducing the water content of the spores. It is recommended that fabrication and assembly of components be carried out under clean conditions of high air flow and low relative humidity. G. R.

A69-15940 #

ETHYLENE OXIDE STERILIZATION RATES AND PROTECTIVE INFLUENCES.

Robert K. Hoffman (U.S. Army, Fort Detrick, Md.).

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05] Edited by P. H. A. Sneath.

Paris, COSPAR Secretariat, 1968, p. 75-86. 12 refs.

Discussion of research concerning ethylene oxide as a sterilizing agent. Ethylene oxide, a gas at room temperature and normal pressure, is noncorrosive, but kills all forms of microorganisms. Its effectiveness depends on temperature, gas concentration, relative humidity, and the type of microorganisms and their surrounding medium. It is found that ethylene oxide kills *B. subtilis var niger* spores at the fastest rate at a relative humidity of about 33%. Sterilization times required at higher humidities become progressively longer, while no sterility was attained at low humidities. For bacterial spores suspended in water, oil, or in plastic containers the time for sterilization is determined by the time required for the gas to penetrate into the spores. G. R.

A69-15941 #

ESTIMATION OF MICROBIAL SURVIVAL IN HEAT STERILIZATION, Samuel Schalkowsky and Robert Wiederkehr (Exotech, Inc., Washington, D. C.).

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05] Edited by P. H. A. Sneath.

Paris, COSPAR Secretariat, 1968, p. 87-100. 14 refs.

Evolution of microbial survival models aimed at overcoming the deficiencies of a logarithmic model. The logarithmic model presently used is not sufficient to account for conditions in spacecraft sterilization. A new model is devised which formalizes the hypothesis that heat inactivation of microorganisms is due to distinct environmental and time-cumulative effects. Analysis of laboratory data shows the utility of this model. Development of analytical models should be complemented by physical modeling. Thus the effects of water activity on microbial destruction could be incorporated in a physical model of moisture diffusing between a spore and its surrounding medium. G. R.

A69-15942 *#

DETERMINATION OF TERMINAL STERILIZATION PROCESS PARAMETERS.

J. A. Stern and A. R. Hoffman (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05] Edited by P. H. A. Sneath.

Paris, COSPAR Secretariat, 1968, p. 109-120. 7 refs.

Discussion of procedures for achieving spacecraft terminal dry-heat sterilization under adequate but minimal time/temperature conditions. Any unnecessarily long exposure to high temperatures should be avoided, because of its effect on the reliability of spacecraft components. A simple geometric and thermal conceptual model has been developed to study relationships between the characteristics of the microbial populations and the thermal characteristics of the spacecraft and heating medium. The reduction of microbial population during both transient and steady-state phases of heating and cooling of the model is considered. G. R.

A69-15943 #

THE POSSIBILITY OF USING HYDROGEN PEROXIDE MIXED WITH A DETERGENT TO REDUCE MICROBIAL CONTAMINATION.

V. I. Vashkov, E. N. Nikiforova, and Ju. F. Shumaeva (Academy of Sciences, Institute of Microbiology, Moscow, USSR).

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05] Edited by P. H. A. Sneath.

Paris, COSPAR Secretariat, 1968, p. 123-126.

Discussion of the use of hydrogen peroxide to sterilize spacecraft. Hydrogen peroxide solutions at 1 to 6% concentrations with 0.5% selected anion active agents (surface tension 28.8 dynes/cm) were investigated, because they are not toxic, have no objectionable smell, and do not spoil the objects being treated. Spores of *Bacillus anthracis* were destroyed in 120 min by immersion in a 3% solution with 0.5% detergent. Surface wettability of various materials was studied. Surfaces can be sterilized by irrigation or wiping with moistened rags. G. R.

A69-15944 #

IMPARTING ANTIMICROBIAL PROPERTIES TO VARIOUS MATERIALS.

V. I. Vashkov and G. V. Shcheglova (Academy of Sciences, Institute of Microbiology, Moscow, USSR).

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05] Edited by P. H. A. Sneath.

Paris, COSPAR Secretariat, 1968, p. 127-131.

Investigation of the feasibility of imparting bactericidal properties to materials by impregnation or chemical combination with bactericides. Antimicrobial activity depends on the bond of the bactericidal agent to the material. If the bond is very strong, there is no antimicrobial effect. If the bond is not durable, the initially high antimicrobial activity disappears rapidly. Heavy metal salts, antibiotics, quaternary ammonium compounds, and preparations of phenolic series were used to impart antimicrobial properties to cellulose and synthetic fiber fabrics. Self-sterilizing varnishes were obtained for coating spacecraft components. G. R.

A69-15945 #

SYNERGISTIC EFFECTS OF ETHYLENE OXIDE AND OTHER AGENTS.

-Saul Kaye.

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05]

Edited by P. H. A. Sneath.
Paris, COSPAR Secretariat, 1968, p. 133-140.

Investigation of the catalytic action of formic acid on the sterilizing effectiveness of ethylene oxide. It is demonstrated that prior exposure of contaminated materials to formic acid vapor or to a solution of formic acid in methyl formate before exposure to ethylene oxide vapor or solution dramatically enhances the effectiveness of the ethylene oxide as a bactericide. It is suggested that the advantage of this process may lie not so much in the decreased dosage of ethylene oxide which is required as in the resulting minimization of the absorption of the ethylene oxide by porous or elastomeric materials, since it is possible to reduce the ethylene oxide exposure by a factor of about 2/3, and since the low concentrations of formic acid used seem to have no deleterious effects upon plastics or metals.

G. V.

A69-15946

STERILIZATION BY LOW TEMPERATURE STEAM AND FORMALDEHYDE UNDER SUB-ATMOSPHERIC PRESSURES AT 80°C.

V. G. Alder (United Bristol Hospitals, Dept. of Pathology, Bristol, England).

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05]

Edited by P. H. A. Sneath.
Paris, COSPAR Secretariat, 1968, p. 141-155. 16 refs.

Description of a sterilization technique using steam mixed with formaldehyde gas at 80°C under subatmospheric pressures. This technique has ensured thorough penetration into narrow bore tubing and fabrics and sterilized a wide range of materials, including plastic, electrical, and electronic equipment, without damage. At the end of the sterilization process insignificant traces of formaldehyde remained, which could only be detected by chemical means. In the tests of the technique, 80°C was found to achieve the best sterilizing effect with minimal damage to surgical equipment likely to be contaminated with infected protein and saline matter. In the evaluation of the procedure, test pieces which were designed to closely approximate protected areas in equipment susceptible to contamination, but which were easy to disassemble and submit to bacteriological test, were used. In almost all cases the mixture of 80°C steam and formaldehyde provided 100% sterilization of these test pieces.

G. V.

A69-15947

THE PLACE OF RADIATION STERILIZATION IN COMBINED TECHNIQUES.

L. O. Kallings (National Bacteriological Laboratory, Stockholm, Sweden).

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05]

Edited by P. H. A. Sneath.
Paris, COSPAR Secretariat, 1968, p. 157-166. 53 refs.

Compendium of research data on the susceptibility of various microorganisms and viruses to sterilization by radiation, by heat, and by a combination of radiation and heat. The potential of heat or of radiation alone for the sterilization of space materials is shown to be limited, since the temperatures required to ensure sterility and the radiation dose for the same result will certainly lead to damage to some of these materials. A combination of radiation and lower temperatures than are normally required for sterilization could, however, provide a method to improve viral inactivation and avoid the adverse effects of large radiation doses on the material.

G. V.

A69-15948

TECHNIQUES FOR THE LIMITATION OF BIOLOGICAL LOADING OF SPACECRAFT BEFORE STERILIZATION.

Joseph J. McDade (Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.), Willis J. Whitfield, Charles A. Trauth, Jr., and H. Donald Sivinski (Sandia Corp., Sandia Laboratory, Planetary Quarantine Dept., Albuquerque, N. Mex.).

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05]

Edited by P. H. A. Sneath.
Paris, COSPAR Secretariat, 1968, p. 173-206. 37 refs.

Discussion of some of the modeling requirements and methods for monitoring microbial contamination, and description of a new type of sampling device for recovering small numbers of microorganisms from large surface areas - namely, the vacuum probe sampler. Two general approaches to microbial contamination control are considered: (1) microbiological barrier techniques, and (2) conventional and laminar airflow cleanrooms. Details of a study of the sterile assembly of an oscillator circuit using glove box techniques and a barrier system are discussed, and a general description of a conventional type of cleanroom is presented. The results of sampling to determine the levels of microbial contamination within conventional cleanrooms are analyzed. General descriptions are provided for laminar airflow devices ranging from laminar downflow and laminar cross-flow cleanrooms to plastic curtained units and clean work benches. Results of sampling done under various conditions of laminar airflow are presented. In general, the data presented indicate that use of the laminar airflow principle has considerable merit in the control of microbial contamination. The levels of intramural microbial contamination within a class 100 cleanroom appear to be extremely low and soil-type microorganisms, such as bacterial and mold spores, do not appear prevalent in the total population of microorganisms. Sampling techniques which could be used to provide accurate estimates of the contamination level of assembled spacecraft are also presented.

G. V.

A69-15949

AN EXPERIMENT TO DETERMINE THE EFFECTS OF SOLID AND LIQUID ROCKET ENGINE COMBUSTION ON THE VIABILITY OF MICROORGANISMS.

A. F. Oberta, J. R. Gillis, M. G. Koesterer, and R. P. Wolfson (General Electric Co., Missile and Space Div., Philadelphia, Pa.).

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05]

Edited by P. H. A. Sneath.
Paris, COSPAR Secretariat, 1968, p. 207-232. 14 refs.

Detailed description of an experiment which yielded quantitative data concerning the ability of microorganisms to survive exposure to the rocket combustion environment in engines designed to use both solid and liquid propellants. This experiment was motivated by the need to determine the probability of biological contamination of the planet Mars as a result of the Voyager missions. Graphical and tabular data are presented which demonstrate that the findings of previous experimenters that the storable liquid propellants are sporidical are substantiated. Meaningful determinations of the natural contamination of solid propellant or the verification of postcure inoculation level must await development of an improved technique for recovering organisms from polymerized materials. The tests demonstrated that bacterial spores can survive the simulated thermal environment of a rocket firing and remain in a viable state. The number of spores recovered from the bipropellant tests was much greater than from the solids, while the monopropellant yielded very little viable ejecta, possibly as a result of engine construction or localized reactions within the catalyst bed.

G. V.

A69-15950

TECHNIQUE FOR STERILE INSERTION AND REPAIR OF SPACECRAFT.

P. C. Trexler (Royal Veterinary College, London, England) and A. A. Rothstein (Martin Marietta Corp., Denver, Colo.).
IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05]

Edited by P. H. A. Sneath.
Paris, COSPAR Secretariat, 1968, p. 233-238. 9 refs.

Recommendation of a technique, involving the use of the split-seam process, for inserting sterile objects into an isolated sterile environment without contaminating it as a method for sterile repair of spacecraft. Experimental tests are described, in which untrained personnel were required to perform sterile insertions under carefully controlled and monitored conditions, using the proposed procedure. While failures - i.e., contamination - did occur in seven out of 21 tests, these failures were traced to breakdowns in isolation rather than to failures in the insertion procedure. G. V.

A69-15951

PANSPERMIA REVISITED, OR HAVE WE ALREADY CONTAMINATED MARS?

John Hotchin (New York State, Dept. of Health, Div. of Laboratories and Research, Special Projects Laboratory, Albany, N. Y.).
IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05]

Edited by P. H. A. Sneath.
Paris, COSPAR Secretariat, 1968, p. 243-254. 11 refs.

Theoretical consideration of the possibility that waste materials ejected from manned orbital vehicles have contaminated Mars with terrestrial microorganisms. Empirical data derived from space probes and orbiting vehicles on the survival of known levels of microbial contamination after exposure to the space environment for varying periods of time are used (in conjunction with suppositions as to the amount of fecal and other contaminants released into orbit by manned orbital vehicles, and the calculations of Arrhenius and Sagan) to postulate the probability of a particular spore having already reached Mars from earth orbit. Assuming that the supposed quantity of contaminated material has, in fact, been released, and assuming that Mars was in a favorable position at the time of release, it is shown that the probability that contamination occurred ranges from an even chance to 1000 to 1 in favor.

G. V.

A69-15952

SAMPLING AND VERIFICATION IN LARGE-SCALE STERILIZATION PROCEDURES.

John H. Brewer (Becton and Dickinson Co., Rutherford, N. J.).
IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05]

Edited by P. H. A. Sneath.
Paris, COSPAR Secretariat, 1968, p. 255-262. 7 refs.

General view of the problems associated with obtaining reliable data in tests to determine if commercially applicable sterilization procedures ensure the required degree of sterilization. Statistical tabular data are presented which demonstrate that sampling of the sterilized lot of items and testing of the samples do not constitute an adequate verification procedure, since, unless the sample taken is unrealistically large, a lot with a small percentage of contaminated items will be passed as sterile in most cases. It is shown that a lot of 1000 items, of which one is contaminated, would, with a sample of 100 items, be passed nine times out of ten, and if there were 500 samples, the lot would still be passed six times out of ten tests. It is suggested, therefore, that a biological indicator be used in sterility testing, and the use of *Bacillus stearothermophilus* is advocated. This bacillus will not grow at normal sterility test incubation temperatures, but requires temperatures from 63 to 65°C for optimum growth and requires only six hours for maximum growth. The use of an organism which requires such an elevated incubation temperature will materially reduce the possibil-

ity of contamination due to technical error. Another advantage is that this organism is not likely to appear in the culture media as an accidental contaminant and that other contaminants which might enter a test due to faulty technique are not likely to reproduce at the incubation temperatures used. That incubation time plays an important role is illustrated by the results of recent experiments, which showed that marginal sterilization cycles with radiation or ethylene oxide gas can yield sterility tests in which growth appears only after prolonged incubation. Data are given for tests in which a dose of 2.6 megarads produced sterility in all cases up to 10^8 exposed items when the tubes were incubated seven days, whereas after 21 days growth occurred in the case of groups containing 10^2 , 10^4 , and 10^6 exposed items. G. V.

A69-15953

CONTROL AND SAMPLING IN STERILE ROOMS.

G. Sykes (Boots Pure Drug Co., Ltd., Microbiology Div., Nottingham, England).

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05]

Edited by P. H. A. Sneath.
Paris, COSPAR Secretariat, 1968, p. 263-268. 5 refs.

General review of methods of reducing microbial contamination in areas where sterile procedures must be carried out, and of the results obtained in laboratory testing of some of these methods. Graphical and tabular data are presented to show that the technician working in the area is the single most important factor in the introduction and dispersal of contaminants. Of the two isolation techniques - namely, isolation of the worker from the job or isolation of the job from the worker - it is found that the greatest returns, from at least the standpoint of creature comfort are derived from isolation of the job in sterile enclosures, screened from the environs by a flow of sterile air and provided with sleeved armholes for access to the interior of the working space. Even in this case it is said to be advisable to install cleanroom equipment, procedures, and techniques, since these provide desirable safeguards. G. V.

A69-15954

FACTORS INFLUENCING THE DETECTION AND ENUMERATION OF MICROBIAL CONTAMINANTS ON SPACE HARDWARE.

Martin S. Favero (U.S. Public Health Service, Bureau of Disease Prevention and Environmental Control, Phoenix, Ariz.).

IN: STERILIZATION TECHNIQUES FOR INSTRUMENTS AND MATERIALS AS APPLIED TO SPACE RESEARCH; COSPAR, SYMPOSIUM, LONDON, ENGLAND, JULY 18-22, 1967, PROCEEDINGS (COSPAR Technique Manual Series. Number 4). [A69-15934 05-05]

Edited by P. H. A. Sneath.
Paris, COSPAR Secretariat, 1968, p. 269-285. 12 refs.

Description of empirical studies to determine the efficacy of present ethylene oxide sterilization techniques and to consider the use of different nutrient broths for culture count incubations. Tabular data are presented to show that, while longer incubation after ethylene oxide treatment in some cases produces more positive indications of contamination, for enumeration by plate count or by multiple tube dilutions, no significant difference in the estimation of bacterial spores resulted from incubation beyond 3 days, and that, therefore, the increase in incubation time is of importance only for the case where a sterility test is involved. Several tests were conducted to determine the efficiency of solid and liquid media for recovering anaerobic spores. In no case was a medium so superior to the normal tripticase soy agar (TSA) medium that it would make any significant change in spore count estimations. For the recovery of injured spores it is suggested that the criterion for selecting a medium other than TSA should be that the medium is at least ten times as efficient as TSA. G. V.

A69-15966

IS THERE LIFE ON MARS? THE ORIGIN AND PROPAGATION OF LIFE IN THE COSMOS [GIBT ES LEBEN AUF DEM MARS? ÜBER ENTSTEHUNG UND VERBREITUNG DES LEBENS IM KOSMOS].

A69-15968

Hans Friedrich Ebel (Heidelberg, Universität, Organisch-chemisches Institut, Heidelberg, West Germany).

Sterne und Weltraum, vol. 7, Dec. 1968, p. 296-301. In German.
Summary of present knowledge of the origins of life. The contributions of molecular biology are noted, insofar as they provide a basis for studying the history of terrestrial life and the possibility of life elsewhere in the universe. It is estimated that life might exist on as many as 50 planets within 100 light years of the earth, and there may be 645 million habitable planets in our Galaxy. B. H.

A69-15968 *

URIC ACID PRODUCTION OF MEN FED GRADED AMOUNTS OF ECG PROTEIN AND YEAST NUCLEIC ACID.

Carol I. Waslien, Doris Howes Calloway, and Sheldon Margen (California, University, Dept. of Nutritional Sciences, Berkeley, Calif.).

(Federation of American Societies for Experimental Biology, Annual Meeting, 52nd, Atlantic City, N.J., Apr. 1968.)

American Journal of Clinical Nutrition, vol. 21, Sept. 1968, p. 892-897. 18 refs.
NIH Grant No. AM-10202; Grants No. NGR-05-003-068; No. NGR-05-003-089.

Discussion of experiments in which healthy male subjects were fed purine-free basal diets containing 0 to 75 g of protein and, at the highest protein level, 0 to 8 g of added yeast ribonucleic acid in order to differentiate the effects of these dietary components on plasma and urinary uric acid production. Urinary uric acid levels were significantly higher and plasma levels lower with 75 g of protein than with a protein-free diet. When the subjects were fed nucleic acid, plasma and urinary uric acid increased linearly in four out of five cases. Predictive equations, describing this response to dietary nucleic acid, were derived. G. V.

A69-15969 *

COMPARISON OF THREE METHODS TO DETERMINE THRESHOLDS FOR PERCEPTION OF ANGULAR ACCELERATION.

John D. Stewart (NASA, Ames Research Center, Moffett Field, Calif.) and Brant Clark.

American Journal of Psychology, vol. 81, June 1968, p. 207-216. 13 refs.

Comparative study of three psychophysical methods used to determine thresholds for the perception of angular acceleration in man. Sixteen men with normal vestibular function were studied using three random forced-choice procedures with a simulator rotating the subject about a vertical axis. The constant method, using a 10-sec constant acceleration, was found to be the most reliable, and there was a high correlation between thresholds determined by a forced-choice random double-staircase method and the constant method. The constantly increasing accelerations of the ramp method were found to produce unreliable, equivocal results. The thresholds determined by the constant and staircase methods for the 16 subjects varied between 0.07 and 1.19 deg/sec². G. V.

A69-15970 *

THE ROLE OF VISCERAL AFFERENT PATHWAYS ON VASOPRESSIN SECRETION AND URINARY EXCRETORY PATTERNS DURING SURGICAL STRESS.

Mitsuo Ukai, Walter H. Moran, Jr., and Bernard Zimmermann (West Virginia University, Medical Center, Dept. of Surgery, Morgantown, W. Va.).

Annals of Surgery, vol. 168, July 1968, p. 16-28. 24 refs.
PHS Grants No. 5-R01-AM04577; No. 2-P02-AM05557; Contract No. Nonr-101-441; Grant No. NGR-49-001-019.

Comparison of the effect of a standardized partial gastrectomy on blood ADH levels and urinary flow of intact dogs with its effect in dogs which had previously undergone interruption of either the vagal or spinal pathways. It was found that the excellent inverse correlation between ADH levels and solute clearance, especially at ADH levels above 10 µU/ml, suggests a dual action of vasopressin during renal conservation of water. M. M.

A69-15971 *

HYPOTHERMIC CARDIOPULMONARY BYPASS IN WHITE RATS.

Pava Popovic, Jaromir Horecky, and Vojin P. Popovic (Emory University, Dept. of Physiology, Atlanta, Ga.).

Annals of Surgery, vol. 168, Aug. 1968, p. 298-301. 8 refs.
National Institute of General Medical Sciences Grant No. GM-09652; Grant No. NGR-11-001-009.

Results of assisted-circulation experiments involving white rats, using a small membrane-type heart-lung machine specially developed for these animals. After cannulation of aorta and right ventricle with large polyethylene tubes, the animals were cooled to a body temperature of 14°C, which produced respiratory arrest, and were then connected to the pump oxygenator. Forty-five rats were kept 1 hr on bypass and thirty rats were kept 3 hr. During and immediately after the bypass, the body temperature, respiratory and heart rates, oxygen content of blood, pH, and hematocrit ratio were measured while blood viscosity was estimated. The survival of rats kept 1 hr on bypass was 100%, while the survival after 3 hr of bypass was 80%. P. v. T.

A69-15982 *

MICROBIOLOGICAL SAMPLING OF SURFACES.

M. S. Favero (U. S. Public Health Service, National Communicable Disease Center, Phoenix Field Station Section, Planetary Quarantine Unit, Phoenix, Ariz.), J. J. McDade, J. A. Robertsen (Dow Chemical Co., Pitman-Moore Div., Biohazards Research and Development Dept., Zionsville, Ind.), R. K. Hoffman (U. S. Army, Fort Detrick, Frederick, Md.), and R. W. Edwards (Airtronics, Inc., Washington, D. C.).

Journal of Applied Bacteriology, vol. 31, 1968, p. 336-343. 30 refs.
NASA Contract No. R-137.

Summary of the four basic methods for the microbiological sampling of surfaces. Whereas no single assay procedure can characterize completely the microbial elements on a surface, the rinse technique is probably the most accurate for enumerating viable microorganisms, and the direct surface agar plating technique is the best for enumerating particulates containing viable microorganisms. However, the convenience of other methods, such as the agar contact method, will often be the dominant factor in the selection of a sampling method. (Author)

A69-15983 *

EFFECTS OF PROGRESSIVE HYPOHYDRATION ON MAXIMAL ISOMETRIC MUSCULAR STRENGTH.

J. S. Bosco, R. L. Terjung (San Jose State College, San Jose, Calif.), and J. E. Greenleaf (NASA, Ames Research Center, Moffett Field, Calif.).

Journal of Sports Medicine and Physical Fitness, vol. 8, June 1968, p. 81-86. 15 refs.

Experimental investigation in which nine male college students between the ages of 20 and 29, who had previous athletic experience and were physically active, were hypohydrated for two one-week periods. During the third week of the diet, a general decrease was evident in all the isometric strength measures except knee extension, paralleled with a mean weight loss of 2.5%. In general, the maximal strengths exhibited decreasing trends but only elbow flexion was significantly decreased at up to 3.1% hypohydration. M. M.

A69-15984 *

SUBCELLULAR PARTICLES IN ECHINODERM TUBE FEET. II - CLASS HOLOTHUROIDEA.

Gladys Harrison (Woods Hole Oceanographic Institution, Woods Hole, Mass.; NASA, Ames Research Center, Moffett Field, Calif.).

Journal of Ultrastructure Research, vol. 23, 1968, p. 124-133. 12 refs.

NSF-supported research.

Extension of the investigation of bioadhesives in echinoderms to the Class Holothuroidea. The tube feet of five species of sea cucumbers were studied by means of the electron microscope with correlative light microscopy. The attaching surfaces of these feet contain channels of secretory packets which, under the electron microscope, reveal a unique ultrastructure. These packets in four

of the five species studied contained three areas: (1) a filamentous area, (2) a dark granular area, and (3) a light granular area. The fifth species had only a filamentous and a granular area. As in starfish, there is a close relationship of the Golgi apparatus to the developing secretory packets. M. M.

A69-16508 #

EXPERIMENTAL VERIFICATION OF THE PERMISSIBLE RADIATION DOSES FOR EXTENDED SPACE MISSIONS ("CHRONIC EXPERIMENTS" WITH DOGS) [K EKSPERIMENTAL'NOMU OBOSNOVANIU DOPUSTIMYKH DOZ RADIATSIH PRI DLITEL'NYKH KOSMICHESKIKH POLETAKH (PROVEDENIE KHONICHESKOGO EKSPERIMENTA NA SOBAKAKH)].

Iu. G. Grigor'ev, B. A. Markelov, V. I. Popov, A. A. Akhunov, A. V. Iiukhin, T. P. Tsessarskaia, A. V. Sedov, and V. A. Korsakov.

Kosmicheskaiia Biologiia i Meditsina, vol. 2, Sept.-Oct. 1968, p. 3-8. In Russian.

Discussion of experiments in which 150 dogs were exposed to chronic radiation at yearly doses of 25 to 150 rem or to chronic irradiation aggravated by acute radiation in doses from 10 to 50 rem. Clinical, morphological, physiological, immunological, and biochemical tests showed that an exposure to radiation at these doses over a period of one year produces no appreciable pathological changes in the organisms of the dogs. V. P.

A69-16509 #

PATHOMORPHOLOGICAL PECULIARITIES OF RADIATION SICKNESS IN ANIMALS IRRADIATED BY HIGH-ENERGY PROTONS [OSOBENOSTI PATOLOGO-MORFOLOGICHESKOI KARTINY LUCHEVOI BOLEZNI PRI OBLUCHENII ZHIVOTNYKH PROTONAMI VYSOKIKH ENERGI].

V. V. Shikhodyrov and B. I. Lebedev.

Kosmicheskaiia Biologiia i Meditsina, vol. 2, Sept.-Oct. 1968, p. 8-11. 6 refs. In Russian.

Discussion of experiments in which animals (primarily dogs) were subjected to single and repeated irradiation by protons with energies of 126 and 510 MeV. Single irradiation was administered in doses of 550, 400, and 250 rads, while the total dose of repeated irradiation (usually every second day for 2, 5, and 7 weeks) was 690, 650, 450, and 350 rad. Most of the animals perished two or three weeks after completion of the experiment. The surviving animals were examined several months later. Photographs showing the radiation-induced changes in the lymph node, stellate ganglion, and the spleen are given and discussed. V. P.

A69-16510 #

CHANGES IN THE RADIATION EFFECT ON PLANTS UNDER THE INFLUENCE OF SPACE FLIGHT FACTORS [K VOPROSU OB IZMENENII RADIATIONNOGO EFFEKTA U RASTENII POD VLIANIEM FAKTOROV KOSMICHESKOGO POLETA].

D. F. Gertsuskii, I. V. Nikitina, L. V. Alekseenko, and I. S. Skukina.

Kosmicheskaiia Biologiia i Meditsina, vol. 2, Sept.-Oct. 1968, p. 12-14. 10 refs. In Russian.

Experimental investigation of the influence of space flight factors on onion bulbs previously irradiated by ionizing radiation in doses of 250 and 500 rads. It is found that space flight factors and ionizing radiation alone tend to increase the vitamin C content in the onion tops, whereas the combined effect of space flight factors and ionizing radiation reduces the ascorbic acid content. V. P.

A69-16511 #

RADIOSENSITIVITY OF POTATOES TO GAMMA-RAY AND PROTON IRRADIATION APPLIED TO WHOLE TUBERS AND TO ISOLATED EYES BEFORE PLANTING [RADIOCHUVSTVITEL'NOST' KARTOFELIA K γ -LUCHAM I PROTONAM PRI PREDPOSADOCHNOM OBLUCHENII TSELYKH KLUBNEI I IZOLIROVANNYKH GLAZKOV].

Iu. I. Shaidorov, D. F. Gertsuskii, I. S. Skukina, L. V. Alekseenko, and I. V. Nikitina.

Kosmicheskaiia Biologiia i Meditsina, vol. 2, Sept.-Oct. 1968, p. 14-19. 19 refs. In Russian.

Investigation of the influence of the exposure of potato tubers and eyes to ^{60}Co gamma-rays and 620-MeV protons on the growth and development of potato plants. It is found that both types of radiation have a pronounced inhibiting effect on the plants, and that the effect of proton irradiation is greater than that of gamma rays. Irradiation of the tubers inhibits the plant growth and development to a greater extent than irradiation of the eyes. V. P.

A69-16512 #

INFLUENCE OF HIGH OXYGEN CONCENTRATIONS ON ANIMAL ORGANISMS [VLIANIE POVYSHENNYKH KONTSENTRATSII KISLORODA NA ORGANIZM ZHIVOTNYKH].

N. A. Agadzhanian, M. S. Gaevskaia, V. G. Galaktionov, V. M. Zemskov, I. R. Kalinichenko, G. D. Kniazeva, M. F. Kolesnikova, I. V. Konstantinova, K. A. Lebedev, A. V. Sergienko, L. M. Slez, and V. P. Smirnov.

Kosmicheskaiia Biologiia i Meditsina, vol. 2, Sept.-Oct. 1968, p. 19-24. 6 refs. In Russian.

Experimental investigation of the effect of an artificial atmosphere (53% O_2 at 760 mm Hg) on the external respiration, pulmonary gas exchange, tolerance to acute hypoxia, oxidative phosphorylation in brain tissues, the immunological indices, and the morphological structure of the internal organs of white rats and mice. Certain changes observed in these parameters are examined. The functional indices were found to return to their normal state during the after-effect period. V. P.

A69-16513 #

HISTOLOGICAL INVESTIGATION OF THE INTERNAL ORGANS OF MICE EXPOSED FOR 20 DAYS TO AN ATMOSPHERE WITH A HIGH OXYGEN CONTENT [GISTOLOGICHESKOE ISSLEDOVANIE VNUTRENNYKH ORGANOV MYSHEL, NAKHODIVSHIKHSIA 20 DNEI V ATMOSFERE S POVYSHENNYM SODERZHANIEM KISLORODA].

V. V. Portugalov, G. N. Durnova, A. S. Kaplanskii, and F. V. Babchinskii.

Kosmicheskaiia Biologiia i Meditsina, vol. 2, Sept.-Oct. 1968, p. 24-27. 13 refs. In Russian.

Application of histological methods to a study of the lungs, heart, liver, kidneys, spleen, testes, thymus, and inguinal lymph nodes of mice exposed for 20 days to an atmosphere having a total pressure of 760 mm Hg and an oxygen partial pressure of 304 mm Hg. The changes in the lungs, heart, kidneys, and tests were negligible. A moderate proliferation of the histiocyte and myeloid elements around the vessels was observed in the liver, while an increased lysis of the lymphocytes was detected in the lymphoid organs. In general, the results indicate exposure to a high-oxygen atmosphere produces no noticeable lesions of the parenchyma of vital internal organs but introduces certain changes in the lymphoid tissue. V. P.

A69-16514 #

ELECTRON MICROSCOPIC CHANGES IN THE LUNGS OF RATS AFTER REPEATED EXPOSURE TO PURE OXYGEN [ELEKTRONNOMIKROSKOPICHESKIE IZMENENIIA V LEGKIKH U KRYS POSLE POVTORNOGO VOZDEISTVIA CHISTOGO KISLORODA].

V. N. Vinogradov and F. V. Babchinskii.

Kosmicheskaiia Biologiia i Meditsina, vol. 2, Sept.-Oct. 1968, p. 27-30. 14 refs. In Russian.

Electron microscope investigation of the lungs of rats exposed to pure oxygen eight times for 24 hr every two or three days and five times for 48 hr every five days. It was found that the resistance to pure oxygen of the "48-hr" animals increases appreciably over that of the "24-hr" animals. It is seen that the tolerance to toxic oxygen effects develops not as a result of physiological adaptation but rather by pathological reconstruction of the blood-air barrier, involving a thickening of the septal spaces of endothelial and alveolar cells and a narrowing of the capillary space, thus impairing oxygen diffusion. V. P.

A69-16515 #

INFLUENCE OF HIGH OXYGEN CONCENTRATIONS AT NORMAL PRESSURE ON THE EVOKED POTENTIAL OF THE CORTICAL OPTIC ZONE AND SOME SUBCORTICAL ZONES [VLIANIE VYSOKIKH KONTSENTRATSII KISLORODA PRI NORMAL'NOM DAVLENI NA VYZVANNYI POTENTSIAL ZRITEL'NOI OBLASTI KORY I NEKOTORYKH OBLASTEI PODKORKI].
L. V. Kaliuzhnyi.

Kosmicheskaiia Biologiia i Meditsina, vol. 2, Sept.-Oct. 1968, p. 31-38. 14 refs. In Russian.

Discussion of experiments in which unanesthetized rabbits exposed to atmospheres containing 96 and 53% O₂ at atmospheric pressure exhibited a three-phase change in the evoked potential to a light flash. For 96% O₂ atmospheres, the first phase is characterized by an increase in the secondary discharge of the evoked potential, with a maximum during the second day (and during the third to fifth day in the case of 54% O₂); in the second phase, the secondary discharge gives way to unstable fluctuations, while the third phase is characterized by the disappearance of the evoked potential, accompanied by a gradual increase in the excitation of the nonspecific subcortical system. Animals exposed to 53% O₂ atmospheres showed: (1) an increase in the secondary discharge, (2) elongation of the slow negative surface wave, and (3) a decrease in the excitation level of the brain structures. V. P.

A69-16516 #

CHANGES IN THE INTESTINAL MICROFLORA OF RATS CAUSED BY PROTEIN-FREE DIETS [IZMENENIYA KISHECHNOI MIKROFLORY PRI BEZBELKOVOM PITANII KRYS].

N. N. Liz'ko, V. M. Shilov, V. I. Fofanov, and N. S. Kliushkina.
Kosmicheskaiia Biologiia i Meditsina, vol. 2, Sept.-Oct. 1968, p. 38-41. 18 refs. In Russian.

Discussion of experiments in which rats were kept on a protein-free diet for 23 days. Changes in the intestinal microflora of the animals were detected, which were characterized primarily by a decrease in lactic acid bacteria and an increase in spore-forming bacteria. The microflora composition returned to normal after the animals were put on protein (18%) diets. V. P.

A69-16517 #

THE PART PLAYED BY THE THYROID GLAND IN CHANGING THE RESISTANCE AND MYOGLOBIN CONTENT OF SKELETAL MUSCLES OF "FLAT-LAND" AND HIGH-ALTITUDE-ACCLIMATIZED WHITE RATS [ROL' SHCHITOVIDNOI ZHELEZY V IZMENENII REZISTENTNOSTI SKELETNYKH MYSHTS I SODERZHANIYA V NIKH MIOGLOBINA U "RAVNINNYKH" I AKKLIMATIZIROVANNYKH K VYSOKOGOR'IU BELYKH KRYS].

A. B. Botombekova.
Kosmicheskaiia Biologiia i Meditsina, vol. 2, Sept.-Oct. 1968, p. 42-45. 10 refs. In Russian.

Investigation of the part played by the thyroid gland in the process of adaptation (at the tissue level) of rats to high altitude (3200 m) conditions. The resistance of skeletal muscles (in vitro experiments), their myoglobin content, and the red blood picture were studied. Thyroidectomy is shown to increase the resistance of skeletal muscles, as a passive reaction due to a reduced basal metabolism. The adaptation of the test animals involved an increase in the resistance of skeletal muscles, due to an increase in the myoglobin content. Thyroidectomy, therefore, does not impair the acclimatization process at the tissue and cell level. The changes in the blood picture of thyroidectomized rats were similar to those described in the literature. V. P.

A69-16518 #

DYNAMICS OF FORMANTS IN THE SPECTRUM OF AUDIBLE SPEECH AS AN OBJECTIVE INDICATOR IN THE DISCRIMINATION OF POSITIVE AND NEGATIVE EMOTIONS [DINAMIKA FORMANT V SPEKTR E SLYSHIMOI RECHI KAK OB'EKTIVNYI POKAZATEL' RAZLICHENIYA POLOZHITEL'NYKH I OTRITSATEL'NYKH EMOTSII].

A. G. Tishchenko.
Kosmicheskaiia Biologiia i Meditsina, vol. 2, Sept.-Oct. 1968, p. 46-51. 17 refs. In Russian.

Analysis of the recorded vocal reactions of a group of 23 engineering students before and after their first parachute jump (and while preparing for it). The analysis was made in an attempt to evaluate the vocal action of humans as a characteristic of positive and negative emotions. The formation and acoustic spectra of vowels are analyzed for a total of 252 common words including "good," "yes," and "no." The results are compared with words spoken by actors expressing various emotions. V. Z.

A69-16519 #

CHANGES IN CARDIAC ACTIVITY DURING PROLONGED HYPOKINESIS (ACCORDING TO VECTOR ANALYSIS DATA) [IZMENE-NIYA SERDECHNOI DEIATEL'NOSTI PRI DLITEL'NOI GIPOKINEZII (PO DANNYM VEKTORNOGO ANALIZA)].

B. A. Korolev.
Kosmicheskaiia Biologiia i Meditsina, vol. 2, Sept.-Oct. 1968, p. 52-55. 12 refs. In Russian.

Results of a vectorometric study of EKGs in a group of 16 healthy subjects, 20 to 25 years old, during 70 days of hypokinesia with or without physical exercises and medication. An increase in the QRS and T vectors and in the ventricular gradient was observed in all the subjects. Changes in the water-salt metabolism are also indicated. V. Z.

A69-16520 #

EFFECT OF PROLONGED HYPOKINESIS ON THE BRAIN BIOPOTENTIALS OF HEALTHY MEN [VLIANIE DLITEL'NOI GIPOKINEZII NA BIOPOTENTIALY GOLOVNOGO MOZGA ZDOROVYKH LIUDEI].

B. N. Petukhov and Iu. N. Purakhin.
Kosmicheskaiia Biologiia i Meditsina, vol. 2, Sept.-Oct. 1968, p. 56-61. 16 refs. In Russian.

Study of the effect of 62 days of bed rest with or without physical exercises on the bioelectrical activity of the cortex in a group of six healthy male subjects. The reactions of EEGs of the subjects to acoustic signals followed by light signals are investigated. Irregularities noted in the functioning of the central nervous system from the twentieth to the thirtieth day of the experiment are discussed. V. Z.

A69-16521 #

APPLICATION OF DOSED CORIOLIS ACCELERATIONS IN VESTIBULOMETRY [PRIMENENIE DOZIROVANNYKH USKORENII KORIOLISA V VESTIBULOMETRII].

R. R. Galle and L. N. Gavrilova.
Kosmicheskaiia Biologiia i Meditsina, vol. 2, Sept.-Oct. 1968, p. 61-66. 29 refs. In Russian.

Description of a technique for applying measured doses of Coriolis accelerations in vestibulometric tests of subjects seated in an inclined position in a rotating chair. Vestibulometric tests lasting up to 40 min were performed by this technique on a group of 20 healthy male subjects. The vestibular curves obtained are discussed. V. Z.

A69-16522 #

BIOMECHANICS OF THE RESPIRATORY ACT UNDER LONG-TERM ACCELERATIONS - AN X-RAY STUDY [BIOMEKHANIKA DYKHATEL'NOGO AKTA PRI DLITEL'NO DEISTVUIUSHCHIKH USKORENIIAKH - RENTGENOLOGICHESKOE ISSLEDOVANIE].

K. I. Murakhovskii.
Kosmicheskaiia Biologiia i Meditsina, vol. 2, Sept.-Oct. 1968, p. 67-73. 17 refs. In Russian.

X-ray study of the biomechanics of the respiratory act during a total of 107 experiments on a group of 30 men subjected to pelvis-to-head accelerations of up to 8 g and back-to-chest accelerations of up to 12 g for periods of up to 5 min. The level and direction of the respiratory amplitude of the ribs and diaphragm and the displacements in the pulmonary picture were X-rayed prior to, during, and after experiments. The results obtained from this study are discussed. V. Z.

A69-16523 #

APPLICATION OF HIGH TEMPERATURES AS A FUNCTIONAL-DIAGNOSTIC TEST [K VOPROSU O PRIMENENII VYSOKIKH TEMPERATUR V KACHESTVE FUNKSIONAL'NO-DIAGNOSTICHESKOI PROBY].

A. N. Azhaev, V. D. Vasiuta, N. A. Lapshina, and T. A. Orlova. *Kosmicheskaja Biologija i Meditsina*, vol. 2, Sept.-Oct. 1968, p. 73-77. In Russian.

Description of a series of 118 heat-chamber tests in which a group of 23 naked subjects were exposed to temperatures of 40, 50, 60, 70, and 80°C and relative humidities ranging from 12 to 29% for periods of up to 1 hr. The performance of the cardiovascular system and heart, the heat exchange of the body, and the chemical composition of the blood and urine of the subjects were investigated. A temperature of 60°C was found to yield the most indicative changes in physiological functions when testing the high-temperature endurance of man. V. Z.

A69-16524 #

AUTOMATIC PROCESSING OF ELECTROCARDIOGRAMS RECORDED DURING SPACE FLIGHT [AVTOMATICHESKAIA OBRABOTKA ELEKTROKARDIOGRAMMY, REGISTRIRUEMOI VO VREMIA KOSMICHESKOGO POLETA].

V. A. Krylov, A. S. Demidov, and A. D. Egorov. *Kosmicheskaja Biologija i Meditsina*, vol. 2, Sept.-Oct. 1968, p. 77-82. 10 refs. In Russian.

Description of a computer technique for automatically processing the EKGs of astronauts during space flight. A set of certain EKG reference types, each coded as a combination of digits, is used as the basis for this technique, which is called extremal formalization. Examples of data transmission by this technique are given. V. Z.

A69-16525 #

BIOCHEMICAL INDICATORS OF THE REACTION OF PILOTS TO COMPLEX CONDITIONS OF FLIGHT [BIOKHMICHESKIE POKAZATELI REAKTSII LETCHIKOV NA SLOZHNYE USLOVIA POLETA]. I. G. Dlusskaia, T. A. Orlova, V. A. Ponomarenko, and I. S. Balakhovskii.

Kosmicheskaja Biologija i Meditsina, vol. 2, Sept.-Oct. 1968, p. 83-87. 11 refs. In Russian.

Results of chemical analysis of blood and urine in a group of 36 pilots of various ages and skills after routine flights and flights complicated by unexpected autopilot failures. The presence of sugar, urea, and cholesterol in the blood and 17-oxy corticosteroids in the urine is noted. Increased sugar contents are established in all the pilots after flights with emotional stresses due to autopilot malfunctions. V. Z.

A69-16622

RESULTS OF QUESTIONNAIRE GIVEN TO FLIGHT PERSONNEL CONCERNING THE LIGHTING OF INSTRUMENT PANELS [RESULTATS D'UNE ENQUETE AUPRES DU PERSONNEL NAVIGANT CONCERNANT L'ECLAIRAGE DES TABLEAUX DE BORD].

J. Chevaleraud, J.-C. Hache (Centre Principal d'Expertise Médicale du Personnel Navigant, Paris, France), A. Mercier, and G. Perdriel.

Revue de Médecine Aéronautique et Spatiale, vol. 7, 3rd Quarter, 1968, p. 147-151. In French.

Results of an inquiry into the preferences of both civilian and military pilots regarding instrument panel lighting under various flying conditions. Questionnaires were given the pilots concerning their preference for red or white lighting, the importance of reflection, and the desirable light intensity during taxiing, takeoff, cruising flight, and landing procedures. M. G.

A69-16623

EFFICIENCY OF VISUAL FUNCTIONS AS A FUNCTION OF THE COLOR OF THE INSTRUMENT PANEL LIGHTING [L'EFFICACITE DES FONCTIONS VISUELLES EN FONCTION DE LA COULEUR DE L'ECLAIRAGE DES INSTRUMENTS DE BORD].

J. Chevaleraud (Centre Principal d'Expertise Médicale du Personnel Navigant, Paris, France), A. Mercier, and G. Perdriel.

Revue de Médecine Aéronautique et Spatiale, vol. 7, 3rd Quarter, 1968, p. 152, 153. In French.

Discussion of the respective advantages and disadvantages of various shades of red and white lighting for use on instrument panels. It is suggested that white is better than red for the overall visual comfort whereas red is better than white for peripheral vision.

M. G.

A69-16624

OUR EXPERIENCE WITH ASTHMA IN MILITARY AIR CREWS [NOTRE EXPERIENCE DE L'ASTHME DANS LE PERSONNEL NAVIGANT DES FORCES ARMÉES].

J. Droniou, A. Fabre, R. Pannier, and L. Tabusse (Hôpital Militaire Dominique Larrey, Service de Médecine Aéronautique, Versailles, France).

Revue de Médecine Aéronautique et Spatiale, vol. 7, 3rd Quarter, 1968, p. 155-161. In French.

General discussion of various stresses encountered during flight that might produce asthmatic attacks. Factors such as flight altitude, insufficient ventilation, and psychological insecurity are discussed as possible causes for the onset of asthmatic attacks. M. G.

A69-16625

CEREBRAL CIRCULATION UNDER LONGITUDINAL ACCELERATION [CIRCULATION CEREBRALE SOUS ACCELERATION LONGITUDINALE].

Demange and Salvagnac.

Revue de Médecine Aéronautique et Spatiale, vol. 7, 3rd Quarter, 1968, p. 162-164. In French.

Results of continuous rheoplethysmographic measurements of the behavior of cerebral circulation during classical longitudinal accelerations (tg_z). Subjects were subjected to centrifugal accelerations up to 5 g in less than 10 sec. The rheoplethysmographic measurements showed a larger increase in heart rate than is observable by classical means. M. G.

A69-16626

SIGNIFICANCE OF SIMULTANEOUS DOUBLE RECORDING OF MOUTH PRESSURE AND HEART RATE IN THE FLACK TEST [INTERET D'UNE DOUBLE INSCRIPTION SIMULTANEE DE LA PRESSION BUCCALE ET DU RYTHME CARDIAQUE DANS LE TEST DE FLACK].

P. Harichaux, M. Taupin, J.-P. Denoex (Faculté de Médecine, Amiens, France), and M. Delmaire (Centre Hospitalier, Amiens, France).

Revue de Médecine Aéronautique et Spatiale, vol. 7, 3rd Quarter, 1968, p. 167-170. 20 refs. In French.

Description of a technique for achieving simultaneous double recordings of mouth pressure and heart rate in the Flack test. The recordings are achieved by using a variable-induction electrometer, a mercury manometer as a reference, and a dual-track polygraphic recorder with implanted amplifiers. M. G.

A69-16627

MAGNETIC FIELDS AND BIOLOGY [CHAMPS MAGNETIQUES ET BIOLOGIE].

L. Miro.

Revue de Médecine Aéronautique et Spatiale, vol. 7, 3rd Quarter, 1968, p. 171, 172. In French.

Brief review of neuropsychiatric and physiological experiments made using magnetic fields. The stimulative effect of homogeneous constant magnetic fields on phagocyte activity is noted. The rejection of tumorous grafts by mice subjected to magnetic fields of various strengths is discussed. It is shown that continuous magnetic fields of the order of 100,000 G must be used to appreciably alter the kinetic constants of certain biochemical reactions. M. G.

A69-16628

DIFFICULTIES AND FINDINGS OF A MEDICAL INQUIRY AFTER AN AIRCRAFT ACCIDENT [DIFFICULTES ET ENSEIGNEMENTS D'UNE ENQUETE MEDICALE APRES ACCIDENT AERIEN].

M. Pingannaud, C. Nogues, and D. Didot.

Revue de Médecine Aéronautique et Spatiale, vol. 7, 3rd Quarter, 1968, p. 176-179. In French.

Description of an actual in-flight collision between two aircraft, and discussion of the difficulties of ascertaining explanations for the collision. The procedure followed by the medical board of inquiry for establishing the cause of the collision is described. M. G.

A69-16630

RETINAL LACERATIONS AND DETACHMENT IN JET PILOTS [DECHIRURES RETINIENNES ET DECOLLEMENT CHEZ LES PILOTES DE REACTEUR].

J. L. Gaudin and J. P. Gerhard.

Revue de Médecine Aéronautique et Spatiale, vol. 7, 3rd Quarter, 1968, p. 189, 190. 6 refs. In French.

Discussion of the case histories of two jet pilots suffering retinal damage, and consideration of the pathogenic problems involved in the observation of retinal detachment in jet pilots. Methods for diagnosing retinal detachment and the surgical methods employed in reattaching the retinas are briefly described. M. G.

A69-16631

THE CORNEAL ARC, A WARNING SIGN OF ATHEROMATOSIS IN FLIGHT CREWS [L'ARC CORNEEN SIGNE EVOCATEUR D'ATHEROMATOSE CHEZ LES MEMBRES DU PERSONNEL NAVIGANT].

G. Perdiel, J.-L. Gaudin, J. Chevaleraud, H. Chesne, J. Charrieau, Altmann, and Dubodat (Centre Principal d'Expertise Médicale du Personnel Navigant, Services d'Ophthalmologie and Laboratoires de Chimie, Paris, France).

Revue de Médecine Aéronautique et Spatiale, vol. 7, 3rd Quarter, 1968, p. 191, 192. In French.

Discussion of the clinical observation of a quite dense greyish opacity which occurs in the form of one or two arcs located on the vertical meridian of the cornea, and which may be associated with the onset of atheromatosis. It is suggested that the opacity may be caused by a metabolic imbalance in the ratio of esterified cholesterol to total cholesterol. M. G.

A69-16701

VHF ELECTROMAGNETIC RADIATION FROM RADAR ANTENNAS [AU SUJET DES RAYONNEMENTS ELECTROMAGNETIQUES T. H. F. DES AERIENS-RADARS].

René Joly.

Inter-Electronique, vol. 23, Dec. 1968, p. 9-17. 33 refs. In French.

Discussion of the biological effects of electromagnetic radiation originating from radar equipment. The radiation is of the pulsed type, highly directive, and is either in the form of a fixed beam or a sweep. The thermal effects of radar radiation, including the influence of the quantity of energy absorbed and the influence of radiation wavelength, are examined. The heating effect, which can cause intestinal lesions, is not homogeneous throughout the organism. Absorption for each tissue depends on water and fat content, dielectric properties, and the shape of internal cavities. The radiation can also affect the eyes, certain endocrine glands, and the nervous system. It is recommended that certain standards for maximum allowable radiation should be established. F. R. L.

A69-16707

BIOTELEMETRIC EXAMINATIONS OF THE HEART AND CIRCULATORY SYSTEM OF JET PILOTS DURING FLIGHT TO DETERMINE A NUMBER OF FLIGHT-INDUCED STRESSES [BIOTELEMETRISCHE UNTERSUCHUNGEN DES HERZ-KREISLAUF-SYSTEMS BEI STRAHLFUGZEUGPILOTEN WAHREND DES FLUGES ZUR FESTSTELLUNG DER UNTERSCHIEDLICHEN FLIEGERISCHEN BELASTUNG].

H. Hoffmann, M. Koch, and W. Schmücking (St. Johannes-Hospital, Medizinische Klinik, Dortmund; Bonn, Universität, Medizinische Universitätsklinik, Bonn, West Germany).

Zentralblatt für Verkehrs-Medizin, Verkehrs-Psychologie, Luft- und Raumfahrt-Medizin, vol. 14, Dec. 1968, p. 193-214. 58 refs. In German.

Results of in-flight examination of 41 pilots on 41 flights of various categories (night, low-level, instrument, gunnery, and formation) to measure circulatory stress leading to pilot failure. A telemetric system is described, which gives continuous readings from three EKG electrodes, as well as continuous EEG and pulse

and respiration rate readings to a ground station for interpretation. These were correlated with flight data on speed, altitude and g load, and with running descriptions of the flight conditions by the pilots. The data are broken down according to flight type, average age of pilot, pilot's flying experience and position in the plane, as well as the position of the plane itself at a given moment. It is noted that the most significant increases in the medical parameters (heartbeat, pulse, respiration) were recorded during takeoff and landing, with the highest readings shortly before final approach. A uniform rise in pulse rate was noted for all types of flight and pilot condition during g load. It is concluded that the responsibility factor has a measurably higher stress-inducing effect on the pilot's circulatory system than the life-risk factor. The system used is held to be more reliable in measuring pilot fitness than techniques in current use. B. H.

A69-16801 *

SPACE CLINICAL MEDICINE.

D. E. Busby (Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.).

Research supported by NASA, Contract No. NASr-115. Dordrecht, D. Reidel Publishing Co., 1968. 287 p. 1178 refs. \$12.60.

A comprehensive monograph laying the initial groundwork for space clinical medicine by considering the characteristics and management of possible medical problems arising from hazards of space operations is offered to both active and inactive physicians, as well as to nonmedical readers, such as design engineers and operations analysts. The monograph is oriented to interplanetary missions of the future, when diagnostic and treatment facilities, and medically trained personnel will be available on spacecraft to care for sickness and injury in space. Medical problems arising from decompression, thermal stresses, particulate contaminants in the spacecraft cabin environment, weightless effects on bone metabolism and the cardiovascular system, ionizing radiation, meteoroid penetration, mechanical forces, and elevated atmospheric carbon dioxide are discussed in depth. General aspects of the practice of medicine in space are examined, and views are presented on the level of medical competence required on future spacecraft. Research areas which will contribute to the field of space clinical medicine are identified throughout the book, and a substantial bibliography is provided for workers in this field. M. M.

A69-16952

SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, ANNUAL NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 6TH, SAN DIEGO, CALIF., OCTOBER 1-3, 1968, PROCEEDINGS.

San Diego, Calif., Survival and Flight Equipment Association, 1968. 177 p. \$10.00.

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PSYCHOPHYSIOLOGIC FACTORS IN USAF AIRCRAFT MISHAPS INVOLVING GROUND EGRESS. V. J. Ferrari, Jr. and R. H. Shannon (USAF, Norton AFB, Calif.), p. B35-B48. [See A69-16959 06-05]

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CHANGING CONCEPTS IN PHYSIOLOGICAL TRAINING AS RELATED TO SURVIVAL. W. A. Staub (Federal Aviation Administration, Oklahoma City, Okla.), p. C35-C40. 8 refs. [See A69-16965 06-05]

A69-16953

PHYSIOLOGICAL APPROACH TO THE TEST AND EVALUATION OF AVIATION SURVIVAL EQUIPMENT. Frank J. Formeller (U.S. Navy, Naval Aerospace Recovery Facility, El Centro, Calif.).

IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, ANNUAL NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 6TH, SAN DIEGO, CALIF., OCTOBER 1-3, 1968, PROCEEDINGS. [A69-16952 06-05]
San Diego, Calif., Survival and Flight Equipment Association, 1968, p. A49-A59. 8 refs.

Description of the role of the experimentally orientated aviation physiologist in the multidisciplinary evaluation of aviation survival equipment. Since the work of a physiologist is the studying of the function and interaction of the different components of living organisms, his training is applicable to the study of man during extreme conditions, such as escape from a burning aircraft. Survival equipment for this paper is defined as any piece of ware (hard or soft), which is meant to help sustain the life of aviation-associated personnel during both the normal operating conditions of the aircraft and the emergencies which may arise. Examples are given of data collection and analysis in the area of environmental clothing and cockpit comfort/escape envelopes. Possible recommendations for the greater utilization of physiologists in a team concept are suggested.

(Author)

A69-16954

RAIN REPELLENT SYSTEM PRESENTATION. Arnold P. Dawkins (Pacific Airmotive Corp., Aircraft and Engineering Div., Burbank, Calif.).
IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, ANNUAL NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 6TH, SAN DIEGO, CALIF., OCTOBER 1-3, 1968, PROCEEDINGS. [A69-16952 06-05]
San Diego, Calif., Survival and Flight Equipment Association, 1968, p. A61-A66.

Discussion of a recently developed nonwetting agent which provides a transparent water repellent film on the windshield surface of an aircraft during rain. This water-repelling agent can be applied as needed during flights and, when properly applied, provides a clarity of vision superior to that of either wiper or pneumatic systems. Applied in small quantities to the base of the glass area, it spreads over the glass surface by the action of the slipstream and water flow, and forms a water-repellent film. The system obviates the tedious ground maintenance requirements of the early repellents and provides the means for rejuvenation in flight of the repellent film as it loses effectiveness due to the abrading effect of the air, water, or ice. P. v. T.

A69-16955

AUTOMATIC INFLATORS. Leo K. Miller (Jay-El Products, Inc., Gardena, Calif.).
IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, ANNUAL NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 6TH, SAN DIEGO, CALIF., OCTOBER 1-3, 1968, PROCEEDINGS. [A69-16952 06-05]
San Diego, Calif., Survival and Flight Equipment Association, 1968, p. A67-A71.

Description of an automatic inflator designed to inflate all types of life jackets or survival gear in emergencies. This device, when submerged in salt or fresh water, will give automatic actuation in less than two seconds. The inflator must be submerged before actuation takes place. Because of this, humidity and rain effects will not cause premature actuation. P. v. T.

A69-16956

DON'T GET CAUGHT - TOO LOW, TOO SLOW, TOO LATE. A. R. Pumper (USAF, Air Force Hospital, Personal Equipment Mobile Training Team, Wiesbaden AFB, West Germany).
IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, ANNUAL NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 6TH, SAN DIEGO, CALIF., OCTOBER 1-3, 1968, PROCEEDINGS. [A69-16952 06-05]
San Diego, Calif., Survival and Flight Equipment Association, 1968, p. B1-B5.

Discussion of the obvious resistance of crewmembers to eject from an aircraft in trouble, in spite of the availability of newer and advanced systems. Through research by various agencies, three underlying reasons have come to light as strong possibilities for the continued fatal ejection rate; they are: hesitation, confusion, and fear of criticism. Crewmembers are warned not to be too low, too slow, and too late for ejection when in trouble. P. v. T.

A69-16957

SCID-OPERATED AIRCRAFT SEAT EJECTION SYSTEMS. Robert C. Allen and Robert M. Lawrence (Teledyne, Inc., Explosive Products Div., Hollister, Calif.).
IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, ANNUAL NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 6TH, SAN DIEGO, CALIF., OCTOBER 1-3, 1968, PROCEEDINGS. [A69-16952 06-05]
San Diego, Calif., Survival and Flight Equipment Association, 1968, p. B7-B16.

Description of a typical SCID (small column insulated delay) aircraft seat ejection system with an illustration of the weight saving which can be accomplished by using a SCID distribution system. The SCID system consists essentially of replacing all high-pressure tubing, initiators, valves, manifolds, and fittings with SCID components, yet retaining and retrofitting with previously qualified end-item devices such as an M7 Thruster for canopy jettison. P. v. T.

A69-16958

I'VE SUCCESSFULLY EJECTED OVER WATER - WHAT'S NEXT? William W. Gilbert (USAF, Air University, Aerospace Studies Institute, Arctic, Desert, Tropic Information Center, Maxwell AFB, Ala.).

A69-16959

IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, ANNUAL NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 6TH, SAN DIEGO, CALIF., OCTOBER 1-3, 1968, PROCEEDINGS. [A69-16952 06-05]
San Diego, Calif., Survival and Flight Equipment Association, 1968, p. B17-B33.

Discussion of the problems facing an aircrew member after successful ejection over water and boarding the life raft. In the event of no immediate rescue, life may soon be endangered due to the inclemencies of the water, the open sea, and the lack of means for physical survival. Survival is entirely dependent on the contents of the survival pack and on the proper deployment of the survival gear. Of these, the flotation equipment, signaling devices, flares, and the signal mirror are discussed in some detail. The physiological aspects may be listed as drinking water, food, injury and pain, seasickness, fatigue, and sleep deprivation. An arbitrarily selected list of psychological aspects may be fear, anxiety, boredom, loneliness, and morale.

P. v. T.

A69-16959 #

PSYCHOPHYSIOLOGIC FACTORS IN USAF AIRCRAFT MISHAPS INVOLVING GROUND EGRESS.

Victor J. Ferrari, Jr. and Robert H. Shannon (USAF, Life Sciences Group, Norton AFB, Calif.).

IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, ANNUAL NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 6TH, SAN DIEGO, CALIF., OCTOBER 1-3, 1968, PROCEEDINGS. [A69-16952 06-05]
San Diego, Calif., Survival and Flight Equipment Association, 1968, p. B35-B48.

Analysis of those psychophysiological factors which affect aircrews in the emergency ground egress situation. In order to evaluate ground egress difficulties, the following factors are investigated: aircraft model, phase of flight, occurrence of fire, personnel injury data, psychological reactions of crew members, and effect of training on egress performance. It is shown that (1) man's performance capability deteriorates with increasing psychic stress; (2) there is a definite correlation between performance decrement and injury; (3) there is a definite relation between human behavior patterns in an emergency ground egress situation and the unique problems of egress training; (4) man's psychophysiological capability to perform in extremely hostile environments must be considered the most important parameter in egress system design; (5) the chances of egress difficulties increase dramatically with an increase in the decisions and actions which a pilot must make to effect a successful emergency egress; and (6) egress system R&D must minimize the options and actions required for emergency egress.

P. v. T.

A69-16960 #

USAF EJECTION EXPERIENCE IN THE COMBAT ENVIRONMENT - 1 JAN 1967-30 JUN 1968.

Robert H. Shannon and Victor J. Ferrari, Jr. (USAF, Life Sciences Group, Norton AFB, Calif.).

IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, ANNUAL NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 6TH, SAN DIEGO, CALIF., OCTOBER 1-3, 1968, PROCEEDINGS. [A69-16952 06-05]
San Diego, Calif., Survival and Flight Equipment Association, 1968, p. B49-B55.

Clinical review and comparative analysis of available combat ejection data and noncombat ejection experience. It is apparent that great differences exist between the conditions of combat and noncombat ejection experience. Combat ejections are highly successful, and the primary reason for this is that crew members do not delay the ejection decision. The reaction to a hit by hostile fire is rapid and positive. The pilot does allow ample time for the completion of the ejection sequence.

P. v. T.

A69-16961 #

THE LAST RESORT.

Willie Hammer (Walter V. Sterling, Inc., Claremont, Calif.).

IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, ANNUAL NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 6TH, SAN DIEGO, CALIF., OCTOBER 1-3, 1968, PROCEEDINGS. [A69-16952 06-05]
San Diego, Calif., Survival and Flight Equipment Association, 1968, p. C1-C15.

Discussion of preferable methods of accident prevention, according to priorities, indicating how maximal safety can best be achieved through various techniques of accident prevention and damage control. It is believed that more reliance should be placed on other methods of accident prevention and damage containment, rather than on use of emergency equipment. Escape, rescue, and emergency equipment should be used only for backup purposes. Such equipment must be subjected to the most stringent mishap prevention analyses and designs to prevent secondary failures and accidents.

P. v. T.

A69-16962 #

HAND OPERATED VISUAL SIGNALING DEVICES.

D. C. Balch (Dela Enterprises, Inc., Escondido, Calif.).

IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, ANNUAL NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 6TH, SAN DIEGO, CALIF., OCTOBER 1-3, 1968, PROCEEDINGS. [A69-16952 06-05]
San Diego, Calif., Survival and Flight Equipment Association, 1968, p. C17-C24.

Analysis of the conclusions of the Visual Signaling Devices Panel, a portion of the USAF-Industry Life Support Conference, that convened at Las Vegas in September 1967, and its recommendations to the pyrotechnic industry. It is concluded that Mini-Signals and the cartridge-load aerial signals offer maximum flexibility to the aircrewman, and are compatible with his clothing and his environs. They may all be operated by one hand to give a signal commensurate with the fliers' needs, and they offer reliability in excess of 97%.

P. v. T.

A69-16963 #

SAR-ASSIST "SEARCHMETER."

Gloria W. Heath (Sar-Assist, Inc., Greenwich, Conn.).

IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, ANNUAL NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 6TH, SAN DIEGO, CALIF., OCTOBER 1-3, 1968, PROCEEDINGS. [A69-16952 06-05]
San Diego, Calif., Survival and Flight Equipment Association, 1968, p. C25-C30. 5 refs.

Description of the Searchmeter, which enables aircraft that are normally engaged in other flying activity to be quickly fitted to locate an emergency radio beacon signal. With the Searchmeter, the beacon signal generally can be located to within a square mile area in 40 min. A small supply of Searchmeters could serve a number of aircraft available for search missions since it can be used interchangeably on aircraft fitted to receive the meter as they become available to fly search sorties. Entering below the cost level of automatic direction finding equipment, the Searchmeter has been designed to provide an ubiquitous capability for aircraft, neither formally assigned to the search system nor expensively equipped, to give "professional," swift performance in locating the site of the downed aircraft's emergency position indicating radio beacon.

P. v. T.

A69-16964 #

RADAR DETECTOR FOR SURVIVORS.

R. J. Spellmire (Atlantic Research Corp., Alexandria, Va.).

IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, ANNUAL NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 6TH, SAN DIEGO, CALIF., OCTOBER 1-3, 1968, PROCEEDINGS. [A69-16952 06-05]
San Diego, Calif., Survival and Flight Equipment Association, 1968, p. C31-C34.

Description of a small, easy to use, radar detector that has recently been developed completing the radar-radar rescue system. The microwave crystal selected for use as the detector is an inexpensive microwave mixer-detector crystal. The mixer-detector crystals are generally less expensive, have a lower rf impedance, and are less sensitive than the detector crystals. The combination of impedance and sensitivity must be considered as a unit in this case, the reason being that the antenna is attached directly to the crystal, with no matching network between them.

P. v. T.

A69-16965 #

CHANGING CONCEPTS IN PHYSIOLOGICAL TRAINING AS RELATED TO SURVIVAL.

William A. Staub (Federal Aviation Administration, Aeronautical Center, Oklahoma City, Okla.).
 IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, ANNUAL NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 6TH, SAN DIEGO, CALIF., OCTOBER 1-3, 1968, PROCEEDINGS. [A69-16952 06-05]
 San Diego, Calif., Survival and Flight Equipment Association, 1968, p. C35-C40. 8 refs.

Discussion of some of the aspects of modern "survival training. A training program for civilians is being conducted in which the students are motivated to explore all facets of survival, stressing that the proper psychological approach is all important. A minimal survival kit for all cross-country flights is recommended. It is stressed that a calm, confident approach is essential in order to succeed in the business of survival. P. v. T.

A69-17010

HYPODYNAMICS AND HYPOGRAVICS: THE PHYSIOLOGY OF INACTIVITY AND WEIGHTLESSNESS.

Edited by Michael McCally (USAF, Systems Command, Aerospace Medical Research Laboratories, Environmental Medical Div., Wright-Patterson AFB, Ohio).
 New York, Academic Press, Inc., 1968. 319 p.
 \$15.

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PREFACE. M. McCally, p. vii-ix.

GRAVITY AS A BIOLOGICAL DETERMINANT. C. C. Wunder, H. Bengel (Iowa, University, Iowa City, Iowa), and B. Duling (Virginia, University, Charlottesville, Va.), p. 1-69. 127 refs. [See A69-17011 06-04]

METHODS OF SIMULATING WEIGHTLESSNESS. C. C. Wunder, H. Bengel (Iowa, University, Iowa City, Iowa), and B. Duling (Virginia, University, Charlottesville, Va.), p. 71-108. 86 refs. [See A69-17012 06-05]

CELLULAR EFFECTS OF WEIGHTLESSNESS. E. C. Pollard (Pennsylvania State University, University Park, Pa.), p. 109-116. [See A69-17013 06-04]

ENERGY METABOLISM. S. Margen (California, University, Berkeley, Calif.), p. 117-131. 21 refs. [See A69-17014 06-04]

BODY FLUID VOLUME AND RENAL RELATIONSHIPS TO GRAVITY. T. E. Piemme (Pittsburgh, University, Pittsburgh, Pa.), p. 133-161. 121 refs. [See A69-17015 06-04]

CIRCULATORY PROBLEMS IN PROLONGED SPACE FLIGHT. L. E. Lamb (Baylor University, Houston, Tex.), p. 163-179. 40 refs. [See A69-17016 06-04]

THE CLINICAL SPECTRUM OF POSTURAL HYPOTENSION. T. E. Piemme (Pittsburgh, University, Pittsburgh, Pa.), p. 181-186. 15 refs. [See A69-17017 06-04]

MUSCLE AND THE WEIGHTLESSNESS STATE. G. H. Bourne, M. N. Golarz de Bourne, and K. Nandy (Emory University, Atlanta, Ga.), p. 187-212. 34 refs. [See A69-17018 06-04]

BONE. S. J. Birge, Jr. and G. D. Whedon (National Institutes of Health, Bethesda, Md.), p. 213-235. 50 refs. [See A69-17019 06-04]

REDUCED SENSORY INPUT STATES - SENSORY AND PERCEPTUAL DEPRIVATION AND ISOLATION. J. T. Shurley (Oklahoma, University, Oklahoma City, Okla.), p. 237-284. 151 refs. [See A69-17020 06-04]

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A69-17011 *

GRAVITY AS A BIOLOGICAL DETERMINANT.

Charles C. Wunder, Howard Bengel (Iowa, University, Dept. of Physiology and Biophysics, Iowa City, Iowa), and Brian Duling (Virginia, University, College of Medicine, Dept. of Physiology, Charlottesville, Va.).

IN: HYPODYNAMICS AND HYPOGRAVICS: THE PHYSIOLOGY OF INACTIVITY AND WEIGHTLESSNESS.

Edited by Michael McCally.

New York, Academic Press, Inc., 1968, p. 1-69. 127 refs.

Research supported by the University of Iowa, State University of Iowa Foundation, NIH, and NASA.

Discussion of the history and biological influence of the earth's gravitational environment. The physics of gravitational fields and their direct effects are treated, together with the response of biological systems to the inertial environment, escape from the earth's gravity, gravity on other worlds, and artificial gravity. M.M.

A69-17012 *

METHODS OF SIMULATING WEIGHTLESSNESS.

Charles C. Wunder, Howard Bengel (Iowa, University, Dept. of Physiology and Biophysics, Iowa City, Iowa), and Brian Duling (Virginia, University, College of Medicine, Dept. of Physiology, Charlottesville, Va.).

IN: HYPODYNAMICS AND HYPOGRAVICS: THE PHYSIOLOGY OF INACTIVITY AND WEIGHTLESSNESS.

Edited by Michael McCally.

New York, Academic Press, Inc., 1968, p. 71-108. 86 refs.

USAF-supported research; Grant No. NGR-16-001-031.

Brief introduction to the concepts implicit in the various methods of weightlessness simulation. The topics discussed are the mechanics of the biological effects of weightlessness, the simulation of specific anticipated effects, indirect methods involving simulated high gravity, and the concept of the equivalent effect of mechanical acceleration and gravity. M.M.

A69-17013

CELLULAR EFFECTS OF WEIGHTLESSNESS.

E. C. Pollard (Pennsylvania State University, University Park, Pa.).

IN: HYPODYNAMICS AND HYPOGRAVICS: THE PHYSIOLOGY OF INACTIVITY AND WEIGHTLESSNESS.

Edited by Michael McCally.

New York, Academic Press, Inc., 1968, p. 109-116.

Discussion of the types of effects that may be observed on simple cells used as model systems for space studies of weightlessness. These effects are related to the size and complexity of the cell, and simple predictions about the utility of simple cells as model systems are made. It is pointed out that organisms with sizes up to and beyond 100 μ might very well be worthwhile to use as a model for the study of hypogravity effects. M.M.

A69-17014

ENERGY METABOLISM.

Sheldon Margen (California, University, Dept. of Nutritional Sciences, Berkeley, Calif.).

IN: HYPODYNAMICS AND HYPOGRAVICS: THE PHYSIOLOGY OF INACTIVITY AND WEIGHTLESSNESS.

Edited by Michael McCally.

New York, Academic Press, Inc., 1968, p. 117-131. 21 refs.

Discussion of changes in energy metabolism that may occur in a weightless environment. The topics considered are basal and nonbasal energy expenditure, oxygen requirements, trace-gas production, and modification of energy metabolism by zero gravity. It is pointed out that all considerations to date suggest that, in general, the energy expenditure in a zero gravitational field will probably be less than that on earth. Little effect is expected on the basal requirements, but the added increments for activity probably will reduce the overall energy requirements. M.M.

A69-17015

BODY FLUID VOLUME AND RENAL RELATIONSHIPS TO GRAVITY.

Thomas E. Piemme (Pittsburgh, University, School of Medicine, Dept. of Medicine, Pittsburgh, Pa.).

IN: HYPODYNAMICS AND HYPOGRAVICS: THE PHYSIOLOGY OF INACTIVITY AND WEIGHTLESSNESS.

Edited by Michael McCally.

New York, Academic Press, Inc., 1968, p. 133-161. 121 refs.

Discussion of body-fluid volume control and of the relationship of the mechanisms of renal excretion to gravity. An attempt is made to present a comprehensive picture of the renal response to blood-volume shifts that result either from altered orientation within

A69-17016

a gravity field or from the absence of a gravity field. The known and presumed mechanisms of body-fluid volume regulation are discussed, together with the gravity dependence of this homeostasis, and changes that occur in assuming the recumbent position are noted. A review of what is known of responses to the weightless state leads to an examination of the analogy between recumbency and weightlessness. The time course of prolonged exposure to altered gravity states is studied with a view toward the practical implications for long-term space flight. M. M.

A69-17016

CIRCULATORY PROBLEMS IN PROLONGED SPACE FLIGHT.

Lawrence E. Lamb (Baylor University, College of Medicine, Houston, Tex.).

(Aerospace Medicine, vol. 35, May 1964, p. 413-419.)

IN: HYPODYNAMICS AND HYPOGRAVICS: THE PHYSIOLOGY OF INACTIVITY AND WEIGHTLESSNESS.

Edited by Michael McCally.

New York, Academic Press, Inc., 1968, p. 163-179. 40 refs.

[For abstract see issue 14, page 1067, Accession no. A64-19130]

A69-17017

THE CLINICAL SPECTRUM OF POSTURAL HYPOTENSION.

Thomas E. Piemme (Pittsburgh, University, School of Medicine, Dept. of Medicine, Pittsburgh, Pa.).

IN: HYPODYNAMICS AND HYPOGRAVICS: THE PHYSIOLOGY OF INACTIVITY AND WEIGHTLESSNESS.

Edited by Michael McCally.

New York, Academic Press, Inc., 1968, p. 181-186. 15 refs.

Discussion of the circulatory effects of altered gravity states. An attempt is made to place in perspective the spectrum of clinical entities manifested by the failure to adapt to the orthostatic posture. The topics treated are vasodepressor syncope, orthostatic arterial anemia, and idiopathic orthostatic hypotension. The level of interruption of the reflex arc in idiopathic orthostatic hypotension is briefly discussed. It is concluded that abnormal responses to the standing posture are varied in terms of their clinical appearance, as well as in terms of the fundamental underlying pathophysiology. Knowledge of the spectrum is critical to the evaluation of astronauts and of patients who manifest syncope. M. M.

A69-17018 *

MUSCLE AND THE WEIGHTLESSNESS STATE.

Geoffrey H. Bourne, M. Nelly Golarz de Bourne (Emory University, Yerkes Regional Primate Research Center, Atlanta, Ga.), and Kalidas Nandy (Emory University, Dept. of Anatomy, Atlanta, Ga.).

IN: HYPODYNAMICS AND HYPOGRAVICS: THE PHYSIOLOGY OF INACTIVITY AND WEIGHTLESSNESS.

Edited by Michael McCally.

New York, Academic Press, Inc., 1968, p. 187-212. 34 refs.

NIH Grants No. NB-02038; No. FR-00165; Grant No. NGR-11-001-016.

Discussion of the structure and relations of normal muscle, the mechanisms of posture and locomotion, the gravitational forces acting on muscles, and the effects of the weightless state on muscles. It is pointed out that human exposure to periods of weightlessness of up to two weeks has not produced any significant problems, insofar as the gross function of the musculoskeletal system is concerned. No operationally significant effects have been noted. However, evidence of muscular disuse atrophy should be expected and assiduously looked for as flights of longer duration are undertaken. In particular, muscles which have an antigravity function and no other should be carefully examined. M. M.

A69-17019

BONE.

Stanley J. Birge, Jr. and G. Donald Whedon (National Institutes of Health, National Institute of Arthritis and Metabolic Diseases, Bethesda, Md.).

IN: HYPODYNAMICS AND HYPOGRAVICS: THE PHYSIOLOGY OF INACTIVITY AND WEIGHTLESSNESS.

Edited by Michael McCally.

New York, Academic Press, Inc., 1968, p. 213-235. 50 refs.

Brief review of the principal observations presented to date that may assist in understanding the physiological response of the human skeleton to the conditions of hypogravity and hypodynamics to be encountered in future space explorations. It is noted that disuse atrophy of bone has been observed to be clinically associated with varying degrees of immobilization. In addition, experimental animal studies and, particularly, bed-rest studies using normal human volunteer subjects suggest that disuse atrophy may also be an anticipated response of the skeleton to the conditions of hypogravity and hypodynamics of space flights. Although an incomplete simulation of this environment, bed-rest studies have provided a practical and (if properly designed and carefully conducted) a valuable experimental approach to the determination of the skeleton's response to weightlessness. M. M.

A69-17020

REDUCED SENSORY INPUT STATES - SENSORY AND PERCEPTUAL DEPRIVATION AND ISOLATION.

Jay T. Shurley (Oklahoma, University, School of Medicine, Oklahoma City, Okla.).

IN: HYPODYNAMICS AND HYPOGRAVICS: THE PHYSIOLOGY OF INACTIVITY AND WEIGHTLESSNESS.

Edited by Michael McCally.

New York, Academic Press, Inc., 1968, p. 237-284. 151 refs.

General review of the state of scientific knowledge relating to the psychobiology of reduced sensory input states in order to better conceptualize the problems and predict possible effects. It is regarded as reasonable to assume that the brain, as the organ of the mind, behaves in many of its aspects as an information-processing system, which requires a varied and varying continuous input of meaningful information via more than one sensory channel for both its maturation and normal function. The world external to the organism is an integral part of the dynamic information transfer loop required for normal brain and mental operations. M. M.

A69-17035

SPACE EXPLORATION AND BIOLOGICAL SCIENCES [KOSMICHESKIE ISSLEDOVANIA I BIOLOGICHESKIE NAUKI].

O. G. Gizenko.

United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968, Paper 68-95715. 11 p. 10 refs. In Russian.

Review of the biological aspects of space exploration. The problems associated with the development of effective multicomponent biological systems in spaceship cabins are examined from the viewpoint of the achievements of space biotechnology. Particular attention is given to the study of the response of the human organism to artificial environments involved in prolonged space missions, and to the methods now being developed to study this response. V. P.

A69-17036

PROFESSIONAL ACTIVITY OF A COSMONAUT.

Iu. A. Gagarin.

United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968, Paper 68-95716. 25 p. In English and Russian.

Reflections of the world's first cosmonaut on the meaning of space flights for mankind. The basic aspects of professional training of cosmonauts, as well as the mental and physical qualities and the engineering background required by this profession, are considered in general terms. V. Z.

A69-17040

BIOTECHNOLOGICAL PROBLEMS CONCERNING THE HABITABILITY OF SPACECRAFT AND PLANETARY STATIONS [BIOLOGOTEKHNIЧЕСKIE VOPROSY OBITAEMOSTI KOSMICHESKIKH KORABLEI I PLANETNYKH STANTSII].

B. A. Adamovich and Iu. G. Nefedov.

United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968, Paper 68-95778. 17 p. 6 refs. In Russian.

Survey of the various aspects of scientific and experimental research associated with the development of efficient life-support systems suitable for prolonged space missions. The various requirements placed on such a system are reviewed, together with some basic aspects of the development of an effective regeneration cycle. The regeneration coefficients of several representative physico-chemical life-support systems are examined (tabulated), together with the block diagram of an advanced life-support system, and a scheme of the material and information flows. V. P.

A69-17061 #

ADVANCES OF HUMAN PHYSIOLOGY IN CONNECTION WITH SPACE MASTERY [DOSTIZHENIJA FIZIOLOGII CHELOVEKA V SVIAZI S OSVOENIEM KOSMOSA]. V. V. Parin. United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968, Paper 68-95729. 18 p. 11 refs. In Russian.

Outline of the content and purpose of space physiology, a new branch of physiology growing out of space explorations. The main subjects of this science are described as studies of the adaptation of the internal medium of an organism, as well as its physiological and physical activities, to the requirements of a space environment, to maintain a balanced relation with environmental factors by the activity of the cortex. Selected Soviet studies in seismocardiography and electroencephalography are cited. The preeminence of Soviet science in this area is stressed. V. Z.

A69-17084

THERMAL PROBLEMS IN BIOTECHNOLOGY; AMERICAN SOCIETY OF MECHANICAL ENGINEERS, WINTER ANNUAL MEETING, NEW YORK, N. Y., DECEMBER 3, 1968, PROCEEDINGS. New York, American Society of Mechanical Engineers, 1968. 131 p. Members, \$6.00; nonmembers, \$7.50.

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A METHOD FOR THE MEASUREMENT OF THE THERMAL PROPERTIES OF BIOLOGICAL MATERIALS. J. C. Chato (Illinois, University, Urbana, Ill.), p. 16-25. 7 refs. [See A69-17086 06-05]

STUDIES ON THERAPEUTIC HEATING BY ELECTROMAGNETIC ENERGY. A. W. Guy, J. F. Lehmann, J. A. McDougall, and C. C. Sorenson (Washington, University, Seattle, Wash.), p. 26-45.

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PREDICTED AND MEASURED HEAT LOSSES AND THERMAL COMFORT CONDITIONS FOR HUMAN BEINGS. P. O. Fanger (Denmark, Tekniske Højskole, Copenhagen, Denmark), R. G. Nevins, and P. E. McNall (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.), p. 61-81. 25 refs. [See A69-17087 06-05]

CONDUCTION COOLING OF THE HUMAN BODY - A BIOTHERMAL ANALYSIS. H. Buchberg (California, University, Los Angeles, Calif.) and C. B. Harrah (USAF, MOL Systems Office), p. 82-95. 9 refs. [See A69-17088 06-05]

SENSIBLE HEAT TRANSFER IN THE GEMINI AND APOLLO SPACE SUITS. R. M. Drake, Jr., J. E. Funk, and J. B. Moegling (Kentucky, University, Lexington, Ky.), p. 96-112. 18 refs. [See A69-17089 06-05]

THE PREDICTION OF SATISFACTORY THERMAL ENVIRONMENT FOR CHICKEN PRODUCTION. C. W. Bouchillon (Mississippi State University, State College, Miss.), J. W. Deaton, and F. N. Reece (U.S. Department of Agriculture), p. 113-126.

A69-17085

ANALYTICAL DETERMINATION OF CYLINDRICAL SOURCE TEMPERATURE FIELDS AND THEIR RELATION TO THERMAL DIFFUSIVITY OF BRAIN TISSUE.

G. J. Trezek (California, University, Dept. of Mechanical Engineering, Berkeley, Calif.) and T. E. Cooper.

IN: THERMAL PROBLEMS IN BIOTECHNOLOGY; AMERICAN SOCIETY OF MECHANICAL ENGINEERS, WINTER ANNUAL MEETING, NEW YORK, N. Y., DECEMBER 3, 1968, PROCEEDINGS. [A69-17084 06-05]

New York, American Society of Mechanical Engineers, 1968, p. 1-15.

A one-dimensional integral solution for the transient temperature field generated by a cylindrical source of finite radius in an infinite medium is presented. The temperature at any position and time is given for the situation of a time dependent surface temperature which is expressed as an arbitrary polynomial in time. The solution is limited to early times in the transient, or to times corresponding to one-dimensional behavior of the resulting temperature field. The thermal properties of the medium are assumed to be constant. An asymptotic approximation for the combination of Bessel functions appearing in the integrand is also presented. Various numerical calculation schemes for evaluation of the temperature field are discussed. (Author)

A69-17086 *

A METHOD FOR THE MEASUREMENT OF THE THERMAL PROPERTIES OF BIOLOGICAL MATERIALS.

John C. Chato (Illinois, University, Dept. of Mechanical Engineering, Urbana, Ill.).

IN: THERMAL PROBLEMS IN BIOTECHNOLOGY; AMERICAN SOCIETY OF MECHANICAL ENGINEERS, WINTER ANNUAL MEETING, NEW YORK, N. Y., DECEMBER 3, 1968, PROCEEDINGS. [A69-17084 06-05]

New York, American Society of Mechanical Engineers, 1968, p. 16-25. 7 refs.

Research supported by the University of Illinois; Grant No. NGR-14-005-103.

A transient method was developed for the measurement of thermal properties of biological materials. The materials suitable for this technique must be resilient enough to close tightly around the measuring probe after it has been inserted with the aid of a hypodermic needle. The system requires only a single, small probe and, consequently, the tissue is only minimally disturbed. Once the probe is in place, the duration of a test can be less than two minutes. The theoretical analysis indicated the possibility of measuring the thermal conductivity, the thermal inertia, and the blood flow rate. The experimental study, however, was restricted to the measurement of the thermal conductivity alone within an estimated 20% error. (Author)

A69-17087

PREDICTED AND MEASURED HEAT LOSSES AND THERMAL COMFORT CONDITIONS FOR HUMAN BEINGS.

P. O. Fanger (Denmark, Tekniske Højskole, Copenhagen, Denmark), R. G. Nevins (Kansas State University of Agriculture and Applied Science, College of Engineering, Manhattan, Kan.), and P. E. McNall (Kansas State University of Agriculture and Applied Science, Dept. of Mechanical Engineering, Manhattan, Kan.).

IN: THERMAL PROBLEMS IN BIOTECHNOLOGY; AMERICAN SOCIETY OF MECHANICAL ENGINEERS, WINTER ANNUAL MEETING, NEW YORK, N. Y., DECEMBER 3, 1968, PROCEEDINGS. [A69-17084 06-05]

New York, American Society of Mechanical Engineers, 1968, p. 61-81. 25 refs.

Derivation of an equation to describe thermal comfort conditions for human beings. The equation is based on both theoretical and empirical analyses. The metabolic heat generated by a person is lost mainly by radiation, convection, and evaporation. Some of the variables included in the equation are: the metabolic rate, nude body area, insulation of clothing, and body attitude. The validity of the equation has been checked for various conditions involving different activity levels and dry bulb air temperatures. The agreement between the subjective responses and the equation was found to be good. G. R.

A69-17088

A69-17088

CONDUCTION COOLING OF THE HUMAN BODY - A BIOTHERMAL ANALYSIS.

Harry Buchberg (California, University, Dept. of Engineering, Los Angeles, Calif.) and Cariold B. Harrah (USAF, MOL Systems Office).

IN: THERMAL PROBLEMS IN BIOTECHNOLOGY; AMERICAN SOCIETY OF MECHANICAL ENGINEERS, WINTER ANNUAL MEETING, NEW YORK, N. Y., DECEMBER 3, 1968, PROCEEDINGS. [A69-17084 06-05]

New York, American Society of Mechanical Engineers, 1968, p. 82-95. 9 refs.

Investigation of conduction cooling of the human body as a substitutive thermoregulatory technique. A significant improvement has been made in the analytical bases for predicting coolant-system operating requirements to satisfy body thermoneutrality, taking account of the two-dimensional heat-transfer effects propagated in both the coolant tube and body from the line of contact. The conduction equations, representing the biothermal system as a multilayered slab, were solved by the finite-difference method of successive point overrelaxation. A conductive liquid analog was constructed to determine the shape factor for conduction from a limited skin contact area through the coolant tube wall. Inlet coolant temperature requirements satisfying both the biothermal and coolant tube analyses were determined, and the sensitivity of this model to coolant heat capacity rate and contact area was tested. The analytical results compared well with human calorimetric data, making possible improved parametric design studies and optimization. G. R.

A69-17089 *

SENSIBLE HEAT TRANSFER IN THE GEMINI AND APOLLO SPACE SUITS.

R. M. Drake, Jr., J. E. Funk (Kentucky, University, Dept. of Mechanical Engineering, Lexington, Ky.), and J. B. Moegling (Kentucky, University, Lexington, Ky.).

IN: THERMAL PROBLEMS IN BIOTECHNOLOGY; AMERICAN SOCIETY OF MECHANICAL ENGINEERS, WINTER ANNUAL MEETING, NEW YORK, N. Y., DECEMBER 3, 1968, PROCEEDINGS. [A69-17084 06-05]

New York, American Society of Mechanical Engineers, 1968, p. 96-112. 18 refs.

NASA Contract No. PR-T-37785-6; Contract No. AF 33(615)-3370.

The sensible heat exchange from the Gemini and Apollo pressure suits was experimentally determined in environmental test facilities permitting a wide range in ambient conditions. The data are presented in terms of both surface total and regional heat flux distribution. The overall thermal emissivity was determined for the Gemini pressure suit enabling the isolation of the convective heat exchange. The convective heat exchange data for the Gemini pressure suit are presented in terms of appropriate Nusselt and Reynolds numbers. (Author)

A69-17105 *

IDENTITY BETWEEN THE GROWTH HORMONE DEGRADING ACTIVITY OF THE PITUITARY GLAND AND PLASMIN.

S. Ellis, J. M. Nuenke, and R. E. Grindeland (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.). Endocrinology, vol. 83, Nov. 1968, p. 1029-1042. 63 refs.

Investigation confirming the identity between plasmin and the esterase contaminating the growth hormone. Degradation products have been found in highly purified preparations of growth hormone. The degradation of the growth hormone and its electrophoretic behavior is presumably caused by a trypsin-like peptidase present in pituitary extracts. The effect could be duplicated with human plasmin during the investigations. Several other tests were performed to establish the identity between plasmin and the esterase. G. R.

A69-17208

A PREDICTIVE SCALE OF AIRCRAFT EMERGENCIES.

Lynn V. Rigby and David A. Edelman (Sandia Corp., Sandia Laboratory, Reliability Dept., Albuquerque, N. Mex.).

Human Factors, vol. 10, Oct. 1968, p. 475-482. 14 refs. AEC-supported research.

Description of a paired comparison scale of 32 common aircraft emergencies judged by 27 former pilots and aircrew members. The scale is intended primarily for use in human-error analysis. A new emergency can be incorporated by matching it to one or more points on the scale, or the scale can be transformed to satisfy any new interpretation of the relationship between emergencies and stress. M. M.

A69-17209 *

LEISURE AND RECREATION IN LONG DURATION SPACE MISSIONS.

T. M. Fraser (Waterloo, University, Waterloo, Ontario, Canada). Human Factors, vol. 10, Oct. 1968, p. 483-488. 12 refs. Contract No. NASr-115.

Discussion of the use of leisure time and the provision of recreational facilities during space missions of long duration. It is noted that leisure activities pursued during long-range space missions should not be considered by planners as merely a way of filling in time. Current astronaut-selection procedure tends to favor those whose characteristics are such that they will spontaneously pursue mission-oriented activities during such leisure time as they have, making the most of whatever facilities are available. With provision of an appropriate climate and opportunity, encouragement can be given to furtherance of the creative use of leisure for self-development of the persons involved. It is pointed out that provision should be made for both active recreation, as in hobbies, communal games, and even music making, and for passive enjoyment as in listening to recorded music and radio, watching television and movies, and reading. Provision for exercise programs is also required. M. M.

A69-17211

FIELD DEPENDENCE AND TARGET IDENTIFICATION.

Carl L. Thornton, Gerald V. Barrett, and James A. Davis (Goodyear Aerospace Corp., Akron, Ohio).

Human Factors, vol. 10, Oct. 1968, p. 493-496. 9 refs.

Investigation of target identification through the study of individual differences and their relation to Witkin's concept of perceptual style. Two experiments were conducted using the embedded figures test (EFT) as a measure of perceptual style. Significant correlations between perceptual style and the ability to correctly identify targets in aerial photographs were found. It is noted that it is possible to use this research in connection with problems associated with target identification. Implications in the areas of experimental design, selection, and training are discussed. M. M.

A69-17213

ATTENUATION OF THE VIGILANCE DECREMENT THROUGH STIMULATION IN A SECOND MODALITY.

Josephine M. Randel (Fordham University, Bronx, N. Y.). Human Factors, vol. 10, Oct. 1968, p. 505-511. 18 refs.

The use of discrete, randomly-placed tones to attenuate a decrement in performance in a visual vigilance task was studied. As the measure of vigilance, the descending critical flicker fusion threshold was taken at 15 time intervals throughout the hour watch. Sixty male subjects were assigned to one of the six conditions of the experiment. A regular or irregular pattern of intervals for the presentation of the visual stimuli was combined with one of three sound conditions: (1) a ready signal in the form of a 1000 cps tone lasting 1 sec and indicating the start of a visual signal, (2) tones of the same dimensions randomly-placed and not indicating the presence of a visual signal, and (3) no tones. The results indicated optimum performance for the first condition with the second and third condition following in that order and confirming that the vigilance decrement can be attenuated to a significant degree when random auditory stimulation is provided. No significant difference was found between the two types of visual patterns. (Author)

A69-17214

THE EFFECTS OF STEREOSCOPY ON THE RECOGNITION OF PATTERNS IN VISUAL NOISE.

Henry Giarretto (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Sunnyvale, Calif.).

Human Factors, vol. 10, Oct. 1968, p. 513-521. 22 refs.

Results of a study conducted to determine if "noisy" visual patterns containing binocular disparity cues could be recognized more accurately than similar patterns with no disparity cues. To obtain a quantitative measure of this visual task, three-dimensional patterns were employed based on the metric figures technique developed by Fitts and his colleagues. The test results indicated, as expected, that the ability to recognize visual patterns in noise degraded as the noise level was increased. However, discrimination ability measured with figures containing binocular disparity cues degraded at a significantly lower rate than with figures without disparity cues. (Author)

A69-17215 *

DETECTION TIME TO A POINT SOURCE OF LIGHT APPEARING ON A STAR FIELD BACKGROUND WITH AND WITHOUT A GLARE SOURCE PRESENT.

Richard F. Haines (Michigan State University, East Lansing, Mich.; NASA, Ames Research Center, Moffett Field, Calif.).

Human Factors, vol. 10, Oct. 1968, p. 523-529. 30 refs.

One hundred and twenty seven untrained observers were tested in a planetarium in order to determine how long it takes to detect the onset of a point source of light appearing at different locations within a star field with and without a veiling glare source present. Results indicated that detection time was shortest when test spots were flashed in a totally dark visual environment. Introduction of a simulated star field produced significantly longer detection times as did the introduction of a star field and glare source. These results are related to findings from previous investigations as well as to certain sighting situations performed in the aerospace environment. (Author)

A69-17595

PROBLEMS RELATING TO THE OBJECTIVE EVALUATION OF THE REACTIVITY OF THE ORGANISM.

L. Novák (Československá Akademie Věd, Biofyzikální Ústav, Brno, Czechoslovakia).

IN: INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 18TH, BELGRADE, YUGOSLAVIA, SEPTEMBER 24-30, 1967, PROCEEDINGS. VOLUME 1 - ASTRODYNAMICS, GUIDANCE AND CONTROL, MISCELLANEA. [A69-17560 06-30]

Edited by Michał Łunc.

Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1968, p. 583-587. 7 refs.

Description of a new methodical approach for the objective evaluation of fine changes in the metabolic functions of the organism. The principle of this approach is based on the fact that the value measured in the experimental individual is compared with the value calculated for the biophysical model of the studied function. The biophysical model includes the factors that can influence the value of the given function. In an example involving the adaptation oxygen consumption of rats it is shown how the new method helps to eliminate the influence of ambient temperature upon the result. G. R.

A69-17642

INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 18TH, BELGRADE, YUGOSLAVIA, SEPTEMBER 24-30, 1967, PROCEEDINGS. VOLUME 4 - LIFE IN SPACECRAFT.

Edited by Michał Łunc.

Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1968. 208 p. In English, Russian, and French. Price of four volumes, \$90.

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Kaliuzhnyi, and A. V. Sergienko (Ministerstvo Zdravookhraneniia, Moscow, USSR), p. 1-10. [For abstract see issue 23, page 4352, Accession no. A68-44090]

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ADVANCED PROTECTION SYSTEMS FOR ASTRONAUT EXTRAVEHICULAR ACTIVITY. D. L. Richardson (Arthur D. Little, Inc., Cambridge, Mass.), p. 27-38. 10 refs. [See A69-17643 06-05]

ENERGY EFFICIENCY OF LIFE-SUPPORT SYSTEMS [OB ENERGETIČESKOI EFFEKTIVNOSTI SISTEM ZHIZNEOBESPEČENIJA]. A. B. Rubin (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR), p. 39-43. 5 refs. [See A69-17644 06-05]

SPACE PHYSIOLOGY.

HUMAN PHYSIOPATHOLOGY IN FACE OF RADIATION AND HYBERNATION. M. Nieto (Academia de Ciencias Médicas de Barcelona, Barcelona, Spain), p. 45-47. [See A69-17645 06-04]

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GASTRIC SECRETION IN CATS AFTER INTENSIVE IRRADIATION CONNECTED WITH PREVIOUS AND SIMULTANEOUS HYP- OXIA. J. Kaulbersz, A. Barylak, and T. Radecki (Akademia Medyczna, Kraków, Poland), p. 71-73.

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GENERAL. I - HYPODYNAMIA.

EFFECT OF 62-DAY HYPODYNAMIA ON THE HUMAN ORGANISM [VLIJANIE 62-SUTOCHNOI GIPOKINEZII NA ORGANIZM CHELOVEKA]. T. V. Benevolenskaia, N. M. Boglevskaia, M. M. Korotaev, T. N. Krupina, I. A. Maslov, G. P. Mikhailovskii, T. A. Petrova, K. V. Smirnov, and I. Ia. Iakovleva (Akademiia Nauk SSSR, Moscow, USSR), p. 81-86. [For abstract see issue 23, page 4352, Accession no. A68-44091]

IS THERE A COMMON GEOTROPIC DEPENDENCY IN ORGANISMS? W. Briegleb (Deutsche Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany), p. 87-90.

THE EFFECTIVENESS OF WEIGHTLESS SIMULATORS FOR OBTAINING MAINTAINABILITY CRITERIA FOR SPACE SYSTEMS. C. B. May (NASA, Marshall Space Flight Center, Huntsville, Ala.), p. 91-114. [See A69-17648 06-05]

PSYCHOMOTOR REACTIONS DURING BALLISTIC ROCKET FLIGHTS [REACTIONS PSYCHOMOTRICES AU COURS DE VOLS BALISTIQUES EN FUSEES]. R. Grandpierre and G. Chatelier

(Centre d'Enseignement et de Recherches de Médecine Aéronautique, Paris, France), p. 115-121. [See A69-17649 06-04]

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GENERAL. II.

MANNED SPACE FLIGHT SAFETY. E. B. Konecci (Texas, University, Austin, Tex.), p. 143-160. 19 refs. [See A69-17650 06-05]

HEART RATE RHYTHM AS AN INDICATOR OF HUMAN ORGANISM NEUROENDOCRINE REGULATION IN SPACE FLIGHT [RITM SERDECHNYKH SOKRASHCHENII KAK INDIKATOR SOSTOIANIIA NEIRO-ENDOKRINNOI REGULIATSII ORGANIZNA V USLOVIAKH KOSMICHESKOGO POLETA]. V. V. Parin, R. M. Baevskaia, and G. A. Nikulina (Akademiia Nauk SSSR, Moscow, USSR), p. 161-169. [For abstract see issue 03, page 376, Accession no. A68-13951]

CURRENT STATE AND PROSPECTS OF STUDYING THE HUMAN CARDIOVASCULAR SYSTEM IN SPACE FLIGHTS [SOVREMENNOE SOSTOIANIE I PERSPEKTIVY ISSLEDOVANII SERDECHNO-SOSUDISTOI SISTEMY CHELOVEKA V KOSMICHESKIKH POLETAKH]. I. T. Akulinichev, V. A. Degtiarev, and D. G. Maksimov (Akademiia Nauk SSSR, Moscow, USSR), p. 171-178. [For abstract see issue 23, page 4352, Accession no. A68-44088]

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PSYCHO-PHYSIOLOGICAL CORRELATIONS OF THE SPACE-GRAVITATIONAL PERCEPTIONS IN FLYING PERSONNEL. V. Ceaușu, S. Sigal, and V. Teodorescu (Medical Center for Aviation, Bucarest, Rumania), p. 187-192. [For abstract see issue 23, page 4358, Accession no. A68-44086]

A69-17643

ADVANCED PROTECTION SYSTEMS FOR ASTRONAUT EXTRA-VEHICULAR ACTIVITY.

D. L. Richardson (Arthur D. Little, Inc., Cambridge, Mass.). IN: INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 18TH, BELGRADE, YUGOSLAVIA, SEPTEMBER 24-30, 1967, PROCEEDINGS. VOLUME 4 - LIFE IN SPACECRAFT. [A69-17642 06-05] Edited by Michał Łunc.

Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1968, p. 27-38. 10 refs. Contract No. AF 33(615)-2963.

Discussion of conceptual designs of advanced extravehicular protection systems allowing astronaut activity on or near the surface of orbiting space stations and on planetary surfaces. The systems include (1) a combined hard and soft space garment, (2) portable life-support and thermal-control components which are integrated into the hard torso shell and which can be replenished while the astronaut is outside the space station, and (3) several unique life-support and thermal-control techniques. The concepts proposed are seen to be a substantial extension of state-of-the-art space suits. Well within the scope of current technology, the concepts can be used as a basis for deriving next-generation extravehicular protection garments. V. P.

A69-17644

ENERGY EFFICIENCY OF LIFE-SUPPORT SYSTEMS [OB ENERGETICHESKOI EFFEKTIVNOSTI SISTEM ZHIZNEOBESPECHENIIA].

A. B. Rubin (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR).

IN: INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 18TH, BELGRADE, YUGOSLAVIA, SEPTEMBER 24-30, 1967, PROCEEDINGS. VOLUME 4 - LIFE IN SPACECRAFT. [A69-17642 06-05] Edited by Michał Łunc.

Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1968, p. 39-43. 5 refs. In Russian.

Discussion of space regeneration systems, treating the latter as closed systems in which only the energy (not the mass) is exchanged with the ambient medium, solar radiation being the main energy source for the existence of the systems in space. The total energy and mass transfer in such a system occurs between individual links in a complex ecological chain which is described by nonlinear differential transport equations. An analysis of these equations shows that it is possible to establish a steady oscillatory state in which the various parameters of the transfer equations will vary periodically in time while the transfer constants will not vary. The input of the external energy required for the transport of mass will also remain constant. A study of the biological links can be based on the molecular and submolecular characteristics of some metabolism processes, which provide information on the internal state of an organism. V. P.

A69-17645

HUMAN PHYSIOPATHOLOGY IN FACE OF RADIATION AND HYBERNATION.

M. Nieto (Academia de Ciencias Médicas de Barcelona, Barcelona, Spain).

IN: INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 18TH, BELGRADE, YUGOSLAVIA, SEPTEMBER 24-30, 1967, PROCEEDINGS. VOLUME 4 - LIFE IN SPACECRAFT. [A69-17642 06-05] Edited by Michał Łunc.

Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1968, p. 45-47.

Discussion of the effects of cosmic radiation on the human organism, its symptoms, and pathological effects. The use of beryll as a radiation resisting agent in spacecraft design is examined, together with the protective effect of substrates against ionizing radiation. A discussion of some aspects of using hibernation as a means of solving the time problem of distant space missions is included. V. P.

A69-17646

POSSIBLE MECHANISMS OF THE INFLUENCE OF CHANGING GRAVITATION CONDITIONS ON BLOOD CIRCULATION IN THE BRAIN [VOZMOZHNYE MEKHANIZMY VLIIANIIA USLOVII IZMENNOI GRAVITATSII NA SISTEMU MOZGOVOGO KROVOOBRAŠCHENIIA].

Iu. E. Moskalenko (Akademiia Nauk SSSR, Leningrad, USSR).

IN: INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 18TH, BELGRADE, YUGOSLAVIA, SEPTEMBER 24-30, 1967, PROCEEDINGS. VOLUME 4 - LIFE IN SPACECRAFT. [A69-17642 06-05] Edited by Michał Łunc.

Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1968, p. 59-69. 20 refs. In Russian.

Generalized results of experimental studies of the effects of accelerations on the cerebral blood circulation system, as determined by using tensometric and induction sensors for recording the intracranial pressure, and electroplethysmography for recording the blood content in the cranial cavity. Active and passive intracranial factors and extracranial factors active in the mechanisms influencing the cerebral blood circulation system during acceleration are discussed. The high sensitivity of the intracranial blood circulation system to changes in gravitation conditions is noted. V. Z.

A69-17647

CERTAIN VISUAL FEEDBACK MECHANISMS IN SIMULATED HIGH-ALTITUDE CONDITIONS [CERTAINS MECANISMES OCULAIRES DE FEED BACK DANS LES CONDITIONS DES GRANDES ALTITUDES SIMULEES].

M. P. Popescu, M. Stefan, I. Pintilie, and D. Pavel (Institut Médico-Pharmaceutique de Bucarest; Centre Médical de l'Aviation, Bucharest, Rumania).

IN: INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 18TH, BELGRADE, YUGOSLAVIA, SEPTEMBER 24-30, 1967, PROCEEDINGS. VOLUME 4 - LIFE IN SPACECRAFT. [A69-17642 06-05]

Edited by Michał Łunc.

Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1968, p. 75-80. 38 refs. In French.

Determination of the situations in which ocular fatigue occurs, and of the best ocular adaptation for maintaining homeostasis. The control mechanisms of ocular homeostasis are discussed, together with the results of dynamic control tests of the principal visual feedback mechanisms under simulated high-altitude conditions (18,000 m). The complex physiological mechanisms involved in visual adaptations to high-altitude flight are examined, and their interrelationships are noted. M. G.

A69-17648 *

THE EFFECTIVENESS OF WEIGHTLESS SIMULATORS FOR OBTAINING MAINTAINABILITY CRITERIA FOR SPACE SYSTEMS. C. B. May (NASA, Marshall Space Flight Center, Huntsville, Ala.).

IN: INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 18TH, BELGRADE, YUGOSLAVIA, SEPTEMBER 24-30, 1967, PROCEEDINGS. VOLUME 4 - LIFE IN SPACECRAFT. [A69-17642 06-05]

Edited by Michał Łunc.

Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1968, p. 91-114.

Discussion of criteria relative to the operational problem, equipment design, man/machine interface, and interior and exterior layouts for weightlessness simulators. The nonparametric experimental design approach is used to obtain data relative to the performance of a representative removal and replacement task in the simulators. An air filled G4-c suit pressurized to 3.5 psi is used by three experienced subjects. The task utilized both power and hand tools in a one hand and a one hand plus knee attached mode. Scaling factors (considering the shirt-sleeve environment as the baseline) are presented for shirt-sleeve, pressurized 1-g, aircraft simulator, six-degree-of-freedom machines, and for underwater simulators. M. G.

A69-17649

PSYCHOMOTOR REACTIONS DURING BALLISTIC ROCKET FLIGHTS [REACTIONS PSYCHOMOTRICES AU COURS DE VOLS BALISTIQUES EN FUSEES].

R. Grandpierre and G. Chatelier (Centre d'Enseignement et de Recherches de Médecine Aéronautique, Paris, France).

IN: INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 18TH, BELGRADE, YUGOSLAVIA, SEPTEMBER 24-30, 1967, PROCEEDINGS. VOLUME 4 - LIFE IN SPACECRAFT. [A69-17642 06-05]

Edited by Michał Łunc.

Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1968, p. 115-121. In French.

Description of an experimental study of the reactions at zero gravity of a Wistar rat, a cat, and two Nemestrina monkeys during ballistic rocket flights. The spontaneous electrical activity of the cortex of the Nemestrina monkeys was monitored by means of electrodes planted in the cortex. The ability of the monkeys to perform preconditioned gestures in response to given signals was studied. The animals were rewarded if the appropriate response was achieved in less than 20 sec. Important modifications in the EEG rhythm recorded during flight are discussed, and the corresponding psychomotor reactions are examined. M. G.

A69-17650

MANNED SPACE FLIGHT SAFETY.

E. B. Konecni (Texas, University, Austin, Tex.).

IN: INTERNATIONAL ASTRONAUTICAL FEDERATION, INTERNATIONAL ASTRONAUTICAL CONGRESS, 18TH, BELGRADE, YUGOSLAVIA, SEPTEMBER 24-30, 1967, PROCEEDINGS. VOLUME 4 - LIFE IN SPACECRAFT. [A69-17642 06-05]

Edited by Michał Łunc.

Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1968, p. 143-160. 19 refs.

Consideration of the risks and unavoidable dangers to which astronauts are exposed on the ground, in training exercises, and in actual space missions. Safety philosophy, permissible risks, and space rescue are discussed in general terms. Safety aspects such as reliability concepts, the human factor, operational procedures, emergency systems, communication networks, and man-rating, tests, and simulation are reviewed. Soviet space safety efforts are mentioned. V. Z.

A69-17670

THE USAF AEROSPACE RESEARCH PILOT SCHOOL.

Donald J. Kutyna (USAF, Aerospace Research Pilot School, Performance Section, Edwards AFB, Calif.).

(Society of Experimental Test Pilots, Symposium, 12th, Beverly Hills, Calif., Sept. 26-28, 1968.)

Society of Experimental Test Pilots, Technical Review, vol. 9, no. 2, 1968, p. 189-220.

Description of the scope and capabilities of the aerospace research pilot school (ARPS). The mission of the school is to train experimental test pilots and aerospace research pilots, and to conduct preliminary training for Manned Orbiting Laboratory (MOL) astronauts. The year-long course at ARPS consists of two phases. Phase I (7 months) comprises the experimental test pilot training, while phase II (5 months) encompasses advanced aircraft and space training. Details are given concerning the curriculum and the number of hours devoted to specific subjects. A number of pictures are presented. G. R.

A69-17834 #

COMPARISON OF THE INCIDENCE OF CARDIAC ARRHYTHMIAS DURING +G_x ACCELERATION, TREADMILL EXERCISE AND TILT TABLE TESTING.

James D. Rogge, Jerry F. Meyer, and William K. Brown (USAF, School of Aerospace Medicine, Brooks AFB, Tex.).

Aerospace Medicine, vol. 40, Jan. 1969, p. 1-5. 27 refs.

Discussion of electrocardiographic records from tilt table, treadmill and +G_x acceleration tests made on 61 male subjects who were examined for arrhythmias. The arrhythmia rate during acceleration was significantly greater than during either the tilt table or treadmill tests, and the predominant type of arrhythmia was different for each test. A combination of factors is responsible for the arrhythmias. The contribution of cardiac chamber distension, sympathetic nervous system activity, circulating norepinephrine levels, and respiratory pattern to the production of arrhythmias during the tests is discussed. B. H.

A69-17835

OXYGEN INTAKE AND BODY TEMPERATURE OF BASAL AND SLEEPING ANDEAN NATIVES AT HIGH ALTITUDE.

Richard B. Mazess (Wisconsin, University, Dept. of Anthropology and Dept. of Radiology, Madison, Wis.), Emilio Picon-Reategui (Instituto Nacional de Biología Andina, Lima, Peru), R. Brooke Thomas (Pennsylvania State University, Anthropology Laboratory, University Park, Pa.), and Michael A. Little (Ohio State University, Dept. of Anthropology, Columbus, Ohio).

Aerospace Medicine, vol. 40, Jan. 1969, p. 6-9. 20 refs.

Contract No. DA-49-193-MD-2260.

Measurement of oxygen intake and body temperatures throughout a night of comfortable sleep, and also during rest, in permanent residents at high altitude in the Peruvian Andes (4000 m). The subjects were seven young males of native Quechua Indian background, who were subsisting on the native high carbohydrate diet. Basal

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and average nighttime metabolic heat production, under controlled thermoneutral conditions, were both close to 42 kcal/m²/hr. This confirmed previous reports, and suggested a slightly elevated resting metabolism in altitude residents. (Author)

A69-17836

AUDIOMETER MODIFICATION AND PULSE-TONE TECHNIQUE FOR PURE-TONE THRESHOLD DETERMINATION.

Vernon C. Bragg and Frederick G. Collins (USAF, Aerospace Medical Div., School of Aerospace Medicine, Otolaryngology Branch, Audiology Function Section, Brooks AFB, Tex.). Aerospace Medicine, vol. 40, Jan. 1969, p. 9-11. 8 refs.

Examination of results of ear tests performed by a single-descent pulse-count procedure for threshold determination. The subjects all had normal hearing. Pulse trains were produced by a modified telephone dial which keyed a manual audiometer. Six frequencies were tested. Results were compared with thresholds obtained using a fixed-frequency instrument of the Bekesy type. No significant differences were found between threshold measures made by the two methods. Test-retest by the pulse-count procedure indicated that reliability compared favorably with that of other threshold measures. The test is recommended for use in clinical audiometry, particularly where assurance is needed that the subject hears at least at a given level. It can be used for testing candidates for flight training and for bone-conduction testing to predict results of middle ear surgery. B. H.

A69-17837 *

HEMOLYSIS IN MICE EXPOSED TO VARYING LEVELS OF HYPEROXIA.

J. Richard Goldstein and Charles E. Mengel (Ohio State University, Dept. of Medicine, Div. of Hematology and Oncology, Columbus, Ohio).

Aerospace Medicine, vol. 40, Jan. 1969, p. 12, 13. 9 refs. PHS Grants No. CA-08702; No. CA-05192; Contracts No. Nonr-495(30); No. NAS 9-6910; No. AF 33(615)-67-C-1482.

Study of tocopherol-deficient mice exposed to 100% oxygen at varying pressures. It is shown that hemolysis can occur at pressures below 60 psia provided that the duration of exposure is increased. The time required for hemolysis to occur increases linearly as a log-log function of the decrease in pressure. The data imply that any degree of hyperoxia can cause hemolysis if sustained long enough. (Author)

A69-17838

EFFECTS OF INCREASED GRAVITY ON GASTROESOPHAGEAL REFLUX IN MONKEYS.

David B. Skinner and Thomas F. Camp, Jr. (USAF, School of Aerospace Medicine, Surgery Branch, Brooks AFB, Tex.; Johns Hopkins University, School of Medicine, Dept. of Surgery, Baltimore, Md.).

Aerospace Medicine, vol. 40, Jan. 1969, p. 14-17. 10 refs.

Results of measurements of esophageal sphincter pressures, and quantitation of gastroesophageal reflux to predict competence of the cardia under increased gravitational stress. Ten rhesus monkeys were the subjects. The technique for standardized assessment of gastroesophageal reflux employed in these studies was previously used to evaluate upper gastrointestinal symptoms, chest pain, and hiatal hernia in flying personnel. The results of the centrifuge experiments indicate that the reflux test offers a valid means for predicting competence of the cardia under increased gravitational stress. B. H.

A69-17839

URINARY EXCRETION OF CATECHOLAMINES AND 17-HYDROXY-CORTICOSTEROIDS FOLLOWING +G_x IMPACT IN HUMANS.

Peter Foster and Richard W. Somtag, Jr. (USAF, Aerospace Medical Div., Aeromedical Research Laboratory, Holloman AFB, N. Mex.).

Aerospace Medicine, vol. 40, Jan. 1969, p. 18-23. 39 refs.

Measurement of urinary excretion of vanilmandelic acid (VMA), revealing a possible relationship of impact stress to sympathoadrenal activity. Measurement of norepinephrine, epinephrine, and 17-

hydroxycorticosteroid in urine allows more precise analysis of sympathoadrenal function during and after impact than VMA. Comparison of sham impact and actual impact data reveal that epinephrine is probably the mediator of the increased sympathetic activity associated with impact and that the threatened or actual exposure of a human to impact is more of a psychological than a physical stress. (Author)

A69-17840

MATHEMATICAL MODEL OF SKIN EXPOSED TO THERMAL RADIATION.

John A. Weaver and Alice M. Stoll (U.S. Naval Material Command, Naval Air Development Center, Aerospace Medical Research Dept., Warminster, Pa.).

Aerospace Medicine, vol. 40, Jan. 1969, p. 24-30. 9 refs.

Discussion of the predictability of dermal injury resulting from exposure to thermal energy of given intensity and duration. Injury predictability is shown to depend entirely on the resultant temperature-time history. Means are now available for assessing heat transfer by low-temperature radiation, convection, and conduction to the bare skin and through thin protective coverings with known physical properties. Thermal effects of nuclear detonations constitute a special problem because much of the radiation lies in the visible range, where the optical properties of the skin and its coverings, if any, greatly influence the heating pattern. Blackening of the skin eliminates effects due to optical properties, but enhances the ever-present variations in the thermal "constants" of the skin. A mathematical equation is given and computer techniques are described for extracting these variations from empirical data obtained at relatively low levels of radiation (< 0.5 cal/cm²-sec), and applying extrapolations of these values in calculations of temperature-time histories at higher levels of irradiance where empirical data are lacking. This procedure is subject to validation by experimentation within a limited range of exposures. If validation is achieved in the blackened skin, then the entire system may be utilized in the determination of optical properties of unblackened skin. B. H.

A69-17841

THERMAL PROTECTION IN LIFE RAFT EXPOSURES.

J. F. Hall, F. K. Klem, and W. Buehring (USAF, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

Aerospace Medicine, vol. 40, Jan. 1969, p. 31-35. 8 refs.

Description of devices to improve the thermal protective property of a life raft. The utilization of recently developed portable heaters using chemical fuel and the application of recently developed infrared reflecting materials were tested. Protection was increased 20% by the use of the heaters alone, 36% when infrared reflective liners were used, and 100% when both were used. B. H.

A69-17843

ACUTE AND PROLONGED EFFECTS OF G SUIT INFLATION ON CARDIOVASCULAR DYNAMICS.

Samuel Gray, III, James A. Shaver, Frank W. Kroetz, and James J. Leonard (Pittsburgh, University, School of Medicine, Div. of Cardiology, Dept. of Medicine, Pittsburgh, Pa.).

Aerospace Medicine, vol. 40, Jan. 1969, p. 40-43. 12 refs. NIH Grant No. HE-05678-02.

Study of the acute and chronic effects of sudden G suit inflation in recumbent and passively tilted individuals. Acute inflation was associated with a transient increase in the cardiac index, mean brachial artery pressure, central blood volume and right atrial pressure, and a transient decrease in the pulse rate. The trends of hemodynamic alterations were similar in both groups, but the changes were of greater magnitude in the tilted subjects. Release of the G suit resulted in a drop in mean brachial artery pressure associated with tachycardia and an increased cardiac index, suggesting that reactive hyperemia had taken place. These studies indicate that acute G suit inflation does result in an increased cardiac index which, although substantial in the upright individual, is transient and probably of little importance in the prolonged use of the garment. B. H.

A69-17844

ROLE OF THE AUTONOMIC NERVOUS SYSTEM IN THE CONTROL OF HEART RATE IN ACCELERATIVELY STRESSED MONKEYS. Jeffrey S. Life and Bruce W. Pince (Space/Defense Corp., Basic and Applied Research Dept., Birmingham, Mich.).

Aerospace Medicine, vol. 40, Jan. 1969, p. 44-48. 10 refs. Contract No. Nonr-4952(00).

Study of the roles played by the sympathetic and parasympathetic nervous system in accelerative bradycardia by exposing 29 squirrel monkeys to accelerations of $200 +G_x$ for 200 sec on an articulated centrifuge. Ten animals were given atropine, ten were given hexamethonium, and nine were administered a placebo. While the heart rate of all animals decreased substantially below baseline values as a consequence of centrifugation, statistically significant differences in rate were observed between the three groups during the initial 50 sec of exposure. The atropinized animals maintained highest rates, those receiving hexamethonium had lower rates, and the control animals demonstrated the most profound bradycardia. There is a predominant parasympathetic influence operating which augments an intrinsic bradycardiac response of the heart to acceleration. This cardiac rate inhibition is opposed by sympathetic influences. These latter influences are modest in effect, however, compared to the overwhelming parasympathetic inhibitory effect. (Author)

A69-17845

TELEMETRY SYSTEM FOR PHYSIOLOGICAL EVALUATION OF SPACE SUITS.

W. C. Kaufman, D. A. Ratino, and A. Marko (USAF, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

Aerospace Medicine, vol. 40, Jan. 1969, p. 48-50.

Description of a telemetry system for the physiological evaluation of space suits and other protective suits. This system transmits five skin temperatures with an accuracy of $\pm 0.2^\circ\text{C}$, rectal temperature with an accuracy of $\pm 0.05^\circ\text{C}$, and an electrocardiogram of clinical quality over distances up to 90 m. The system is pulse-duration multiplexed and uses a commercially available FM receiver. It has simplified experimental procedures in physiological evaluation of space and immersion suits by eliminating all complications of electrical leads penetrating protective shells. (Author)

A69-17846 #

COMPARATIVE CARDIOVASCULAR RESPONSES OF BABOONS AND DOGS TO NEAR-VACUUM PRESSURES.

Julian P. Cooke, William P. Fife, and Richard W. Bancroft (USAF, School of Aerospace Medicine, Environmental Physiology Div., Physiology Branch, Brooks AFB, Tex.).

Aerospace Medicine, vol. 40, Jan. 1969, p. 51-54. 9 refs.

Results of an experiment in which anesthetized adult baboons were rapidly decompressed from a pressure of 250 torr to 2 torr for exposures lasting 60 sec in the near-vacuum environment. Cardiovascular responses are compared with those of dogs subjected to the same anoxic conditions, in order to determine whether or not peculiar differences exist between one of the larger primates and mongrel dogs. Cardiovascular responses, respiratory behavior and body swelling showed no appreciable differences between the two species. B.H.

A69-17847 #

RENAL PATHOLOGY OF ACUTE METHYLHYDRAZINE INTOXICATION IN DOGS.

Roger L. Sopher, Alfredo R. Esparza, and Farrel R. Robinson (USAF, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

Aerospace Medicine, vol. 40, Jan. 1969, p. 55-61. 15 refs.

Study of forty-two Beagle dogs who received single intraperitoneal injections of monomethylhydrazine ranging between 5 and 30 mg/kg. The animals receiving more than 10 mg/kg were protected against convulsions by the administration of pyridoxine hydrochloride. Hemolytic anemia and hemoglobinuric nephropathy developed at doses of 7.5 to 10 mg/kg and increased in severity as greater doses were used. The dogs were sacrificed at various intervals to study the progression of histopathologic changes in the kidneys. Despite the

severity of the renal lesions they were reversible if complications were avoided. Siderosis of the kidney and reticuloendothelial organs, proportional to the degree of hemolysis was the only sequela. (Author)

A69-17848

INCIDENCE OF CARDIOVASCULAR DISEASES AMONG THE FLIGHT DECK PERSONNEL OF AN AIRLINE.

J. Lavernhe, J. Pasquet, and A. Mathivat (Compagnie Nationale Air France, Medical Dept., Paris, France).

Aerospace Medicine, vol. 40, Jan. 1969, p. 62, 63. 9 refs.

Investigation of the link between the general aging of flight personnel and the growing number of cardiovascular diseases recently noted. The frequency of cardiovascular diseases is low among crew members under 40 (less than 1 per 1000 per year) and then increases steadily until it reaches 14.5 per 1000 per year among persons aged over 55. Coronary insufficiency, with or without myocardial infarction was found in 68% of the cases studied. The foreseeable increase in the number of pilots aged over 50 in the coming years requires closer cardiological supervision and the introduction of preventive measures if high standards of air safety are to be maintained. B.H.

A69-17849

INCIDENCE, CAUSES AND RESULTS OF AIRLINE PILOT INCAPACITATION WHILE ON DUTY.

L. E. Buley (International Civil Aviation Organization, Montreal, Canada).

Aerospace Medicine, vol. 40, Jan. 1969, p. 64-70. 12 refs.

Analysis of the known cases of death or terminal collapse of airline pilots due to organic causes (cardiac in all instances) while on active duty, from 1961 to 1968. It was determined with reasonable certainty that in five cases the occurrence was the cause of an accident. Fatalities due to these accidents are tabulated. The death of twelve other pilots resulted in no accidents. Major interim conclusions of the investigation, initiated by ICAO in collaboration with IATA and IFALPA, are that not all fatal air carrier accidents caused or contributed to by preexisting pilot disease can in fact be recognized as such, and that more demanding licensing-medical requirements cannot alone reduce the pilot incapacitation hazard to acceptable levels. Optimum development and application of the "fail-safe crew" concept are considered of prime importance. B.H.

A69-17850

ESSENTIAL HYPERTENSION IN AIRLINE PILOTS.

F. Jönsson and N. Sundgren (Scandinavian Airlines Systems, Inc., Medical Dept., Stockholm, Sweden).

Aerospace Medicine, vol. 40, Jan. 1969, p. 70-75. 33 refs.

Review of hypertension problems in the selection and evaluation of airline pilots. Efforts to define normal blood pressure are not considered successful, and the use of arbitrary cutoff values is discussed. It is maintained that essential hypertension in a skilled pilot should not terminate his flying career if there is no evidence of complications. The use of thiazides under competent medical supervision seems to offer the safest possible and most effective drug therapy. Eight case histories using thiazide therapy on flight duty are described. B.H.

A69-17851

THERAPEUTIC POTENTIAL OF DIMETHYL SULFOXIDE (DMSO) IN AEROSPACE MEDICINE.

Stanley W. Jacob (Oregon, University, Medical School, Dept. of Surgery, Portland, Ore.), Don C. Wood (Providence Hospital, Dept. of Research, Portland, Ore.), and J. Harold Brown.

Aerospace Medicine, vol. 40, Jan. 1969, p. 75-84. 82 refs.

Review of the development of the DMSO (dimethyl sulfoxide) drug concept. Short and long term animal experiments are reported, with DMSO administered topically, subcutaneously, intraperitoneally, orally, into the eye, and to the mucous membrane. Generally good tolerance and low toxicity are reported. Some ophthalmic changes are reported as a result of high dosages to animals. No toxicity or ophthalmic changes are reported in humans after two and a half years of DMSO therapy. A wide range of pharmacological

A69-18021

actions is reported, including membrane penetration, anti-inflammation, local analgesia, enhancement of the action of concomitantly administered drugs, bacteriostasis, diuresis, cholinesterase inhibition, nonspecific enhancement of immunity, vasodilation, and lessening of adhesiveness of blood platelets. The possibility of forming a depot in the horny layer of the skin for such prophylactic agents as sun-screening, insect repellants, and antiseptics, is considered. Potential uses in aviation and aerospace medicine include the treatment of soft-tissue injuries, frostbite, thermal injuries, and the effects of changes in barometric pressure. Other uses include topical antiradiation capacity, reduction of the normal electric potential across intact skin, feeding through the intact skin, prophylaxis against skin sepsis, and relief of postural edema from prolonged cramped positions. B. H.

A69-18021

THE EEG OF PILOTS. II.

Hayao Hori and Hirofumi Furuya (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self-Defence Force, Aeromedical Laboratory, Reports, vol. 8, Mar. 1968, p. 121-128. 14 refs. In Japanese.

Investigation aimed at establishing standards for evaluating EEGs in pilot fitness examinations. It was found that EEG readings increased with the number of flying hours. Although high-voltage slow or high-voltage fast EEGs were found in some pilots, they had had about 1000 hr flight experience without accident. Proposed standards for pilot fitness were established on the following basis: pilots whose EEGs showed spike-wave complex or forked-spike readings were disqualified. In cases of high-voltage slow and/or fast EEGs, neurological and psychiatric follow-ups are recommended. B. H.

A69-18022

AN EXPERIMENTAL STUDY ON THE DISCRIMINATION OF FIGURE PROPORTION.

Norifusa Iwataki (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self-Defence Force, Aeromedical Laboratory, Reports, vol. 8, Mar. 1968, p. 129-134. 9 refs. In Japanese.

Study of visual distortion in estimating comparative vertical and horizontal lengths by means of four geometric figures. The greatest distortion was found in the figure consisting of a single vertical and a single horizontal. The next greatest distortions were found in the triangle and trapezoid, respectively. The least distortion was noted in the rectangle. B. H.

A69-18023

EFFECTS OF CORIOLIS STIMULUS DURING MILD CENTRIFUGAL G LOAD UPON STICK PERFORMANCE.

Masaaki Iwane, Mikio Ono, and Michiko Sawada (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self-Defence Force, Aeromedical Laboratory, Reports, vol. 8, Mar. 1968, p. 135-141. 12 refs. In Japanese.

Investigation of the influence of Coriolis stimulation in a low-g field on spatial orientation and accompanying stick performance. Twenty healthy adults (18 males and 2 females), none of whom were pilots, were subjected to mild centrifugal g loads (up to +1.1 Gz), and simultaneous Coriolis stimulation (right and left face turn). EKG, ENG, and stick performance were studied, and the subjective complaints of the subjects were examined. Under clockwise centrifuge at slower than 6 rpm (g level of 1.14 g) it was noted that subjects tended to move the stick in a right-forward direction when their heads were turned to the left. This reaction is considered dangerous if duplicated by pilots during circling or turning in aircraft at low altitudes. B. H.

A69-18024

METHOD OF ESTIMATING WHOLE-BODY COLD TOLERANCE AND ITS RELATION TO SEASONAL VARIATION OF BMR.

Ryohei Yurugi, Michihiko Iizuka, Teruko Akiyama, Fumitaka Kawashima, and Chieko Sakakibara (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self-Defence Force, Aeromedical Laboratory, Reports, vol. 8, Mar. 1968, p. 150-156. 11 refs. In Japanese.

Study of extreme temperature tolerance in nude men, and heat production increase and skin temperature decrease in clothed men exposed to cold, to determine the main physiological reactions involved in temperature regulation in the entire body. At extreme temperatures an increase in heat production takes place as a result of a rise in the metabolic rate, and a decrease in skin temperature results from vasoconstriction in the skin. Nude Japanese subjects were found to tolerate lower temperatures than nude white men, indicating stronger insulating responses in Japanese men. B. H.

A69-18025

EXPERIMENTAL STUDY ON READING EFFICIENCY OF ROUND AND VERTICAL TYPE DISPLAYS IN AIRCRAFT.

Sadahito Aramaki, Kiyohisa Niwa, Hiroko Hagihara, and Yukoh Nagasawa (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self-Defence Force, Aeromedical Laboratory, Reports, vol. 8, Mar. 1968, p. 169-178. 6 refs. In Japanese.

Comparison of reading and reliability efficiency in round vs vertical aircraft displays. Vertical reading instruments were found to be more reliable, with the altitude indicator showing double to triple efficiency. It is found that pilots have no adjustment difficulties in transferring from round to vertical displays. B. H.

A69-18026

TRANSIENT CHANGES IN OXYGEN CONSUMPTION, CO₂ ELIMINATION AND R. Q. DURING AND AFTER ACUTELY INDUCED HYPOXIA TO RABBITS.

Haruo Ikegami, Mamoru Furuya, and Chieko Sakakibara (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self-Defence Force, Aeromedical Laboratory, Reports, vol. 8, Mar. 1968, p. 179-183. 10 refs. In Japanese.

Experiment to induce hypoxia in five rabbits by inhalation of a low oxygen-gas mixture containing 8.4% oxygen in nitrogen, in order to determine the time required to attain a new steady state, from the point of view of gas metabolism. The following results are reported (1) oxygen consumption did not change significantly during hypoxia, and increased after termination of hypoxia, and (2) elimination of CO₂ and respiratory quotient increased markedly in the early phase of hypoxia, and reached a new steady state 25 min after its onset. The oxygen consumption decreased to under control level after the termination of hypoxia, but returned to normal after 30 min. B. H.

A69-18027

AN EXPERIMENTAL STUDY ON THE LIQUID CONDITIONING JACKETS.

Yoshiro Hagiwara, Yoshihiro Ogihara, Yutaka Mine, and Sueyoshi Tokutome (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self-Defence Force, Aeromedical Laboratory, Reports, vol. 8, Mar. 1968, p. 184-188. In Japanese.

Description of experimental water-cooling jackets made of plastic textile-reinforced film to reduce the high inside temperature in special clothing such as pressure suits, antiexposure suits, fire-fighting suits, and rocket fuel handlers' protective garments. Results of measurements of the temperature of the water used for circulation inside the garments, the air temperature inside and outside the garments, and the skin temperature are reported. It is concluded that the design of the jacket must be perfected with respect to weight and durability to make the jacket suitable for practical use. B. H.

A69-18028

THE SURVEY ON THE PHYSIOLOGICAL FUNCTION OF THE AGED PILOTS OF JASDF.

Ichiro Saito, Takao Watanabe, Yoshihisa Yamazaki, Kenji Nakahara, and Yoshinori Kurihara (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self-Defence Force, Aeromedical Laboratory, Reports, vol. 8, Mar. 1968, p. 189-194. 11 refs. In Japanese.

Results of a survey of the physiological functioning of aged pilots, conducted from 1965 to 1966. Eighty-one pilots between the

ages of 45 to 59 were tested. It was found that, although the average height and weight of Japanese pilots is greater than that of the average Japanese male, a higher Rohler index and a thicker layer of subcutaneous fat revealed in the tests suggest a tendency toward obesity in pilots. The investigation relates these findings to the presence of positive urinary sugar, leftward deviation of the QRS axis, and positive stress results in EEGs. It was also found that pilots show normal deterioration of vision due to aging. Hearing disturbances were recorded at pitches of 4000 to 6000 Hz and were attributed to occupational hazard. It is recommended that pilots continue physical fitness programs after the age of 45. B. H.

A69-18029 #

QUESTIONNAIRE SURVEY OF APPROACH LIGHT.

Norifusa Iwataki (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self-Defence Force, Aeromedical Laboratory, Reports, vol. 8, Mar. 1968, p. 195-198. In Japanese.

Survey of a questionnaire polling 27 pilots on the efficiency of various methods of approach lighting. The Calvert bar system and strobe flash lighting were both considered useful visual aids in approach lighting at low visibility, with strobe flash lighting giving less glare. The pilots agreed, however, that on clear nights approach lighting could cause a disturbing glare in the final landing stage. B. H.

A69-18030 #

ALTERATION OF MANUAL PERFORMANCE DURING SUSTAINED ACCELERATION EXPOSURE BY MEANS OF HAND-WRITING PRESSURE MEASUREMENT IN MAN.

Masaaki Iwane, Mikio Ono, and Ryohei Yurugi (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self-Defence Force, Aeromedical Laboratory, Reports, vol. 9, June 1968, p. 6-14. 9 refs. In Japanese.

Results of an experiment made with a simple handwriting pressure meter which is made of strain gauges attached to the tip of a ball-point pen and preamplifier and was designed to test manual performance during exposure to abnormal environmental conditions. Subjects were tested for their handwriting pressure pattern, maximum pressure, and writing speed before, during, and after sustained acceleration with a force of $+3 G_z$ in a centrifuge. Results are discussed in the light of certain delicate manual performances required of aircraft pilots during flight. M. G.

A69-18031 #

EFFECT OF ABRUPT DECELERATION ON THE HEART RATE IN MONKEYS.

Isao Matsumoto, Masatomo Harada, Shoji Ogata, Yosuke Hashimoto, Mikio Ono, and Ryohei Yurugi (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self-Defence Force, Aeromedical Laboratory, Reports, vol. 9, June 1968, p. 15-23. 7 refs. In Japanese.

Study of the effects of abrupt deceleration (peak G, 20 to 120 g, duration, 0.06 to 0.10 sec; jolt, 2000 to 24,000 g/sec) on the heart rate of monkeys. Relative bradycardia occurred in all cases. It is assumed that this bradycardia may be due to a vagal reflex from the carotid sinus, which is stimulated by hydraulic ram effects in the cervical blood stream, and is activated by head movement or displacement of internal organs. M. G.

A69-18032 #

EXPERIMENTAL STUDY ON FINGER DEXTERITY WITH PRESSURE GLOVES.

Hiroko Hagihara, Yoshihisa Yamazaki, and Noriko Kato (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self-Defence Force, Aeromedical Laboratory, Reports, vol. 9, June 1968, p. 30-43. 11 refs. In Japanese.

Discussion of steps taken to improve the finger dexterity of the JMG-1 pressure glove in order to increase the efficiency associated with fine adjustments. Aiming, pegboard, switch-control, and simulated radar control were studied as finger dexterity checks, and the results were compared with those of the unimproved pressure

glove under normal (8 mm Hg) and emergency (120 mm Hg) conditions. A comparison is made between the unimproved pressure glove and the improved pressure glove in actual flight of an F-104 fighter. M. G.

A69-18033 #

CHARACTERISTICS OF PILOTS ON PERSONALITY TESTS. I. Sakurako Takigawa, Hayao Hori, Norimichi Takemoto, and Hirofumi Furuya (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self-Defence Force, Aeromedical Laboratory, Reports, vol. 9, June 1968, p. 44-51. 7 refs. In Japanese.

Discussion of a battery of psychological tests administered by the Aeromedical Evaluation Board to accident-experienced pilots. Results are given for the Wechsler Adult Intelligence Scale, the Yatabe-Gilford Personality Inventory, and the Minnesota Multiphasic Personality Inventory. M. G.

A69-18035 #

RELATIONSHIPS BETWEEN FLYING SAFETY AND HUMAN FACTORS FROM JOB-SATISFACTION IN JASDF. I.

Isao Kuroda, Yoshinori Kurihara, and Yukiko Kakimoto (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self-Defence Force, Aeromedical Laboratory, Reports, vol. 9, June 1968, p. 62-69. 8 refs. In Japanese.

Investigation of the relationship between flying safety and human factors using a job-classification survey oriented toward social psychology. The study was made using a questionnaire answered by 4460 men (pilots, maintenance, and administrative personnel). The questionnaire dealt with physical problems, psychosomatic problems, work surroundings (facilities, pay, and promotion), human relations, and job problems. M. G.

A69-18036 #

VISUAL PROBLEMS CONCERNING LANDING ACCIDENTS.

Norifusa Iwataki (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self-Defence Force, Aeromedical Laboratory, Reports, vol. 9, June 1968, p. 70-75. 15 refs. In Japanese.

Discussion of the climatic factor which may affect a pilot's vision and thus contribute to misjudgment during landing procedures. The problem of undershoot caused by pilot error is examined. Undershoot accident rate by aircraft type is discussed, and it is shown that fighters in the USAF between 1960 and 1964 had 12.4 undershoot accidents per 10,000 landings. The effect of a downward slope in the runway approach on aircraft glide slope is also discussed. M. G.

A69-18037 #

HOW TO REDUCE THE WEIGHT OF PRESSURE GARMENTS.

Yoshiro Hagiwara, Osamu Takahashi, and Yutaka Mine (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self-Defence Force, Aeromedical Laboratory, Reports, vol. 9, June 1968, p. 80-89. 5 refs. In Japanese.

Discussion of methods for reducing the weight of pressure garments, based on a comparison of various partial pressure systems equipped with capstan, bladder, airpipe, or foam rubber. A prototype bladder system is described which seems to be superior to other systems now in use. M. G.

A69-18079 *#

SOLAR FLARE RADIATION PROTECTION REQUIREMENTS FOR PASSIVE AND ACTIVE SHIELDS.

Francis W. French (Avco Corp., Avco Everett Research Laboratory, Everett, Mass.).

American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 7th, New York, N.Y., Jan. 20-22, 1969, Paper 69-15, 15 p. 20 refs.

Members, \$1.00; nonmembers, \$1.50.

Contract No. NAS 8-21392.

Investigation of the degree of protection from solar flare radiations required by astronauts on interplanetary flights, taking into account protection provided by passive means (bulk shielding), and

A69-18177

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 are suggested for illustrative purposes. Curves are presented of dose vs shield thickness and plasma radiation shield voltage, with the 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)

biosynthesis is controlled by end-product (feedback) inhibition of enzyme action and repression of enzyme synthesis. Microorganisms have evolved sophisticated methods, involving both end-product inhibition and enzyme repression, for the control of branched metabolic pathways leading to the formation of two or more enzyme acid end products. The mechanisms whereby end-product inhibition, enzyme repression, and genic expression are effected are reviewed. Examples of simple and branched pathways are described, and the significance of metabolic control is discussed. B. H.

A69-18177 ***EFFECT ON A FLOUR BEETLE OF IRRADIATION DURING SPACE FLIGHT.**

John V. Slater (California, University, Lawrence Radiation Laboratory, Donner Laboratory for Medical Physics, and School of Public Health, Berkeley, Calif.), Brenda Buckhold (California, University, Lawrence Radiation Laboratory, Donner Laboratory for Medical Physics, Berkeley, Calif.), and C. A. Tobias.
BioScience, vol. 18, no. 6, 1968, p. 595-597. 6 refs.
NASA-AEC-supported research.

Study of the effect of weightlessness alone and of gamma radiation combined with weightlessness on somatic wing development, germ cells, and the pupal period of the flour beetle *Tribolium confusum*. In the Biosatellite, 720 *Tribolium* pupae between 19 and 27 hr old were orbited, half in the presence of ^{85}Sr and half shielded from it. Two thirds of the pupae in each group had received a preirradiation dose of 1350 r of 180-keV X rays to bring them into the dose range in which the additional in-flight dose would contribute a major portion of the wing damage - i.e., out of the "shoulder" portion of the dose-response relationship. Identical earth controls were maintained at 86°F. The percentages of wing abnormalities in the control group and the flight group are compared. A 50% increase in wing abnormalities was observed for the doubly irradiated flight group over the control group. M. G.

A69-18202 *#**APOLLO 4 AND 6 RADIATION ANALYSIS.**

Timothy T. White and Alva C. Hardy (NASA, Manned Spacecraft Center, Space Physics Div., Houston, Tex.).

American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 7th, New York, N.Y., Jan. 20-22, 1969, Paper 69-17. 7 p. 15 refs.

Members, \$1.00; nonmembers, \$1.50.

Analysis of radiation measurements inside the Apollo 4 and 6 command modules while passing through the most intense portions of the trapped radiation belts. Measurements of the integrated radiation dose behind shields of 0.015 and 0.9 in. of aluminum were made inside the command modules on both missions. Dose-rate measurements behind similar shielding were obtained in the Apollo 6 command module during the ascent to apogee. Dose calculations were made with Manned Spacecraft Center computer codes, using analytical shielding descriptions, models of the radiation environment, and radiation-transport data. The calculated mission doses were within a factor of 2.5 of the measured doses, with better agreement in the calculations for the more thinly shielded sensors. The differences between the calculated and measured doses were, for the most part, attributed to errors in the model environment. The analysis of the Apollo 4 and 6 data indicated that dose calculations for manned lunar missions which pass through the more intense portion of the trapped radiation belt are reliable and that the expected doses are well below the planning operational dose limits set by NASA. (Author)

A69-18238 #**CONTROL OF AMINO ACID BIOSYNTHESIS IN MICRO-ORGANISMS.**

H. Tristram (London, University, University College, Dept. of Botany, London, England).

Science Progress, vol. 56, Winter 1968, p. 449-477. 80 refs.

Study of the controlled synthesis of amino acids by microorganisms. Since the synthesis is directly related to growth requirements there is little or no over-production. Control of over-production may be lost as a result of mutation. Amino acid

LC ENTRIES

A69-80346

METHODS FOR DETERMINATIONS OF TOXIC SUBSTANCES IN AIR: INORGANIC COMPOUNDS.

Osamu Tada (Inst. for Sci. of Labour, Div. of Hyg., Lab. of Hyg. (I), Tokyo, Japan).

Journal of Science of Labour, vol. 44, Sep. 1968, p. 10-22. 73 refs.

Analytical methods used in the determinations of inorganic toxics in industrial work places were outlined. Methods were given for the determinations of the following gaseous toxics: (1) ammonium (NH_3); (2) arsine (AsH_3); (3) bromine (Br); (4) chlorine (Cl_2); (5) hydrogen bromide (HBr); (6) hydrogen chloride (HCl); (7) hydrogen cyanide (HCN); (8) hydrogen fluoride (HF); (9) hydrogen peroxide (H_2O_2); (10) hydrogen selenide (H_2Se); (11) hydrogen sulfide (H_2S); (12) iodine (I_2); (13) mercury (Hg); (14) nitric acid (HNO_3); (15) nitrogen dioxide (NO_2); (16) ozone (O_3); (17) phosphine (PH_3); (18) stibine (SbH_3); and (19) tetraethyl lead ($\text{Pb}(\text{C}_2\text{H}_5)_4$). Methods were also described for the determinations of the following particulate toxics: (1) alkali (NaOH , KOH); (2) antimony (SB); (3) arsenic (As); (4) barium (Ba); (5) beryllium (Be); (6) boron oxide (B_2O_3); (7) cadmium (Cd); (8) chromic acid (CrO_3); (9) cobalt (Co); (10) copper (Cu); (11) cyanide (CN); (12) fluoride (F); (13) iron oxide fume (Fe_2O_3); (14) lead (Pb); (15) manganese (Mn); (16) nickel (Ni); (17) phosphoric acid (H_3PO_4); (18) selenium (Se); (19) sulfuric acid (H_2SO_4); (20) tin (Sn); (21) titanium (Ti); (22) vanadium (V); and (23) zinc (Zn).

A69-80347

THE SELF REGULATORY MECHANISMS IN THE CENTRAL NERVOUS SYSTEM OF THE BIOPOTENTIAL RHYTHMS DURING PHOTOSTIMULATION [AVTOREGULIATSIONNYYE MEKHAZIMY TSENTRAL'NOI NERVNOI SISTEMY PRI FOTOSTIMULIATSII V RITME BIOPOTENTIALOV].

P. V. Bundzen (USSR, Acad. of Med. Sci., Inst. of Exptl. Med., Lab. of Neurocybernetics, Leningrad).

Fiziologicheskii Zhurnal SSSR, vol. 54, Jun. 1968, p. 683-691. 24 refs. In Russian.

A study was presented of the bioelectric activity parameters of the human cerebral cortex, reflecting the activity of nonspecific regulation mechanisms, which ensured the self-regulation process of the ongoing functional state of the brain. A bioelectronic system with a selective controlled feedback was used in the experiments. The amplitude-frequency pattern of the basic (alpha) rhythm of the occipital and central regions of the cortex revealed a relationship with the self-regulation mechanisms of the brain. An important role in the self-regulation process of the tonic stimulation level of the higher regions of the central nervous system seemed to be played by the "contrary" or "conjugated" inhibition process elicited by the low lability of nonspecific regulatory brain structures. The self-regulation of the ongoing functional state of brain was directly related with the "optimization" process of the afferent current altering power. It could be inferred that during photostimulation the alpha rhythm activity showed an ability to adaptation which expressed directly the principle of "optimum interaction of the nervous centers"

A69-80348

REGULATION OF THE BLOOD CIRCULATION IN THE EXTREMITIES OF THE DOG DURING BREATHING OF HYPO-

AND HYPEROXIC GASEOUS MIXTURES [REGULIATSIIA KROVOOBRAZHENIIA V KONECHNOSTI U SOBAK PRI DYKHANII VOZDUKHOM S POVYSHENNYM I PONIZHENNYM SODERZHANIEM KISLORODA].

IU. M. Smirnov and N. K. Savel'ev (Med. Inst., Dept. of Normal Physiol., Orenburg, USSR).

Fiziologicheskii Zhurnal SSSR, vol. 54, Jun. 1968, p. 712-719. 21 refs. In Russian.

The effect of changes in the oxygen content of the air upon the reaction of systemic arterial pressure, blood circulation in the femoral artery and vascular tonus of the extremities was studied in dogs under nembutal anesthesia. The role of the carotid and aortal reflexogenic zones, the sympathetic adrenergic fibers and cholinergic vasodilators in the vascular tonus of the extremities was investigated during inhalation of hypo- and hyperoxic gaseous mixtures. It was shown that under hypo- and hyperoxic conditions, the vascular tonus in intact animals depended on the interaction of reflex activity of the carotid or aortal chemoreceptors and the local effect of excess or lack of oxygen on the vascular muscles.

A69-80349

EFFECT OF HYPOXIA ON THE DEVELOPMENT OF GASTRIC ULCERS IN PYLORUS-LIGATED, RESERPINE-TREATED AND IMMOBILIZED RATS.

J. Hideg, F. Gelencsér, T. Gáti, and G. Luszitig (U. Med. School, Dept. of Pathophysiol. and Hung. People Army, Health Serv., Budapest, Hungary).

Acta Biologica et Medica Germanica, vol. 21, no. 1, 1968, p. 13-22. 57 refs.

The effect of hypoxia on the development of Shay-, reserpine, and immobilization ulcers in rats was studied. Hypoxia totally prevented the development of ulcers induced by Shay-operation. Hypoxia significantly decreased the quantity of gastric secretion, its free acid content and total acidity, and increased its pH. The diminished peptic activity due to hypoxia was considered to be the dominant factor of the protective effect. Hypoxia significantly increased the sensibility of rats to reserpine and immobilization ulcers. In both forms hypoxia caused the aggravation of gastric changes. Both cellular lesions and the increased production of hypophyseal adrenal hormones induced by hypoxia were thought to be involved in this increasing effect.

A69-80350

THE INFLUENCE OF WATER DEPRIVATION ON THE PERIPHERAL AND CENTRAL NERVOUS ACTIVITY OF RATS [UNTERSUCHUNGEN UBER DEN EINFLUSS DES WASSERENTZUGES AUF DAS PERIPHERE UND ZENTRALNERVOSE GESCHEHEN AN RATTEN].

H. Schwarzberg (Med. Akad., Physiol. Inst., Magdeburg, East Germany).

Acta Biologica et Medica Germanica, vol. 21, no. 1, 1968, p. 23-49. 91 refs. In German.

Rats deprived of water for seven to 10 days revealed strong reduction of neurosecretion in the nucleus supraopticus, nucleus paraventricularis and tractus hypothalamo-hypophyseus. The neurosecretion was seen to move from the nucleus paraventricularis and the tractus hypothalamo-hypophyseus into the third ventricle. The decrease in neurosecretion in the above mentioned intermediate brain areas is accompanied by a four-fold increase of the vasopressin titre in the blood while the activity of oxytocin is left unchanged. The condition of thirst increases the activity of the nervus laryngicus (175%) and prolongs the time of response of a conditional reflex. These changes are explained by the elevated blood vasopressin titre, since similar effects can be evoked in normal animals by injection of hypophysary preparations or of synthetic vasopressin, where the effect of the latter is inversely dependent upon concentration. A high dose (300 mE./kg.) is less effective than a very

small one. The strongest effect occurs if a dose is administered which corresponds to the vasopressin titre of thirsting animals (200 μ E/kg.). By contrast, oxytocin (250 to 350 mE/kg.) lowers the activity of the nervus laryngicus and shortens the time of response. Possibilities of an intra- and extracerebral attack of the neurohormones, vasopressin and oxytocin are discussed. activity of the nervus laryngicus and shortens the time of response. Possibilities of an intra- and extracerebral attack of the neurohormones, vasopressin and oxytocin are discussed.

A69-80351**STRESS AND CLEARING FACTOR LIPASE IN RAT ADIPOSE TISSUE.**

Helion Povoá, Jr., Adyr N. A. Callado, J. M. Pereira, and J. M. Coutinho (Inst. Oswaldo Cruz, Biochem. Lab. and Natl. Council of Res., Rio de Janeiro, Brazil).

Acta Biologica et Medica Germanica, vol. 21, no. 1, 1968, p. 125-126. 8 refs.

The effects of formalin stress and cold stress at 5° C. for seven days on the clearing factor lipase in the adipose tissues of rats was investigated. Analysis of the results indicated that in stress, the activity of lipase is significantly decreased as compared to normal animals.

A69-80352**THE EFFECT OF CHLORPROMAZINE ON ADENOSIN- AND AMP-DEAMINASE IN BRAIN REGIONS OF RATS OF VARIOUS AGES [DER EINFLUSS VON CHLORPROMAZIN AUF DIE ADENOSIN- UND AMP-DESAMINASE IN HIRNREGIONEN VON RATTEN VERSCHIEDENEN ALTERS].**

H. Kluge, V. Wieczorek, and H. Bräunlich (Friedrich-Schiller-U., Klin. für Psychiat. und Neurol. "Hans Berger", Jena, East Germany).

Acta Biologica et Medica Germanica, vol. 21, no. 1, 1968, p. 139-141. 7 refs. In German.

The effects of chlorpromazine on the specific activities of adenosine monophosphate (AMP) deaminase and adenosine deaminase in brain regions of rats were investigated *in vivo* and *in vitro*. The specific activity of AMP deaminase was significantly reduced in all areas by chlorpromazine in young animals, but no influence was noted in older animals. A distinct age differentiation was noted in the effect of chlorpromazine on AMP deaminase activity. Under equal experimental conditions, the effect of chlorpromazine on adenosine deaminase was less than that on AMP deaminase. In the older group no differences appeared that were analogous to the AMP deaminase results. The influence of chlorpromazine on both enzymes *in vitro* was indicated first by an end concentration of 10^{-3} M and higher at an insignificant inhibition. The effect of longer treatment with higher dosages of chlorpromazine was especially important in the reduction of the AMP deaminase activity of the brain.

A69-80353**EFFICIENCY OF DIGESTION IN GERM-FREE AND CONVENTIONAL RABBITS.**

T. Yoshida, J. R. Pleasants, B. S. Reddy, and B. S. Wostmann (Notre Dame, U., Dept. of Microbiol., Lobund Lab., Ind.).

British Journal of Nutrition, vol. 22, Dec. 1968, p. 723-737. 62 refs.

Contract NONR 1623(O4) and Grant NIH HDO 0855; Notre Dame, U. supported research.

Germ-free (GF) and conventional (CV) rabbits wearing collars to prevent coprophagy were fed an autoclaved diet with added cellulose. Their fecal excretion was analyzed to determine nutrient digestibility. Clearly distinguishable hard feces were excreted by the GF rabbit only if the diet contained at least 15% cellulose. Unlike

CV rabbits, the GF rabbits did not consume their soft feces even when permitted to do so. Soft feces made up a larger proportion of the total output of GF than of CV rabbits. Food intake and total dry-matter excretion/kg. body-weight were similar in both groups. Although digestibility of dry matter was similar in the two groups, in the GF rabbits there was a higher digestibility of crude fat and true protein and a lower digestibility of crude fiber and nitrogen-free extract. GF rabbits excreted a higher percentage of ingested calcium and phosphorus in the urine than did CV rabbits. The results suggest that intestinal microbes, even without the enhancing effect of coprophagy, aid in the digestion of carbohydrate by rabbits. The greater fecal excretion of crude fat and true protein by CV rabbits could result from poorer digestion and absorption, but could also represent nutrients synthesized by microbes from simpler materials. The reingestion of fecal crude fat and true protein might therefore improve the quality of the total nutrient intake. The results suggest ways of assuring an adequate dietary intake by GF rabbits in the absence of contributions from an intestinal microflora.

A69-80354**A BREATHING VALVE WITH LOW BREATHING RESISTANCE [EIN ATEMVENTIL MIT NIEDRIGEM ATEMWIDERSTAND].**

W. Sieber and H. Franz (Max Planck-Inst. für Arbeitsphysiol., Dortmund, West Germany).

Internationale Zeitschrift für Angewandte Physiologie, vol. 26, Nov. 4, 1968, p. 279-282. In German.

A breathing valve of plexiglas with very low breathing resistance was described. The valve has proved to be very good in research concerned with high work loads.

A69-80355**EFFECT OF PHYSICAL EXERCISE ON TISSUE RESPIRATION OF ENDOCRINE GLANDS.**

Wladyslaw Strazyński and Wieslaw Romanowski (Acad. School of Phys. Educ., Dept. of Physiol., Warsaw, Poland).

Internationale Zeitschrift für Angewandte Physiologie, vol. 26, Nov. 4, 1968, p. 290-297. 37 refs.

A volumetric microrespirometer was used to investigate changes in the tissue respiration of the adrenals, thyroid and pituitary of rats after a single exhausting physical exercise. The animals were made to run on a treadmill for 90 min., that is, until they showed signs of fatigue. Oxygen uptake increased in the adrenals by 39.1% but decreased in the thyroid by 51.9% and in the pituitary by 37.4%. It should be emphasized that the changes were statistically highly significant. It was thought that increased adrenal O_2 uptake may have been due to the stimulating influence of adrenocorticotrophic hormone (ACTH) on the respiration processes in the cortex and intensification of oxidative processes in the medulla, and also increased blood supply in the entire organ during physical work. Diminished consumption of oxygen by the thyroid may have been caused by the inhibitory influence of factors connected with stress (the inhibitory influence of ACTH and corticosteroids, effort sympathicotonia, and increased body temperature). The decreased respiration of the pituitary is difficult to interpret but may have been caused by diminished blood supply and perhaps also an overheating of the organ.

A69-80356**THE PROBLEM OF "OPTIMUM" ACCLIMATISATION.**

C. G. Williams, C. H. Wyndham, and A. Heyns (South Africa, Chamber of Mines, Math. Statist. Div., Johannesburg).

Internationale Zeitschrift für Angewandte Physiologie, vol. 26, Nov. 4, 1968, p. 298-308. 8 refs.

A study was carried out on three groups of 20 male subjects to determine the combination of environmental stress and a standard

rate of work of five kcal./min. that will give the optimum level of acclimatization. Each group was acclimatized at one of three temperature conditions (wet-bulb (WB) temperatures of 32.2°, 33.9° and 35.6° C.) and thereafter tested also under the remaining two conditions. The degree of acclimatization was judged by the physiological reactions to a standard work rate of five kcal./min. at the various WB temperatures. The test at a WB temperature 32.2° C. revealed that optimum acclimatization was obtained when men were acclimatized at 33.9° C. WB. The test at 33.9° C. WB illustrated that the physiological reactions of the group acclimatized at 35.6° C. WB were decidedly poor when compared to those of the groups acclimatized at 32.2° and 33.9° C. WB. The test carried out at 35.6° C. WB showed that, irrespective of the WB temperature at which the men were acclimatized, their heat tolerance to the test environment was poor.

A69-80357
STRENGTH AND ENDURANCE GAINS AND THEIR RELATIONSHIPS.

George H. McGlynn (San Francisco, U., Exercise Physiol. Lab., Calif.).

Internationale Zeitschrift für Angewandte Physiologie, vol. 26, Nov. 4, 1968, p. 323-329. 13 refs.

The relationship between maximum strength and muscular endurance and the relationship between strength and endurance gains following an extended period of isometric training were investigated. The subjects (N=60) were divided into two equal groups, control and experimental. The control group was tested for maximum strength and endurance once at the beginning of the experiment and once after 20 days. The subjects in the experimental group were tested for maximum strength and endurance before a 20 day period of isometric training. They held tension for 100 sec. in the morning and again in the afternoon. Periodic tests were on the 5th, 10th, 15th and 20th day. There was a significant relationship between maximum strength and the percentage of maximum strength held. There was an inverse proportional relationship between maximum strength and maximum strength gain and between endurance and endurance gain following an extended period of training. Finally it was found that isometric endurance increased proportionately with isometric strength.

A69-80358
COMPARATIVE STUDY OF THE MAXIMAL OXYGEN CONSUMPTION BY FEMALE STUDENTS TRAINED AND UNTRAINED [ETUDE COMPARATIVE DE LA CONSOMMATION MAXIMUM D'OXYGENE CHEZ DES ETUDIANTES PRATIQUANT OU NON L'EDUCATION PHYSIQUE].

R. Bottin, R. Deroanne, J. M. Petit, J. Juchmes, and F. Pirnay (Liège, U., Inst. Léon Fredericq and Méd. Sociale, Inst. Ernest Malvoz, Liège, Belgium).

Internationale Zeitschrift für Angewandte Physiologie, vol. 26, Nov. 4, 1968, p. 335-340. 9 refs. In French.

Maximal O₂ consumption was measured in 64 female students (trained and untrained) running on a treadmill. The results were compared with those of the literature. The mean values of O₂ consumption were 36.0 ml./min./kg. for the untrained and 41.1 ml./min./kg. for the physical education students. The last results were lower than that reported for female athletes.

A69-80359
THE INFLUENCE OF GRADIENT OF TREADMILL IN RUNNING ON RESPIRATION AND ENERGY EXPENDITURE [UBER DEN EINFLUSS DER STEIGUNG AUF ATMUNG UND STOFFWECHSEL BEIM LAUF].

H.-J. Hammel, F. Backhausen, H. Mies, and J. Stracke (Deut. Sportochschule, Sportphysiol. Inst., Cologne, West Germany). *Internationale Zeitschrift für Angewandte Physiologie*, vol. 26, Nov. 4, 1968, p. 341-354. 31 refs. In German. Bundesinnenministerium und das Kuratorium für sportmed. Forsch. e.V. supported research.

Four test series of 0, 5, 10 and 15% elevation of the treadmill were performed. The speed of running always was eight km./hr. Before, during and 10 min. following the end of the running the values of circulation, total ventilation, oxygen uptake and CO₂ output were continuously registered. From these parameters the ventilation equivalent, the respiration exchange ratio and the energy cost were calculated. Every 1% of gradient and every one min. of running caused a 6% increase of total ventilation, CO₂ output and energy cost/kg. body weight. The increase of oxygen uptake was determined to be 6% at a gradient of treadmill from 0% to 10%. At a gradient from 10% to 15% the increase of oxygen uptake was determined to be only 3.45% for every 1% elevation of the treadmill. The usual linear increase of oxygen uptake in relation to gradient seemed to be true for moderate elevation. By reason of the behavior of the ventilation equivalent, there is the question of whether this quotient is only an indicator for the efficiency of respiration or if it possibly could show more valuable facts.

A69-80360
COMPARISON BETWEEN MEASUREMENTS OF MAXIMAL OXYGEN INTAKE DURING LEVEL RUN OF TWO OR THREE MINUTES [MESURES COMPAREES DE LA CONSOMMATION MAXIMUM D'OXYGENE PAR PALIERS DE DEUX OU DE TROIS MINUTES].

R. Bottin, J. M. Petit, R. Deroanne, J. Juchmes, and F. Pirnay (Liège, U., Inst. Léon Fredericq and Méd. Sociale, Inst. Ernest Malvoz, Liège, Belgium).

Internationale Zeitschrift für Angewandte Physiologie, vol. 26, Nov. 4, 1968, p. 355-362. 10 refs. In FRENCH.

The comparison between the values of maximal O₂ intake obtained during level run of two or three min. was realized on ten subjects exercising two tests of each type. A fifth test consisted of a specially programmed exercise to induce the subjects to exhaustion at the end of a last level run of three min. No statistically significant difference appeared between the maximal values obtained by either method. It appeared that the level run of two min. to obtain the maximal O₂ intake by a progressively increasing intensity test was entirely justified.

A69-80361
RIGHT-LEFT COMPARISON OF ISOMETRIC ARM MUSCULAR TRAINING WITH DIFFERENT TRAINING STIMULI IN EIGHT YEAR-OLD CHILDREN [RECHTS-LINKS-VERGLEICH BEI ISOMETRISCHEM ARMMUSKELTRAINING MIT VERSCHIEDENEM TRAININGSREIZ BEI ACHTJAHRIGEN KINDERN].

W. Rohmert (Tech. Hochschule, Inst. für Arbeitswiss., Darmstadt, West Germany).

Internationale Zeitschrift für Angewandte Physiologie, vol. 26, Nov. 4, 1968, p. 363-393. 20 refs. In German.

Twenty-nine eight yr. old children (14 boys, 15 girls) took part in 116 isometric muscular training experiments (58 comparisons) between right and left extremities of the flexors and extensors of the arms. Six days/wk. the effect of two different isometric training stimuli was studied. Training I consisted of one daily maximum contraction of one sec., and Training VI consisted of one daily maximum contraction of six sec. The experimental duration was 9.5 \pm 1.0 wk. The following results were obtained. In 70% of all right-left-comparisons training VI showed a higher increase in

strength than training I whether or not the right or the left arm muscle group received the stronger stimulus of training VI. Only 25% of all right-left-comparisons had the opposite result. These examples were discussed. Five percent of all right-left comparisons had the effect zero; that is, neither training I nor training VI showed any increase in strength. Training I or VI had no differences in the speed of increase in strength up to the strength limit. There was also no influence of sex. Higher incentives by rewards made a small and single further improvement above the strength limit. In opposition to adult men and women there were no sex differences in the initial strength of children. There were not as many children as adults who showed no strength effects at all. For both training I and VI and the initial relative strength was smaller for children than for adults. But there was no difference in the speed of increase in strength between children and adults. Examples indicated that in children as well as in adults, all amounts of existing differences in strength of right and left arm muscle groups are only accidental differences, and they can be changed within a wide range by different training.

A69-80362**A THEORETICAL STUDY OF CONTROLLED VENTILATION.**

Alvin A. Wald, Terence W. Murphy, and Valentino D. B. Mazzia (N. Y. U., Med. Center, New York).

IEEE Transactions on Bio-medical Engineering, vol. BME-15, Oct. 1968, p. 237-248. 20 refs.

Grant NIH FR-00331-01.

This paper is a theoretical study of controlled ventilation with a respirator. An electric circuit analog of the respiratory system is used with respiratory parameters of the normal adult. Deleterious effects of positive pressure ventilation are considered and related to the model. The effects considered include peak alveolar pressure and its time of occurrence, work, and average alveolar pressure. Different pressure waveforms are used as the driving source for the respirator model. These waveforms are rectangle, ramp, negative ramp, sine, and exponential. For a particular dead space and alveolar ventilation there is shown to be a minimum value of average alveolar pressure, which gives a corresponding tidal volume and respiration rate. This condition is also a function of the peak alveolar pressure allowed. Design curves and equations are presented for the particular case of the negative ramp pressure waveform.

A69-80363**ELECTRODELESS MEASUREMENTS OF THE EFFECTIVE RESISTIVITY OF THE HUMAN TORSO AND HEAD BY MAGNETIC INDUCTION.**

Peter P. Tarjan and Richard McFee (Syracuse U., Dept. of Elec. Eng., N. Y.).

IEEE Transactions on Bio-medical Engineering, vol. BME-15, Oct. 1968, p. 266-278. 34 refs.

Grant NIH HE-5629.

A magnetically coupled impedance measuring instrument has been developed for determining an effective electrical resistivity of human subjects without electrodes. The instrument operates at 100 kHz. The value obtained represents an average of the resistivity of tissue near the coils. The human torso and the head were found to act, in regard to this measurement, as if they had homogeneous resistivities of about 425 and 350 Ω cm. respectively. Thoracic resistivity fluctuations due to respiration (tidal volume) and pulsatile blood flow were about 4% (breathing) and 1% (blood pumping). These measurements were taken when the subjects were lying face down with their hearts directly over the coil system. The records resemble in shape typical ventricular stroke-volume curves provided that the subject holds his breath at maximum level of inspiration. Various tests were performed which indicate that the records reflect

predominantly the changing volume of the heart. Peak-to-peak effective resistivity fluctuations of the head during the cardiac cycle were found to be less than 0.05%.

A69-80364**THE SKIN TUNNEL TRANSFORMER: A NEW SYSTEM THAT PERMITS BOTH HIGH EFFICIENCY TRANSFER OF POWER AND TELEMETRY OF DATA THROUGH THE INTACT SKIN.**

Carl F. Andren, Moneim Ahmed Fadali, Vincent L. Gott, and Stephen R. Topaz (Johns Hopkins U., Baltimore, Md.).

IEEE Transactions on Bio-medical Engineering, vol. BME-15, Oct. 1968, p. 278-280.

Contract DN NOw 62-0604-c and Grant PHS HE-9997.

Artificial organs which are to be chronically implanted require a means of getting power into the body from an external power source with minimum risk of infection and irritation to the skin. The skin tunnel transformer is such a device whereby high level electromagnetic energy can be transmitted through the skin with very low losses and noncritical positioning. Two versions of the transformer are shown and described, and experimental results obtained with dogs are presented. Transmission over 50w. at better than 95% efficiency has been accomplished with no ill effects. The use of the transformer for simultaneous transmission of telemetry data is also discussed.

A69-80365**THE USE OF MULTIPLE MODELS IN CARDIOVASCULAR SYSTEM STUDIES: TRANSPORT AND PERTURBATION METHODS.**

Jan E. W. Beneken and Vincent C. Rideout (Wis. U., Dept. of Elec. Eng., Madison).

IEEE Transactions on Bio-medical Engineering, vol. BME-15, Oct. 1968, p. 281-289. 25 refs.

NASA Grant NGR-50-002-083; Wis. Alumni Res. Found. and Wis. U. supported research.

Computer models of the circulation, based on lumped circuit approximations, may be used for simulation studies of its pulsatile pressure, flow, and volume interrelationships. A second model, coupled to such a basis circulation model, may be devised to simulate the flow of substances carried by the blood. Such a slave, or dependent model, is based on the notion that transport flow is proportional to concentration in the slave circuit multiplied by flow in the main circuit. The combined, or multiple model, may be used in studies of dye dilution measurement schemes, or control studies related to the transport CO₂ or O₂. Another kind of multiple model of the circulation is based on perturbation analysis. In this case, subtraction of the unperturbed from the perturbation equations upon which the slave or dependent model is based. Coupling between the two models in this case is required only at points of nonlinearity. These multiple models may be used to study the propagation of small pressure or flow disturbances with advantages in scaling and detection of the disturbance amplitudes.

A69-80366**REGULATION OF ERYTHROPOIESIS. 23. DISSOCIATION BETWEEN STEM CELL AND ERYTHROID RESPONSE TO HYPOXIA.**

Bernhard Kubanek, Luigi Ferrari, William S. Tyler, Donald Howard, Susan Jay, and Frederick Stohlman, Jr. (Tufts U., School of Med., St. Elizabeth's Hosp., Boston, Mass.).

Blood, vol. 32, Oct. 1968, p. 586-596. 16 refs.

Grants PHS HE07542 and PHS HE05600.

The effect of hypoxia on red cell production and stem cells, as measured by colony forming units (CFU), was studied in two strains of mice. One of these strains, the CAF₁, has been shown

to produce relatively little erythropoietin in response to hypoxia; the other, the CF₁, produces substantial amounts of erythropoietin. In the studies reported herein the CAF₁ mice had an increase of ≈30% in red cell mass after 23 days of exposure to either discontinuous (16 hr./day) or continuous hypoxia equivalent to 23,000 ft. of altitude. The CF₁ mouse doubled in its red cell mass after similar exposure. The splenic CFU decreased to as low as 17% in the poorly responding CAF₁ but remained at or near control levels in the CF₁. It is suggested that the dissociation between erythroid response and changes in the CFU reflect a secondary effect of hypoxia not directly related to the erythropoietin-induced increase in red cell production.

A69-80367**WATER AND ELECTROLYTE EXCHANGE IN RATS EXPOSED TO COLD.**

Melvin J. Fregly (Fla. U., Coll. of Med., Dept. of Physiol., Gainesville).

Canadian Journal of Physiology and Pharmacology, vol. 46, Nov. 1968, p. 873-881. 30 refs.

Contract DA-49-193-MD-2549.

Exposure of rats to air at 6° C. for ten days increased food intake and urine output but failed to affect water intake. A comparison of water with food intake revealed a smaller water intake for a given food intake for cold-exposed than for control rats. The urine output at a given water intake was also greater for cold-exposed rats. In addition, cold exposure failed to affect urine osmolality significantly. Thus, the greater solute output accompanying cold exposure was accomplished by increasing urine flow rather than by concentrating urine. These results suggest possible mechanisms for both the relative dehydration and increased plasma osmolality observed after removal of rats from cold air. Both fecal and urinary routes of sodium and potassium excretion were increased by cold exposure; however, fecal excretions of both potassium and sodium were greater fractions of the total output during cold exposure than prior to it. Although cold exposure tends to induce a relative dehydration in rats, an important factor limiting the extent of the dehydration may be increased fecal electrolyte loss.

A69-80368**STUDIES ON HUMAN SUBJECTS STAYING IN AN AIR-TIGHT PIT.**

P. V. Karambelkar, S. L. Vinekar, and M. V. Bhole (Kaivalyadhama S.M.Y.M. Samiti's Lab., Lonavala, India).

Indian Journal of Medical Research, vol. 56, Aug. 1968, p. 1282-1288. 12 refs.

Min. of Educ., Govts. of India and Maharashtra State supported research.

The effects of a stay inside an air-tight pit were studied on one professional Yogi, one Yoga student and two non-Yogi subjects. Oxygen consumption was reduced below basal O₂ consumption levels by about 34 to 2% in different subjects. This seems to be a normal physiological response to the environment in the pit. The reduction in O₂ consumption showed an inverse relationship with the subject's practice of *Pranayama* (yogic breathing practices including holding the breath). The stress during the stay became marked, when CO₂ went above 5% in the pit and respiratory rate, heart rate, blood pressure and galvanic skin response showed significant increases thereafter.

A69-80369**INFLUENCE OF MICROBIOTA ON METABOLIC FECAL NITROGEN IN RATS.**

B. G. Harmon, D. E. Becker, A. H. Jensen, and D. H. Baker (Ill., U., Dept. of Animal Sci., Urbana).

Journal of Nutrition, vol. 96, Nov. 1968, p. 391-396. 18 refs.

The influence of microbial flora on metabolic fecal nitrogen was determined with selected levels of protein up to 21.5%, fed as liquid and dry diets. Metabolic fecal nitrogen was less in axenic than in conventional rats when fed autoclaved dry or filtered liquid diets. Slopes of regression curves describing fecal nitrogen excretion were similar for axenic and conventional rats fed autoclaved diets, and much greater than in conventional rats on the nonautoclaved diets. The intercepts were similar for conventional rats on both nonautoclaved and autoclaved diets.

A69-80370**RADIATION RETINOPATHY.**

Percival H. Y. Chee (Miami, U., School of Med., Bascom-Palmer Eye Inst., Fla.).

American Journal of Ophthalmology, vol. 66, Nov. 1968, p. 860-865. 12 refs.

Four cases of posterior fundus lesions due to radiation were presented. All typically had radiation around the orbital area with scatter into the globe posteriorly. A varying latent period then followed before a visual deficit was noted. The posterior fundus picture varied and could include papillitis, neovascularization, retinal pigment epithelial atrophy, exudates, and microaneurysms or telangiectases. Many of these changes simulate the picture of diabetic retinopathy. However, diabetic retinopathy normally does not have the extensive retinal pigment epithelial atrophy present in these cases.

A69-80371**CATARACT SECONDARY TO MICROWAVE RADIATION.**

George H. Kurz and Richard B. Einaugler (N. Y. U., Med. Center, Dept. of Ophthalmol., New York).

American Journal of Ophthalmology, vol. 66, Nov. 1968, p. 866-869. 9 refs.

Grants PHS NB 05-059-05 and PHS NB 05-002-13.

Bilateral subcapsular cataracts were removed from a 51-yr.-old technical writer eight yr. after exposure to microwave radiation over a seven-yr. period. Histopathologic examination of the extracted lenses revealed prominent areas of degeneration at the posterior pole containing globules of acid mucopolysaccharide and numerous, minute, birefringent needlelike structures.

A69-80372**EFFECT OF BETA-AMINOETHYLISOTHIURONIUM-BROMIDE ON CARBON 14 LABELED ACETATE INCORPORATION INTO TISSUE LIPIDS OF IRRADIATED RATS.**

S. Naqvi, K. S. Kumar, and T. A. Venkatasubramanian (Delhi, U., V. Patel Chest Inst., Dept. of Biochem., India).

Experientia, vol. 24, Sep. 15, 1968, p. 891-892. 12 refs

The *in vivo* acetate-1-¹⁴C incorporation into lipids in irradiated and β-aminoethylisothiuronium-bromide hydrobromide (AET) treated rats was investigated. Among the tissues studied, the liver appeared to be the major site of lipogenesis in irradiated rats with the kidney next. The lipogenesis in the spleen appeared to be negligible. The data indicated that a very low dose of AET exerts a profound inhibitory effect on lipogenesis.

A69-80373**ALTERATIONS OF TRYPTOPHAN METABOLISM INDUCED BY SLEEP DEPRIVATION.**

A69-80374

E. Kuhn, K. Ryšánek, and V. Brodan (Inst. of Human Nutr. and Res. Inst. for Exptl. Therapy, Praha-Krc, Czechoslovakia). *Experientia*, vol. 24, Sep. 15, 1968, p. 901-902. 5 refs.

Sleep deprivation (SD) induced alterations of tryptophan metabolism were investigated through the study of the three main tryptophan metabolic pathways in healthy subjects. SD led to a considerable disturbance of the tryptophan metabolism. Between the first and second SD day of the excretion of 5-hydroxyindolacetic acid increased in absolute values as well as those referred to creatinine. The excretion of further tryptophan metabolites, i.e. indolylacetic acid (IAA) and kynurenine, did not change significantly in the course of the experiment. The absence of change in IAA excretion permitted the conclusion that the dietary supply of tryptophan in the subjects was balanced, and that changes in the supply of this amino acid did not participate in changes in the excretion of the metabolites investigated. Xanthurenic acid excretion increased on the fifth day of SD, and anthranilic acid excretion declined on the fifth and sixth SD days. This was explained by a relative vitamin B₆ deficiency.

A69-80374
UNIT RESPONSES OF THE LATERAL GENICULATE BODY TO LIGHT FLASHES IN FREE MOVING UNRESTRAINED CATS.

L. M. Mukhametov and G. Rizzolatti (Parma, U., Ist. di Fisiol. Umana, Italy).

Experientia, vol. 24, Sep. 15, 1968, p. 911. 10 refs.

Grant AF EOAR 67-7 and Consiglio Nazl. delle Ric. supported research.

Unit responses of the lateral geniculate body (LGB) to light flashes in free moving unrestrained cats were investigated. The findings indicated that the firing rate of LGB units in response to a natural stimulation increases from synchronized sleep to waking and from waking to desynchronized sleep. However, in a structure exhibiting as the LGB does a spontaneous activity, the background level must be taken into account in the analysis of the responses. Assuming that the signal-to-noise ratio is a meaningful parameter for evaluating the transmission efficiency of the neuron, the wakefulness turns out to be the best condition for the transmission of information in the LGB.

A69-80375
EFFECT OF RADIATION AND HYPOTHERMIA ON THE HEMOGLOBIN CONTENT OF SINGLE ERYTHROCYTES IN NEW-BORN MICE [DER EINFLUSS VON RONTGENSTRAHLEN UND HYPOTHERMIE AUF DEN HAMOGLOBINGEHALT DES EINZELNEN ERYTHROZYTEN NEUGEBORENER HAUSMAUSE].

H. Scheufler (Martin-Luther-U., Med. Fak., Biol. Inst., Halle-Wittenberg, East Germany).

Experientia, vol. 24, Sep. 15, 1968, p. 947. 10 refs. In German.

New-born mice were exposed to a dosage of 600 r X-rays. If the mice were irradiated under extreme hypothermia, a decrease of the content of hemoglobin in the single erythrocyte below the level of animals that were subjected to irradiation or hypothermia only was found.

A69-80376
EVIDENCES FOR A HYPOCALCEMIC FACTOR FROM PITUITARY GLAND.

M. S. Zileli, G. Kanra, G. Urünay, T. Güner, and S. Caglar (Hacettepe Med. School., Metab. Div., Ankara, Turkey).

Experientia, vol. 24, Sep. 15, 1968, p. 960-961. 10 refs.

The study was concerned with the existence of a pituitary substance which stimulates either the thyroid or the parathyroid

gland or both to release a hypocalcemic factor in rats and guinea pigs. The diffusion of this hypocalcemic hormone seemed to be under pituitary regulation.

A69-80377
A DIFFERENTIAL POLAROGRAPHIC STUDY ON RADIOPROTECTIVE SUBSTANCES CONTAINING SULFHYDRYL.

Y. Ueno (Kyoto U., Fac. of Med., Dept. of Exptl. Radiol., Japan). *Experientia*, vol. 24, Sep. 15, 1968, p. 970.

Polarographic behavior of the sulfhydryl containing radioprotective substances of L-cysteine, reduced and oxidized glutathiones, S-β-amino-ethylthiuronium bromide hydrobromide (AET) and bovine serum albumin was observed by a differential polarography method. The dose dependency of wave height was studied in each solution, and the results were tabulated. It appeared to be possible to use differential polarography to determine quantitatively and qualitatively L-cysteine, reduced glutathione, cysteamine or cystamine. AET was undetectable by this method.

A69-80378
ADAPTATION TO HYPOXIA IN VASCULAR SMOOTH MUSCLE.

Reed Detar and David F. Bohr (Mich., U., Dept. of Physiol., Ann Arbor).

Federation Proceedings, vol. 27, Nov.-Dec. 1968, p. 1416-1419. 9 refs.

Microcirculatory Soc. Symp., Atlantic City, Apr. 15, 1968.

Grant NIH HE-03756.

Adapted and non-adapted helical strips of rabbit aortae were subjected to oxygen tensions (pO₂) between 0 and 100 mm. Hg, and their tension development in response to epinephrine was recorded in order to examine manifestations of adaptation to hypoxic conditions. It was demonstrated that the contractile response during hypoxia of vascular strips, that have been deprived of oxygen for several hours, is markedly improved. The relationship between pO₂ and contractility during abrupt changes in pO₂ seen in adapted vessels was a reversal of normal pO₂-contractility relationship seen in non-adapted vessels. Results indicated that vascular smooth muscle has the metabolic potential to support tension development at either high or low pO₂. The relative activities of the anaerobic and oxidative pathways depend on environmental conditions, which thus become important determinants of the overall contractile process.

A69-80379
DETERMINATION OF THE SENSITIVE VASCULAR SITES FROM WHICH HYPOXIA AND HYPERCAPNIA ELICIT RISES IN PULMONARY ARTERIAL PRESSURE.

Edward H. Bergofsky, Francois Haas, and Robert Porcelli (N. Y. U., School of Med., Depts. of Rehabil. Med. and Physiol., New York City).

Federation Proceedings, vol. 27, Nov.-Dec. 1968, p. 1420-1425. 10 refs.

Microcirculatory Soc. Symp., Atlantic City, Apr. 15, 1968.

Grant HRC U-1249.

The purpose of the study was to locate the portion of the pulmonary vascular bed at which hypoxia and hypercapnia are effective in eliciting pulmonary vasoconstriction. The isolated perfused lung of the cat was used in conjunction with a disc-type blood-gas equilibration in order to impose either hypoxia or hypercapnia selectively on various portions of the precapillary pulmonary vascular segments, the alveoli and capillaries, and the postcapillary vascular segments. The data were consistent with three

viewpoints that have emerged recently concerning the pulmonary vascular pressor responses to hypoxia and to hypercapnia. The first, that elaborate reflexes involving the autonomic and the central nervous system are unnecessary for these responses, was supported by the observations of pressor responses in the isolated lung with its nervous connections cut. The second, that one need not postulate an undiscovered reflex, such as an alveolo-vascular reflex, was supported by the fact that hypoxia and hypercapnia applied either at the alveolus or within the blood vessel were both effective in eliciting pulmonary hypertension. The third, that the site sensitive to hypoxia and hypercapnia is closely associated with pulmonary arterial, or precapillary, blood vessels, was supported by the observations that hypoxia and hypercapnia when localized to the pulmonary arteries elicited a rise in pulmonary vascular resistance; whereas, the same stimuli localized to the pulmonary veins did not do so. The data indicated that the sites in the pulmonary circulation most sensitive to hypercapnia differ from those most sensitive to hypoxia. Also, the fact that portions of the pulmonary arterial tree are differentially sensitive to hypoxia and hypercapnia suggested that the mechanisms through which these two stimuli act may not be similar or are at least more complicated than their theoretic ability to produce an increased H⁺ concentration.

A69-80380

EFFECT OF RADIOPROTECTORS ON BLOOD COAGULATION PROCESSES DURING ACUTE RADIATION SICKNESS IN GUINEA PIGS [VLIHANIE RADIOPROTEKTOROV NA PROTSESSY SVERTYVANIIA KROVI PRI OSTROI LUCHEVOI BOLEZNI U MORSKIKH SVINOK].

O. IA. Vorob'ev (USSR, Acad. of Med. Sci., Inst. of Exptl. Pathol. and Therapy, Sukhumi).

Radiobiologiya, vol. 8, Mar.-Apr. 1968, p. 310-313. 21 refs. In Russian.

The prophylactic effects of the antiradiation drugs cystamine and mexamine on blood coagulation processes were studied in guinea pigs. The animals were exposed to acute whole body Co⁶⁰ irradiation of 450 r. The drugs were injected subcutaneously 15 min. before irradiation. During acute radiation sickness a marked impairment of the recalcification time occurred in the guinea pigs. Cystamine and mexamine had a radioprotective effect on the recalcification time, but mexamine was more effective. Changes in the prothrombin index, fibrinogen concentration and fibrinolytic activity were noted during acute radiation sickness. The radioprotective drugs had no effect on these changes.

A69-80381

ESTIMATES OF PERMISSIBLE RADIATION DOSES IN PLANNED SPACE MISSIONS. [OBOSNOVANIE DOPUSTIMYKH DOZ OBLUCHENIIA PRI PLANIROVANII KOSMICHESKIKH POLETOV]

B. I. Davydov, V. V. Antipov, and P. P. Saksonov.

In Kosmicheskie Issledovaniia, vol. 6, May-Jun. 1968, p. 450-470. 78 refs. In Russian.

Estimates of the permissible radiation dose for spacecraft crew members during short and extended flights were presented. The different criteria such as somatic effects, life-shortening, leukemia, and genetic damage were analyzed for use as evaluating factors. New specific criteria (the resistance of the irradiated organism to the extremal flight factors) to evaluate the permissible level of ionizing radiation for the astronauts were discussed. The concept of "planned dose" (permissible dose) was introduced and a definition of "justifiable risk dose" (acceptable emergency exposure) was given. The importance of heterogeneous irradiation by different types of ionizing radiations was emphasized. Some values

of permissible doses calculated under dynamic flight factor conditions and partial irradiation (head and abdomen screened) were presented.

A69-80382

BIOLOGICAL EFFECTS OF MAGNETIC FIELDS [O BIOLOGICHESKOM DEISTVII MAGNITNYKH POLEI].

A. I. Dernov, P. I. Senkevich, and G. A. Lemesh.

Voenna-Meditsinskii Zhurnal, no. 3, Mar. 1968, p. 43-48. 7 refs. In Russian.

The present investigation established reliable and objective parameters to be used in studies on the effect of magnetic fields on humans. White rats, mice and rabbits were used in the experiments. The animals were exposed for periods lasting from four hr. to 10 days to constant magnetic fields with intensities of 300, 100 and 50 oersteds, and to alternating magnetic fields of 50 c.p.s. frequency and intensities of 50, 100 and 150 oersteds. Results of hematological and morphological studies were presented and discussed. An analysis of the findings showed that the constant magnetic field produced marked biological effects being observed with fields of relatively high intensity starting at 100 to 150 oersteds. Although large hematological and morphological changes related to damaged structures were not found, the occurrence of a certain shift could be explained by the inhibition of some regulatory function of the central nervous system. The preceding inferences needed further more detailed experimental corroboration.

A69-80383

ENHANCING MAN'S STATOKINETIC RESISTANCE [O POVYSHENII STATOKINETICHESKOI USTOICHIVOSTI CHELOVEKA].

V. I. Kopanov, V. IA. Lopukhin, and V. G. Strelets.

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

Statokinetic resistance was defined as man's ability to retain spatial orientation and work capacity in spite of the stimulation arising in passive as well as active space travel. Statokinetic resistance expressed more correctly man's potentialities in space travels than vestibular resistance alone. The problem of statokinetic resistance was closely related to the problem of motion sickness. The necessity to devise methods to enhance human tolerance to the statokinetic effect, and the problem could be approached in three ways: (1) training with simulators; (2) using antimotion drugs; and (3) with physical exercise programs especially selected for this purpose. The latter was investigated in this study, it being the most appropriate for wide application. It was found that athletes practicing diving, figure skating, basketball, swimming, and gymnastics were the most resistant to the statokinetic effect. The statokinetic resistance was increased 34-80% by swimming (crawl, breast stroke, butterfly, dolphin) four times a week for five mo. and when the crawl included a rotation around the body axis. The training effect of the swimming activity was lost three mo. after the exercises were discontinued, but it was retained longer when the crawl with rotation around the body axis was practiced.

A69-80384

THE BIOCHEMICAL CHARACTERISTICS OF RODOZIN (RHODIOLA ROSEA L.) STIMULANT EFFECT DURING MUSCULAR EXERCISE OF DIFFERENT DURATION [BIOKHMICHESKAIA KHARAKTERISTIKA STIMULIRUIUSHCHEGO DEISTVIA RODOZINA PRI DOZIROVANNOI MYSH-ECHNOI NAGRUZKE].

A. S. Saratkov, B. IU. Sal'nik, T. A. Revina, E. A. Dambueva, G. I. Bakhareva, V. A. Telesheva, and V. A. Kapustina.

Izvestia Sibirskogo Otdeleniia Akademii Nauk SSSR, no. 5, Apr. 1968, p. 108-115. 8 refs. In RUSSIAN.

The effect of rodozin (*Rhodiola rosea* L.) as a central nervous system stimulant was investigated by studying some basic indices of skeletal muscles, brain, liver and blood metabolism in rats during muscular exercise of various duration. The drug was administered subcutaneously and the indices were determined at rest and after exercise. At rest the drug activated glycolysis, caused a decrease of glycogen content in the liver, and increased lactic acid concentration in the muscles and blood. The increase in glycolysis at rest seemed to be one of the causes of the subsequent activation in the respiratory phosphorylation. Animals receiving rodozin performed physical exercises with a lower glycolysis rate, a smaller muscle and brain glycogen expenditure, and an increased rate in lipid metabolism. After the work, an improved balance of high-energy phosphorus compounds and glycogen in the brain and the muscles, a higher level of phospholipids in the liver and the muscles, and sugar in the blood were noted in the rats. During muscular exercise rodozin seemed to regulate the respiratory phosphorylation which resulted in a stabilization of high-energy phosphorus compound concentration. The improvement of energy metabolism during physical exercise in animals receiving rodozin was also reflected in the normalization of the nitrogen metabolism rate.

A69-80385

CORRELATION BETWEEN THE RADIOPROTECTIVE EFFECT OF BETA-AMINOETHYLISOTHIURONIUM AND THE RADIATION DOSAGE. [O ZAVISIMOSTI RADIOZASHCHITNOI EFFEKTIVNOSTI BETA-AMINOETILIZOTIURONIIA OT DOZY RADIATSII].

S. S. Vishnevskaia.

Izvestiia Akademii Nauk Kazakhskoi SSR, Seriya Biologicheskaiia, no. 3, May-Jun. 1968, p. 82-86. 11 refs. In Russian.

The administration of beta-aminoethylisothiuronium (AET) to mice 7 to 15 min. before exposure to a radiation dose of 600 r increased the survival of the animals up to 40%; when the mice were exposed to 1,000 r no protective effect was noted. The prophylactic administration of AET to mice exposed to acute radiation increased the amount of viable cells of the bone marrow. The dose reduction coefficient remained constant and did not depend on the radiation dosage. The number of uninjured cells in the total bone marrow attained its maximum with radiation doses of 600 r, and it decreased with a smaller or greater dose exposure.

A69-80386

THE RELATIVE RADIOSENSITIVITY OF NUCLEIC ACIDS (DNA AND RNA) SYNTHESIS, THE CELL GROWTH, AND REPRODUCTION IN YEAST [OTNOSITEL'NAIA RADIOCHUVSTVITEL'NOST' SINTEZA NUKLEINOVYKH KISLOT (DNK I RNK), ROSTA I RAZMNOZHENIIA DROZHZHEVYKH KLETOK].

E. N. Sokurova and V. I. Korogodin (USSR, Acad. of Sci., Inst. of Biol. Physics, Obninsk).

Radiobiologiya, vol. 8, Jan.-Feb. 1968, p. 7-16. 8 refs. In Russian.

Cultures of *Saccharomyces vini* strain Megri 139-G cells were used to study the effect of gamma-irradiation on nucleic acid synthesis (DNA, RNA), cell reproduction and growth. It was found that ionizing radiation inhibited in various degrees the different functions of the yeast cells; though the first postirradiation gemmation was not prevented, the subsequent reproduction processes were markedly more delayed than the RNA synthesis and the biomass increase. The radiosensitivity of DNA synthesis occupied an intermediary position. The average dry weight and RNA content in a single cell of the growing irradiated cultures were found to exceed a few times that of a similar non-irradiated cell. A surplus of

DNA accumulation related to a lighter inhibition of DNA synthesis occurred in the irradiated cells in comparison with the inhibition of cell division. With the resulting increase of cell concentration in the growing medium an inhibition of various trophic functions were observed, both in irradiated and non-irradiated cultures. The postirradiation recovery processes were affected in a significantly lesser degree by the density of the cell suspension than cell reproduction and DNA synthesis.

A69-80387

CHANGES IN THE CALCIUM CONTENT OF RABBIT TISSUES UNDER THE EFFECT OF IONIZING RADIATION AND COMPOUNDS, AFFECTING THE OXIDATIVE PHOSPHORYLATION [IZMENENIE SODERZHANIIA KAL'TSIIA V TKANIAKH U KROLIKOV PRI DEISTVII IONIZIRUIUSHCHEI RADIATSII I VESHCHESTV, VLIIAIUSHCHIKH NA OKISLITEL'NOE FOSFORILIROVANIE].

S. P. Grozdov (USSR, Min. of Health, Inst. of Biophysics, Moscow).

Radiobiologiya, vol. 8, Jan.-Feb. 1968, p. 23-29. 32 refs. In Russian.

The effect of radiation on the calcium content of different tissues was studied in rabbits by taking into account the close relationship existing between calcium metabolism and oxidative phosphorylation and the changes occurring in high energy phosphate metabolism during radiation sickness. The effect of stimulants and compounds dissociating the oxidative phosphorylation were also investigated. A marked increase of calcium concentration in different tissues was noted in rabbits exposed to whole-body gamma irradiation of 800 r, or injected subcutaneously with Polonium-210. An accumulation of calcium in the tissues was also observed after administration of compounds which dissociated the oxidative phosphorylation (2,4-dinitrophenol, sodium oleinate). Administration of adenosine diphosphate and magnesium chloride decreased the level of calcium in the blood plasma. Irradiation and dissociative compounds eliminated this reaction. It seemed that the concentration of calcium in the tissues played an important part in the deterioration of the oxidative and phosphorylation processes during radiation exposure and treatment with the drugs.

A69-80388

STRONTIUM-90 METABOLISM IN GROWING RATS AS A FUNCTION OF AGE AND CALCIUM EXCHANGE [OBMEN STRONTSIIA-90 U RASTUSHCHIKH KRYS KAK FUNKTSIIA VOZRASTA I SOSTOIANIIA KAL'TSIEVOGO OBMENA].

Z. V. Dubrovina and I. A. Sarapul'tsev (USSR, Min. of Health, Inst. of Biophysics, Moscow).

Radiobiologiya, vol. 8, Jan.-Feb. 1968, p. 40-45. 7 refs. In Russian.

The interrelationships of strontium and calcium metabolic processes were studied in young rats born to mothers on a strontium-90 diet and exposed either continuously or to a single dose of Sr⁹⁰ and Ca⁴⁵ while on diets of various calcium contents, (deficient, normal and high calcium). The animals were observed over a period of 120 days, during this period their body weight increased linearly. Bone absorption and retention of calcium and strontium 90, discrimination against ingested Sr⁹⁰ relative to Ca⁴⁵, gastrointestinal absorption of Sr⁹⁰ during the growth period were determined and discussed. The results showed that the only acceptable variant in calcium defense was to maintain a strictly normal calcium diet. Increase of the dietary calcium level proved ineffective when the excess was not absorbed by the gastrointestinal tract, or it disrupted the calcium metabolism when it was absorbed. This raised once more the crucial question of what is the normal calcium level in men and animals.

A69-80389**EFFECT OF CYSTAMINE ON THE POST TRAUMATIC REGENERATION OF THE SKELETAL MUSCLES IN LOCALIZED RADIATION [VLIANIE TSISTAMINA NA POSTTRAVMATICHESKUIU REGENERATSIIU MESTNO OBLUCHENNOI SKELETNOI MUSKULATURY].**

A. A. Klishov and A. I. Ivanov (S. M. Kirov Mil.-Med. Acad., Leningrad, USSR).

Radiobiologiya, vol. 8, Jan.-Feb. 1968, p. 58-61. 7 refs. In Russian.

The antiradiation effect of cystamine was studied in the post traumatic regeneration of somatic muscles exposed to localized irradiation. White rats with similar weight were used for the experiments, they were divided into four groups. The tibial muscle was incised in all the animal. The first group was used as controls, and in the second group the incision was performed after irradiation. The third group was administered cystamine prior to the incision and the fourth received cystamine two hr. before irradiation than two hr. later the irradiated muscle was incised. The data obtained showed that the prophylactic administration of cystamine resulted in some improvement of the regeneration processes in the irradiated muscle and consequently has some radiation protection effect in muscular tissues.

A69-80390**AMOUNT OF IMMUNOCOMPETENT AND COLONY FORMING CELLS IN THE MICE SPLEEN AT DIFFERENT INTERVALS AFTER IRRADIATION [KOLICHESTVO IMMUNOKOMPETENTNYKH I KOLONIEOBRAZUIUSHCHIKH KLETOK V SELEZENKE MYSHEI V RAZNYE SROKI POSLE OBLUCHENIIA].**

V. A. Kozlov and L. S. Sestlavina (USSR, Min. of Health, Inst. of Biophysics, Moscow).

Radiobiologiya, vol. 8, Jan.-Feb. 1968, p. 72-78. 15 refs. In Russian.

The effects of radiation on the survival and proliferation of antibody-producing cells were studied in mice at various time intervals after exposure to Co⁶⁰ gamma rays of 600 r. It was determined that mice immunized on the first and seventh day of the postirradiation period had the maximal inhibition of antibody formation. The antibody formation mechanism was partially reestablished in the animals about 30 days after irradiation. But even with immunization there was no complete restoration of the number of immunocompetent cells in the spleen 60 days after exposure: their number represented 59 and 46% of the number of these cells in control per 1.10⁷ spleen cells and whole spleen respectively. The number of colony-forming units (CFU) determined in the mice spleen at different time intervals after exposure showed a sharp decrease on the first and seventh postirradiation day. One m. after the exposure the amount of CFU per 1.10⁷ spleen cells was 103% and 63% of the whole spleen. The CFU level in test animals reached the CFU level in controls two m. after irradiation and was respectively 108 and 137% per 1.10⁷ spleen cells and whole spleen. It could be inferred that in mice exposed to 600 r the number of colony forming units in the spleen returned to the normal level more rapidly after irradiation than the antibody producing cells.

A69-80391**EFFECT OF CYSTAMINE ON BLOOD VESSEL TONUS BEFORE AND AFTER IRRADIATION [VLIANIE TSISTAMINA NA TONUS KROVENOSNYKH SOSUDOV DO I POSLE OBLUCHENIIA].**

T. I. Bachurina (S. M. Kirov Mil.-Med. Acad., Leningrad, USSR). *Radiobiologiya*, vol. 8, Jan.-Feb. 1968, p. 92-94. 22 refs. In Russian.

The present study investigated the character of the vasomotor reactions in animals receiving a protective dose of cystamine prior to irradiation. The isolated, perfused-rabbit-ear method was used, and the animals were irradiated with 800 r with a dose rate of 24.8 r/min. The findings showed that cystamine decreased the vasoconstriction reactions in the rabbit ear that were usually observed during the initial reaction period to irradiation. This effect could be related to the spasmolytic and adrenergic action of cystamine.

A69-80392**EFFECT OF ANTIRADIATION DRUGS ON IRREVERSIBLE RADIATION INJURIES [VLIANIE PROTEKTOROV NA NEOBRATIMUIU KOMPONENTU LUCHEVOGO PORAZHENIIA].**

S. P. Armonenko, O. P. Ol'shevskaia, and N. L. Shmakova (USSR, Acad. of Med. Sci., Inst. of Labor Hyg. and Occupational Diseases, Moscow).

Radiobiologiya, vol. 8, Jan.-Feb. 1968, p. 95-100. 27 refs. In Russian.

This report attempted to evaluate comparatively the importance of somatic mutations of the bone marrow and liver cells induced directly by radiation. The formation of delayed effects, as well as the effect of antiradiation drugs was studied. Mice and rats were exposed to X-rays, Co⁶⁰ gamma rays or proton radiation. Beta-aminoethylisothiuronium (AET), mexamine, MEA and cystaphos were used as radio-protectors and were injected intraperitoneally ten min. before irradiation. The radiosensitivity of bone marrow and liver cells using the chromosomal aberration criteria differed slightly, about 15-20% of aberrant cells occurred for an exposure of 100 r. Mexamine was equally effective in protecting marrow and liver cells, whereas the thiols were not too effective as protectors in liver cells. The role of the radiation injuries in chromosomes in the formation of irreversible injuries was investigated. In active proliferating tissues its effect was apparent both in acute and delayed radiation effects. In tissues with low physiological regeneration it conditioned mainly the development of delayed effects. The results obtained on the protection of chromosome breakage in the marrow and liver cells agreed with the literature data on the differentiated action of antiradiation drugs on direct and delayed effects in organs with high and low proliferation activity.

A69-80393**FORMATION OF FOLIC ACID FORMYL DERIVATIVES IN THE LIVER HYALOPLASM IN PIGEONS AFTER IRRADIATION AND ADMINISTRATION OF RADIOPROTECTORS [OBRAZOVANIE FORMIL'NYKH PROIZVODNYKH FOLIEVOI KISLOTY V GIALOPLAZME PECHENI GOLUBEI POSLE OBLUCHENIIA I VVEDENIIA PROTEKTORA].**

E. F. Romantsev and S. K. Khalikov (USSR, Min. of Health, Inst. of Biophysics, Moscow).

Radiobiologiya, vol. 8, Jan.-Feb. 1968, p. 107-110. 16 refs. In Russian.

The processes of biosynthesis of folic acid formyl derivatives (FAFD) were studied in the liver extracts of irradiated and non-irradiated pigeons and when beta-mercaptopyrrolamine was administered as a radioprotector. The FAFD's were determined by chromatography and were identified by their maximum absorption by UV. Two-C¹⁴-formate was used as the one-carbon compound donor. It was found that the formation of FAFD was inhibited 10 to 60 min. after the pigeons were exposed to a minimum lethal gamma radiation dose. It returned to normal 24 hr. after the exposure. A marked depression in FAFD was observed in the liver extract 10 min. after the injection of protective doses of beta-mercaptopyrrolamine.

A69-80394

STUDY OF THE OXYGEN EFFECT IN THE RADIOPROTECTIVE ACTION OF PROPYLAMINE AND ITS COMPOUNDS [ISSLEDOVANIE ROLI "KISLORODNOGO EFFEKTA" V RADIOZASHCHITNOM DEISTVII PROPILAMINA I EGO PROIZVODNYKH].

M. M. Konstantinova, O. M. Sokolova, and A. G. Tarasenko (USSR, Acad. of Sci., Inst. of Biol. Develop., Moscow). *Radiobiologiya*, vol. 8, Jan.-Feb. 1968, p. 149-150. In Russian.

Experiments were conducted on white mice to study the role of oxygen in the antiradiation effect of sulfhydryl compounds. The SH- and Br-derivatives of the propylamine series were used. These include propylamine, beta-mercaptpropylamine, dimercaptpropylamine, beta-mercapto, gamma-brompropylamine and dibrompropylamine. The drugs were administered 15, 30, 60, 90 and 120 min. before the exposure of the animal to acute whole-body gamma irradiation of 900 r. Survival of 30 days after irradiation was used as the radiosensitivity criterion. The oxygen tension in the spleen was determined *in situ* by polarography. The results obtained confirmed the theory that the antiradiation drug should contain the sulfhydryl group in its molecule to have an effect. Changes of oxygen tension in the tissues with the development of hypoxia was regulated by the introduction of the SH-group in the gamma-position or of a halogen in the presence of the sulfhydryl group in the beta position.

A69-80395

DEPENDENCE OF THE RADIOSENSITIVITY IN RATS ON INDIVIDUAL DIFFERENCES BETWEEN THEORETICAL AND REAL OXYGEN CONSUMPTION [ZAVISIMOST' RADIOCHUVSTVITEL'NOSTI KRYS OT INDIVIDUAL'NOI RAZNITSY RASCHETNOGO I DEISTVITEL'NOGO POTREBLENIIA KISLORODA].

L. Novak, M. Pospishil, and B. Goshek (Czechoslovak Acad. of Sci., Inst. of Biol. Physics, Brno). *Radiobiologiya*, vol. 8, Jan.-Feb. 1968, p. 152-154. 13 refs. In Russian.

The possible existing relationship between the state of the energy balance prior to irradiation expressed by the index of the change in oxygen consumption (ΔO_2) and the lethal effect of acute whole-body irradiation, was investigated in rats. The results showed that the sensitivity of the animals to acute whole-body irradiation of 600, 675 or 800 r, expressed by the survival percentage 30 days after irradiation, depended to a certain degree on the intensity of the energy metabolism, determined before irradiation and expressed by the amount ΔO_2 . These results confirmed data obtained in previous studies on the changes occurring in the body weight after non-lethal irradiation that were related to the ΔO_2 value.

A69-80396

QUANTITATIVE CHANGES IN THE CELLS OF THE HEMOPOIETIC SYSTEM EXPOSED TO IONIZING IRRADIATION [KOLICHESTVENNYE IZMENENIIA KLETOK KROVOTVORNYKH ORGANOV POD VOZDEISTVIEM IONIZIRUIUSHCHEGO OBLUCHENIIA].

E. A. Tarakhtii (USSR, Acad. of Sci., Inst. of Plant and Animal Ecol., Sverdlovsk). *Radiobiologiya*, vol. 8, Jul.-Aug. 1968, p. 514-518. In Russian.

Changes in the total number of nucleated cells were studied simultaneously in the spleen, lymphatic nodes, femoral bone marrow, and one ml. of peripheral circulation in mice at different intervals after acute total body gamma-irradiation in LD₅₀₍₃₀₎ doses. The cell counts fell in the tissues as follows: (1) 10 times in the

spleen; (2) 30 times in the bone marrow; (3) 42 times in the blood, in the inguinal lymph node 90 times; and (4) in the mesenteric lymph node 180 times. The time periods of maximum decrease in the cell counts varied in the spleen and bone marrow (four days), in the inguinal lymph node (eight days), in the mesenteric lymph node and peripheral circulation (16 days). At the end of the observation period (32 days) the cell count was entirely restored in the spleen, bone marrow and peripheral circulation. In the mesenteric lymph node it reached 42% of the preirradiation level and in the inguinal lymph node 16%. The peripheral circulation did not always reflect the state of the hemopoietic tissues. The weight of the studied organs also decreased (four to five times), and this accounted for the lower rate in changes in the cell count per weight unit of tissue.

A69-80397

POSITIVE REACTIONS OF PLASMA AND AUTOERYTHROCYTE LYSATES RELATED TO THE RADIATION DOSAGE AND THE ADMINISTRATION OF S, BETA-AMINOETHYLISOTHIURONIUM [POLOZHITEL'NYE REAKTSII PLAZMY S LIZATOM AUTOERITROTSITOV V ZAVISIMOSTI OT DOZY OBLUCHENIIA I VVEDENIIA S, BETA-AMINOETILIZOTIURONIIA].

E. I. Lavrenchik (USSR, Acad. of Med. Sci., Inst. of Labor Hyg. and Occupational Diseases, Moscow). *Radiobiologiya*, vol. 8, Jul.-Aug. 1968, p. 565-568. 15 refs. In Russian.

The number of positive reactions of the plasma with autoerythrocyte lysates in mice was linearly related to the radiation dosage of 300 to 850 r. The protective effect of S, beta-aminoethylisothiuronium in mice exposed to irradiation doses of 700 and 850 r, was two times smaller on the immunocompetent cells than in bone marrow cells, while the dose reduction factor of the autoantibodies was 1.5. Further experiments with the erythrocyte lysates and plasma of irradiated (700 r) and non-irradiated mice showed that the plasma of irradiated animals reacted with erythrocyte lysates of non-irradiated animals, but that the plasma of non-irradiated animals did not react with the erythrocytes of irradiated animals.

A69-80398

KINETICS OF THE HEMOPOIETIC SYSTEM RECOVERY PROCESSES IN MICE AFTER GAMMA-IRRADIATION [KINETIKA VOSSTANOVITEL'NYKH PROTSESSOV V KROVOTVORNOI SISTEME MYSHEI POSLE GAMMA-OBLUCHENIIA].

E. D. Plotnikova, L. Kh. Eidus, and V. P. Kovalev (USSR, Acad. of Sci., Inst. of Biol. Physics, Pushchino-na-Oke). *Radiobiologiya*, vol. 8, Jul.-Aug. 1968, p. 573-581. 12 refs. In Russian.

Kinetics of hemopoietic recovery in the stem cell population were studied in mice exposed to fractionated gamma-irradiation. The change in the number of colony-forming units (CFU) after irradiation with different sub-lethal doses including preliminary administration of aminoethylisothiuronium were used as a parameter. A significant compensation of the damages in the pool of the CFU was observed in the first postirradiation days. The recovery of the pool of the CFU stopped on the fourth to fifth day. According to a proposed hypothesis these occurrences could be explained by the activation of the pool of durable stem cells. These results were compared with the recovery processes using the animals survival as a criterion.

A69-80399**RADIOPROTECTIVE EFFECT OF S-ALKYL SUBSTITUTED DERIVATIVES OF ISOTHIUREA SALTS IN SINGLE OR COMBINED TREATMENT [RADIOZASHCHITNYI EFEKT SOLEI S-ALKILZAMESHCHENNYKH PROIZVODNYKH IZOTIOMOCHEVINY PRI IKH RAZDEL'NOM I KOMBINIROVANNOM PRIMENENII].**

P. G. Zhrebchenko, I. U. D. Zil'ber, G. P. Pospekhova, F. I. U. Rachinskii, N. M. Slavachevskaia, and L. I. Tank (S. M. Kirov Mil.-Med. Acad., Leningrad, USSR).

Radiobiologia, vol. 8, Jul.-Aug. 1968, p. 582-587. 25 refs. In Russian.

The radioprotective effects of S-ethylisothiuronium salts and other S-alkyl derivatives of isothiurea, alone and in combination with other radioprotectors were studied in white mice. The animals were exposed to doses of X-irradiation of 700 and 850 r. It was demonstrated that the chemical structure of the anion did not inhibit the antiradiation activity of S-ethylisothiuronium which was apparent in a wide dose range (12.5 to 150 mg./kg.). In combined administration of the radioprotectors, S-ethylisothiuronium enhanced the radioprotective effect of beta-aminoethylthiophosphate but did not influence the effect of 5-methoxytryptamine. The results indicated that the mechanism by which S-ethylisothiuronium attenuated the radiation damage differed from aminothiols and showed similarities with indolylalkylamines.

A69-80400**EFFECT OF RADIOPROTECTIVE AGENTS (ADRENALINE, MORPHINE, SODIUM NITRITE) ON THE LEVEL OF PROTEIN BOUND SULFHYDRYL GROUPS IN MICE BONE MARROW CELLS [VLIANIE RADIOZASHCHITNYKH AGENTOV (ADRENALINA, MORFINA, NITRITA NATRIIA) NA UROVEN' BELKOVYKH SUL'FGIDRIL'NYKH GRUPP V KLETKAKH KOSTNOGO MOZGA MYSHEI].**

G. V. Dontsova and E. I. A. Graevskii (USSR, Acad. of Sci., Inst. of Biol. Develop., Moscow).

Radiobiologia, vol. 8, Jul.-Aug. 1968, p. 630-632. 8 refs. In Russian.

Results were presented from studies on the changes in the concentration of protein sulfhydryl (SH) groups in the mouse bone marrow cells under the effect of adrenaline, morphine, and sodium nitrite. Quantitative determination of protein SH-groups was carried out cytophotometrically. The mean values of single cell extinction obtained after administration of the radioprotective agents were higher than the mean values of extinction under normal conditions and very similar to the results obtained in anoxic conditions. The data showed that at their maximum radioprotective activity the protectors studied distinctly increased the level of protein SH groups in the mouse bone marrow cells.

A69-80401**EVALUATION OF PHYSICAL TRAINING BY OVERLOAD FUNCTIONAL TEST METHODS [OTSENKA FIZICHESKOI TRENIROVANNOSTI METODOM VYSOKONAGRUZOCHNOI FUNKSIONAL'NOI PROBY].**

T. T. Dzhamgarov, I. U. K. Dem'ianenko, L. A. Kustov, P. I. Kalinin, V. L. Marishchuk, G. I. Topuriia, and E. E. Shuvaev.

Voenno-Meditsinskii Zhurnal, no. 1, Jan. 1968, p. 66-69. In Russian.

The importance of correct evaluation of the physical fitness of pilots was discussed. One of the most simple and easily administered tests to determine the level of physical training and the functional capacity of the cardiovascular system in student and young pilots (to 35 yr.) seemed to be the Harvard step-test

slightly modified by reducing the stepping period to three min. and changing the scoring index. It would be a valuable addition to the routine procedure carried out during aeromedical evaluation of flying personnel fitness.

A69-80402**VASCULAR REFLEX REACTION OF THE NOSE MUCOSA IN DIVERS [O REFLEKTORNOI SOSUDISTOI REAKTSII SLIZISTOI NOSA U VODLAZOV].**

I. N. Nikiforov.

Voenno-Meditsinskii Zhurnal, no. 1, Jan. 1968, p. 70-73. In Russian.

The vascular reflex reaction of the nose mucosa was studied in student divers before training (winter) and after training (summer) under normal and high atmospheric pressures (up to three atm.), and after training in decompression chambers at high pressures (up to three atm.). The findings showed that systematic training decreased the vascular reflex reaction of the nose mucosa when the feet were immersed in cool water. The vascular reflex reaction of the nose mucosa did not disappear after completion of training but remained at the reaction level of physically fit individuals. A decrease of 0.35° C. of the nose mucosa temperature should be considered a low rate vascular reaction. The spastic vascular reflex reaction induced by high pressures was not seen in well trained divers. Training at high atmospheric pressures sharply decreased the intensity of the vascular reflex reaction at normal atmospheric pressure; however no important effects were noted at high pressure.

A69-80403**REPETITION VERSUS LUMINANCE AS A DETERMINANT OF RECOGNITION.**

Lionel G. Standing, B. Dennis Sales, and Ralph Norman Haber (Rochester, U., N. Y.).

Canadian Journal of Psychology, vol. 22, Dec. 1968, p. 442-448. 9 refs.

Grants PHS MH 10753 and NSF GB 5910.

The effect of repeated brief exposures of single-letter stimuli was studied to determine whether the number of repetitions of a stimulus may be varied inversely with its luminance to produce a constant level of recognition performance. This postulated reciprocity relationship was refuted: performance always declined when the luminance was reduced (even though the number of repetitions increased). However, the deviation from reciprocity was small for stimuli at or above threshold luminance, and the facilitatory effect of repetition upon recognition was clearly shown for all luminance levels employed. Implications of the findings for models of visual information processing are briefly discussed.

A69-80404**A MATHEMATICAL MODEL FOR THE CONTINUOUS CULTURE OF MICROORGANISMS UTILIZING INHIBITORY SUBSTRATES.**

John F. Andrews (Clemson U., Environ. Systems Eng., S. C.).

Biotechnology and Bioengineering, vol. 10, Nov. 1968, p. 707-723. 12 refs.

Grant FWPCA WP-00622.

A mathematical model is presented for both batch and continuous cultures of microorganisms utilizing inhibitory substrates. The key feature of the model is the use of an inhibition function to relate substrate concentration and specific growth rate. Simulation studies show that the primary result of inhibition by substrate in a batch culture is an increase in the lag time whereas in continuous culture inhibition by substrate may result in process instability. The model should be of value in investigations of the stability of

A69-80405

biological processes used for the treatment of certain industrial wastes such as those containing phenols, thiocyanates, nitrates, ammonia, volatile acids, etc., which are known to be inhibitory to many of the organisms metabolizing them.

A69-80405**THE ROLE OF EXPERIENCE IN JUDGMENTS OF COMPLEXITY OF RANDOM SHAPES.**

Linda S. Siegel (Mo., U., Columbia).

Canadian Journal of Psychology, vol. 22, Dec. 1968, p. 474-483. 10 refs.

Mo., U. supported research.

The role of experience in the estimation of number of turns in random shapes was examined using two types of training procedures with third-grade, sixth-grade, and college subjects. Systematic training groups practised discriminating similar levels of complexity; random training groups practised discriminating widely varying levels of complexity. Both training experiences resulted in significant improvements in the performance of college students when compared with a control group. The improvement in processing ability occurred primarily at the lower levels of complexity. However, third- and sixth-grade training groups showed no significant improvement in performance. College students also showed a significant tendency to underestimate the information in random shapes as a result of the training, a finding which may account for previously reported preference shifts.

A69-80406**THE APPARENT PITCH OF SHORT TONES.**

Irwin Pollack (Mich., U., Ann Arbor).

American Journal of Psychology, vol. 81, Jun. 1968, p. 165-169. 11 refs.

Grant NSF GB 6148.

The apparent pitch of short tones was determined by a frequency-matching procedure. Subjects adjusted the frequency of a 1.0-sec. comparison-tone to match the pitch of a short tone. As the duration of tones decreased, the variability of frequency-adjustments across subjects sharply increased. The apparent pitch of short low-frequency tones was shifted upward; the apparent pitch of short high-frequency tones was shifted downward; and the apparent pitch of short intermediate-frequency tones was unshifted. The results support the proposition that the mode of processing low-frequency auditory information may differ from that of high-frequency auditory information.

A69-80407**MODIFICATION OF THE DISPARITY-DEPTH RELATIONSHIP AS A RESULT OF EXPOSURE TO CONFLICTING CUES.**

William Epstein (Kan., U., Lawrence).

American Journal of Psychology, vol. 81, Jun. 1968, p. 189-197. 10 refs.

Grant PHS MH 4153-07.

An experiment was conducted to determine if continuous exposure to cue-conflict involving binocular disparity and kinetic-depth effect leads to modification of disparity-depth relationship. The experiment was designed to eliminate sources of information which may have contributed to the modification reported earlier. A total of 160 subjects, eight in each of 20 conditions, judged the separation in depth of a pair of points viewed binocularly in total darkness, telestereoscopically viewed a rotating skeletal wire octahedron, and then once more judged the depth between the pair of points. (The 40 subjects invulnerable to the telestereoscopic

effect had already been eliminated.) Duration of training (2, 4, 6, 8, and 10 min.) and number of rotations during training (24, 48, 72, and 96) were varied. The results confirmed Wallach's conclusion that exposure to conflicting cues leads to perceptual learning, in this case to a modification of the disparity-depth relationship. They may also have more general implications for an understanding of the effectiveness of a certain class of cues for visual space perception.

A69-80408**ESTIMATION OF DISTANCE OF A SOURCE OF SOUND.**

Paul Cochran, Janet Throop, and W. E. Simpson.

American Journal of Psychology, vol. 81, Jun. 1968, p. 198-206. 8 refs.

Grant NSF GY 196.

Three experiments investigated estimation of the distance of a speaker, using auditory cues only, in relatively free-field outdoor situations (Experiments I and II) and in more reverberatory indoor situation (Experiment III). Binaural difference-cues from head movement and varying source-direction did not appear to influence judgments. Distance of the standard stimulus, relative to which magnitude-estimates were made, proved critical in determining error of estimation. The principal error notes was underestimation of far distances, especially relative to nearer standards. In the free-field situations a power function adequately described the relationship between physical distance and judged distance, although in the reverberatory setting this was not the case.

A69-80409**COMPARISON OF THREE METHODS TO DETERMINE THRESHOLDS FOR PERCEPTION OF ANGULAR ACCELERATION.**

Brant Clark and John D. Stewart (NASA, Ames Res. Center, Moffett Field, Calif.).

American Journal of Psychology, vol. 81, Jun. 1968, p. 207-215. 21 refs.

The purpose of this study was to compare three psychophysical methods used to determine thresholds for the perception of angular acceleration in man. Sixteen men with normal vestibular function were studied using three random forced-choice procedures with a simulator rotating the subject about a vertical axis. The Constant method, using a 10-sec. constant acceleration, was found to be the most reliable, and there was a high correlation between thresholds determined by a forced-choice random double-staircase method and the Constant method. The constantly-increasing accelerations of the Ramp method were found to produce unreliable, equivocal results. The thresholds determined by the Constant and Staircase methods for 16 subjects varied between 0.07° and 1.19°/sec.²

A69-80410**EFFECTS OF FREQUENCY ON IDENTIFICATION AND NAMING OF OBJECTS.**

Arthur Wingfield (Brandeis U., Waltham, Mass.).

American Journal of Psychology, vol. 81, Jun. 1968, p. 226-234. 16 refs.

Med. Res. Council supported research.

Two experiments attempted to determine whether differences in naming-latencies for common and rare objects were due primarily to differences in the time devoted to (1) sampling the stimulus for visual information, (2) processing this information for perceptual identification of the object, or (3) selecting the appropriate verbal response. Visual sampling-time, as estimated by visual-duration thresholds, yielded systematic differences for common and rare objects, but these differences were too small to account directly for

differences in naming-latency. Latencies to same-different judgments between a name and the picture of an object were the same for common and rare objects. Results were consistent with the suggestion that differences in naming-latencies for common and rare objects are due primarily to differences in the time occupied in response-selection, rather than in the time required for perceptual identification.

A69-80411
VIBRATORY STIMULATION OF THE SKIN BY ELECTROSTATIC FIELD: EFFECTS OF SIZE OF ELECTRODE AND SITE OF STIMULATION ON THRESHOLDS.

Thomas J. Moore (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
American Journal of Psychology, vol. 81, Jun. 1968, p. 235-240. 8 refs.

The vibratory sensitivity of the skin was studied by means of an electrostatic force, and the effects of electrode-area and site of stimulation were determined. Electrostatic stimulation provided an effective means of determining vibratory sensitivity of the skin without having the electrode in direct contact with the skin. For both the hand and the arm, the smallest electrode gave the highest thresholds and the two larger electrodes gave lower and similar threshold values. For the finger, variation of electrode-area resulted in little change in threshold. The effects of site of stimulation were, as expected, that the finger was the most sensitive, the hand less so, and the arm least sensitive. The shape of the threshold-frequency function appeared to differ for the three sites and may have partially depended on the mechanical characteristics of the skin at the site of stimulation.

A69-80412
THE BASIS OF POSITION-CONSTANCY DURING PASSIVE MOVEMENT.

Irvin Rock (Rutgers-The State U., Inst. for Cognitive Studies, New Brunswick, N. J.).
American Journal of Psychology, vol. 81, Jun. 1968, p. 262-265. 10 refs.
 Grant NSF GB-3410.

A subject transported passively in a vehicle ordinarily does not perceive the world as moving despite the displacement of the retinal image. It was demonstrated that when a subject is moved at uniform velocity along a straight path this position-constancy is based on the tendency of a displacing frame of reference to induce a sense of movement in a subject. If however, a subject is accelerated, proprioceptive-vestibular information also yields position-constancy.

A69-80413
VISUAL ILLUSIONS.

Richard L. Gregory.
Scientific American, vol. 219, Nov. 1968, p. 66-76.

A number of visual illusions were presented and discussed according to the various theories associated with the attempted explanation of the illusions. Size constancy was suggested as a logical perceptual mechanism providing a reasonable theory of illusions. Measurement of illusions experienced by observers who are in motion with respect to their surroundings were discussed, and the experimental difficulties encountered were indicated. In the conditions of space, perception may be dominated by the prevailing hypothesis of distance and velocity. If either is wrong, as it may be for lack of reliable visual information, astronauts may suffer visual illusions that could be serious. The importance of individual

perceptual learning for associating the nonoptical properties of objects with their retinal images was also discussed.

A69-80414
ARTERIAL OXYGEN TENSION DURING OXYGEN BREATHING.

R. Victor Glick (St. Joseph Hosp., School and Dept. of Respirat. Therapy, Lancaster, Pa.) and John N. Benner (Lancaster Gen. Hosp., Pa.).

Inhalation Therapy, vol. 13, Jun. 1968, p. 31-33. 7 refs.
Am. Assn. for Inhalation Therapy, 13th Ann. Meeting, Los Angeles, Nov. 12-17, 1967.

A.A.I.T. supported research

Arterial oxygen tension was measured in 12 healthy subjects between the ages of 19 and 26 to evaluate the effectiveness of oxygen delivered by nasal cannula, nasal catheter and face mask. Highest oxygen levels were achieved using the mask. Oxygen levels did not vary significantly using nasal cannula or nasal catheter whether the subject breathed through his mouth or nose. Overall evaluation of comfort placed the cannula first, mask second, and catheter last.

A69-80415
HYPOTHERMIA: EFFECT ON CANINE BRAIN AND WHOLE-BODY METABOLISM.

John D. Michenfelder and Richard A. Theye (Mayo Clin. and Mayo Found., Sect. of Anesthesiol., Rochester, Minn.).

Anesthesiology, vol. 29, Nov.-Dec. 1968, p. 1107-1112. 16 refs.
 Grants PHS NB-7507, PHS HE-4881, and PHS HE-3588.

The effects of hypothermia (28 to 38° C.) on brain and whole-body metabolism were studied in ten dogs. Cerebral metabolic rates for oxygen, glucose, and lactate were calculated from the arterial-sagittal sinus blood differences and direct blood flow measurements. Whole-body oxygen uptake was measured by a closed-circuit spirometric method. The average extrapolated decrease in CMR_{O_2} for 10° C. was 55% ($Q_{10} = 2.23$) and in whole body V_{O_2} was 49% ($Q_{10} = 1.94$). These values are in agreement with van't Hoff's rule and with results of other whole-body studies but differ from results of other *in vivo* brain studies. The difference probably is accounted for by differences in methods. There was no evidence of an alteration in cerebral metabolic pathways occurring with cooling.

A69-80416
ELECTRONIC SYSTEMS FOR PHYSIOLOGICAL MEASUREMENT IN CLINICAL MEDICINE.

B. W. Watson (St. Bartholomew's Hosp., Dept. of Med. Electron., London, Great Britain).

Bio-Medical Engineering, vol. 3, Oct. 1968, p. 460-466. 12 refs.
 Physiological measurements in hospitals were discussed according to the situations in which the measurements are made, and examples of instrumentation for use in the four situations were presented. The four different situations were: (1) intracardiac measurements in the cardiac laboratory; (2) routine measurement of physiological variables in the ward, outpatient clinic, operating theater, recovery ward, or intensive therapy suite; (3) measurements which require radio telemetry because of the interactions between the measuring instrument and the physiological measurement, e.g. measurements in the intestinal tract using endoradiosonde techniques, and measurement during exercise using VHF radio-telemetry; (4) special measurements of specific variables relevant to a particular disease, requiring specially trained people for supervision of the measurement. A special room is sometimes provided for such measurements to be carried out as, for example, electromyographic and electroencephalographic measurements. It

A69-80417

was concluded that no system is ever successful without close integration of the electronic engineer, physicist and the clinician, with all workers understanding the problems involved in the particular measurement.

A69-80417

BIOCHEMICAL VARIATIONS DURING MUSCULAR FATIGUE [ZU PROBLEMEN BIOCHEMISCHER VERÄNDERUNGEN WAHREND DER MUSKELTÄTIGKEIT].

S. M. Binnewies (Deut. Zentralinst. für Arbeitsmed., Inst. für Arbeitshyg., Berlin, East Germany).

Zeitschrift für die gesamte Hygiene und ihre Grenzgebiete, vol. 14, Sep. 1968, p. 657-669. 176 refs. In German.

The stage of fatigue is associated with a number of biochemical factors which are characterized by changes of the intermediate stages of metabolism. Tiring physical work invariably leads to an accumulation and increase of lactate in the blood, to an oxygen deficit which arises at the beginning of each work, being increased along with the increasing intensity of work, and to a non-conformity between respiration and oxidative phosphorylation in the muscle. Physical work leads to a strong decrease of the standard bicarbonate relative to the efficiency per time unit. Along with the duration of work, the ammonia content in the blood increases, whereas the glutamine content in the muscle is decreased. There is a direct interrelation between the duration of work and the rise of urea in the blood and in the liver. Under conditions of prolonged strain the neutral fat in the blood is increased. Its content rises under a heavy strain. This process takes place due to the increased consumption of the depot fat. In the course of work there occurs an intensive consumption of carbohydrates and lipids which also depends on the intensity of the respective work. The content of ketone bodies in liver, muscles and blood depends on the duration of the respective work. Prolonged work which leads to a severe fatigue is characterized by hypokalemia and an increase of the glycolyse, which leads to a decrease of the ratio NAD:NADH and to a lowering of the entire NAD.

A69-80418

PROBLEMATICS OF INDIVIDUAL AUDITORY PROTECTION IN CIVIL AVIATION [ZUR PROBLEMATIK DES INDIVIDUELLEN HORSCHUTZES IN DER ZIVILEN LUFTFAHRT].

W. Lorenz (Martin-Luther-U. Halle-Wittenberg, Klin. und Poliklin. für Hals-, Nasen- und Ohrenkrankh., Halle, East Germany).

Zeitschrift für die gesamte Hygiene und ihre Grenzgebiete, vol. 14, Sep. 1968, p. 669-674. 45 refs. In German.

In principle, the application of an individual auditory protecting agent is a makeshift measure. The protecting agent introduced into the auditory duct protects up to a phon scale of 105 db. A capsule screening of the ear region protects up to a phon scale of 120 db., while the maximum protecting effect of a noise-protecting helmet ranges from about 130 to 130 db. If the above phon scales are exceeded, the body-sound conducted via the bones suffices to produce a noise injury in spite of the application of an auditory protecting agent. The respective statements of factories on the effect of auditory protectors and threshold value data of different investigators differ widely. Unfortunately, noise-exposed workers often refuse to use such auditory protective agents, pretending the latter reduce their capacity to understand the words of their fellow workers and moreover, prevent them from acoustically controlling machines. The objection that individual auditory protecting agents are not suited for pilots and other aviation staff is refuted by speech-audiometric examinations.

A69-80419

INVESTIGATIONS WITH REGARD TO DAMAGES OF SPORTS PILOTS CAUSED BY NOISE [UNTERSUCHUNGEN ZUR LARMGEFAHRDUNG VON SPORTFLIEGERN].

W. Lorenz and H. G. Demus (Martin-Luther-U. Halle-Wittenberg, Klin. und Poliklin. für Hals-, Nasen-, und Ohrenkrankh., Halle, East Germany).

Verkehrsmedizin und ihre Grenzgebiete, vol. 15, no. 9, 1968, p. 375-390. 20 refs. In German.

The most frequent otolaryngological disturbances induced by flying are the barotraumatic insults and damages caused by noise. Noise measurements of small airplanes show that there are high sound levels in the cockpit which have a detrimental effect on the inner ear. The time of exposure for sports flying can be demonstrated only approximately. The period of exposure to noise should also include engine warmup, braking and taxiing. The powered flight sports can, in addition to occupational noise, represent another noise induced trauma.

A69-80420

DETERMINATION OF THE CHEMICAL COMPOSITION OF THE ATMOSPHERE OF VENUS BY THE SPACE PROBE VENUS-4 [OPREDELENIE KHIMICHESKOGO SOSTAVA ATMOSFERY VENERY MEZHPLANETNOI STANTSIEI VENERA-4].

A. P. Vinogradov, I. U. A. Surkov, K. P. Florenskii, and B. M. Andreichikov (USSR, Acad. of Sci., V. I. Vernadskii Inst. of Geochem. and Anal. Chem., Moscow).

Doklady Akademii Nauk SSSR, vol. 179, no. 1 1968, p. 37-40. 5 refs. In Russian.

A discussion was presented on the chemical composition of Venus's atmosphere, based on data collected by the Soviet Venus 4 probe that soft landed on the planet in October 1967. The apparatus and the methods used to determine the chemical composition of the planet's atmosphere were described. Taking into consideration the results obtained it was concluded that the chemical composition of Venus's atmosphere was made up of: carbon dioxide, $90 \pm 10\%$, oxygen more than 0.4% and less than 1.5%; less than 7% nitrogen; and 1 to 8 mg./l. of water vapor. These figures were compared with those for the present atmosphere of the earth, and the conclusion was drawn that the earth and Venus were very similar endogenously, and that it was the exogenous processes dependent on the surface temperature that had formed such different atmospheres.

A69-80421

EFFECT OF CARBON MONOXIDE ON FUNCTION AND STRUCTURE OF THE LUNG.

Aron B. Fisher, Richard W. Hyde, Arthur E. Baue, John S. Reif, and D. F. Kelly (Pa. U., School of Vet. Med., Dept. of Physiol., Div. of Graduate Med., and Lab. of Pathol., Philadelphia).

Journal of Applied Physiology, vol. 26, Jan. 1969, p. 4-12. 25 refs.

Grants PHS HE 10324, PHS HE-06352-07, and PHS 2T1-GM-057-05.

Four human subjects who inhaled 6% carbon monoxide for 18 sec. had no significant change in lung volumes, mechanical properties, or diffusing capacity. Further investigations of possible histotoxic effects of carbon monoxide were performed in seven anesthetized dogs. After insertion of a tracheal divider and occlusion of the left pulmonary artery with a balloon catheter, the left lung was ventilated for 14 to 20 min. with a gas containing 8-14% carbon monoxide while the right lung breathed air or oxygen. Femoral artery blood carboxyhemoglobin saturation did not rise higher than 18%. Measurements of diffusing capacity and pressure-volume

curves of both lungs over the next 1/2 to 49 hr. and examination of the lungs by light- and electron microscopy failed to reveal changes which could be attributed to carbon monoxide inhalation. Another dog that developed a carboxyhemoglobin saturation of 61% had congested, edematous, and hemorrhagic lungs. Therefore, the lung damage seen with carbon monoxide poisoning is probably related to impaired oxygen transport by the blood and is not a result of direct histotoxicity of the alveolar carbon monoxide.

A69-80422

NITROGEN BALANCE AFTER INTRAVENOUS AND ORAL ADMINISTRATION OF AMMONIUM SALTS TO MAN.

Peter Fürst, Bertil Josephson, Giuseppe Maschio, and Erik Vinnars (Central Clin. Lab. and Dept. of Anesthesiol., St. Eriks Sjukhus, Stockholm, Sweden).

Journal of Applied Physiology, vol. 26, Jan. 1969, p. 13–22. 27 refs.

Grant SMRC B68-19X-573-03 and Found. "Therese och Johan Anderssons Minne" supported research.

Ammonium acetate (200 meq./day, corresponding to 2.8 g. of N) was administered with and without concomitant intravenous infusion of the essential amino acids to healthy volunteers. When the salt was infused intravenously, the previously negative nitrogen balance became positive whether or not essential amino acids were administered. After oral ingestion, the nitrogen balance was only insignificantly augmented. In four subjects, the hepatic vein was catheterized and the splanchnic blood flow estimated. Intravenous administration of ammonium acetate produced an increased ammonia concentration in the peripheral blood but no increase of urea in the hepatic vein. Oral ingestion of ammonium salt was not followed by any increase in the blood ammonia, but by an augmentation of the urea production from the liver. It was concluded that ammonium ions, after intestinal absorption, pass directly to the liver, where they are transformed into urea and, subsequently, lost in the urine. Intravenously infused ammonium salts are brought directly to the tissues, where the ammonia nitrogen becomes available as nonessential nitrogen for protein synthesis.

A69-80423

VENTRICULAR PERFORMANCE DURING GRADED HYPOVOLEMIA INDUCED BY LOWER BODY NEGATIVE PRESSURE.

Donald O. Nutter, Victor W. Hurst III, and Raymond H. Murray (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).

Journal of Applied Physiology, vol. 26, Jan. 1969, p. 23–30. 32 refs.

Left ventricular (LV) function was analyzed in intact, anesthetized dogs during graded hypovolemia produced by exposure to -30, -60, and -90 mm. Hg lower body negative pressure. Aortic blood flow (chronically implanted flowmeter), ventricular pressure (micromanometer), and ventricular volume (thermodilution) were measured, and performance indices were calculated. Graded decreases in end-diastolic volume (EDV) (-11 to -40%) produced significant ($P < .05$) and essentially linear decreases in LV pressure, the maximum derivative of pressure (max dp/dt), ejection fraction, aortic flow, maximum aortic volume acceleration (max dF/dt), peak power, and stroke work. The performance of the ventricle was shifted to the left and downward on the ventricular function curve. Circumferential shortening distance and mean wall force fell significantly (maximum of -41 and -45%, respectively) as EDV decreased and were associated with an insignificant decrease in the mean rate of circumferential fiber shortening (maximum of -29%). The relative stability of shortening velocity during hypovolemia may reflect the reciprocal effects of length and tension on the intact myocardial wall. Contractility as measured by the

ratio of max dp/dt to the instantaneous pressure and max dF/dt to peak flow was not significantly altered by moderate hypovolemia. The data indicate that the net performance of the intact left ventricle decreases in a predictable manner, unaccompanied by deterioration of myocardial function, in response to graded decreases in filling volume.

A69-80424

OXYGEN UPTAKE DURING MAXIMAL TREADMILL AND BICYCLE EXERCISE.

Lars Hermansen and Bengt Saltin (Gymnastik-och Lidrottshogskolan, Dept. of Physiol., Stockholm, Sweden and Inst. of Work Physiol., Oslo, Norway).

Journal of Applied Physiology, vol. 26, Jan. 1969, p. 31–37. 19 refs.

Bank of Sweden, Mutual Group Insurance Co., and Swed. Sports Federation supported research.

Fifty-five male subjects 19 to 68 yr. of age and with maximal oxygen uptake of 42 to 79 ml./kg. x min. performed maximal exercise on the treadmill running uphill ($3^\circ = 5.25\%$) and on the bicycle ergometer with a pedal frequency of 50 r.p.m. The leveling-off criterion was applied to establish maximality; 0.28 l./min. (7%) higher oxygen uptakes were obtained during maximal running compared to bicycling ($P < 0.001$). Forty-seven of the subjects had higher values on the treadmill. No significant differences were observed in maximal values for the work time, pulmonary ventilation, blood lactate, and heart rate. Age or training condition did not seem to influence the obtained results. In six subjects maximal running uphill (3°) gave 0.20 l./min. higher oxygen uptake than running maximally at no inclination. At pedal frequencies of 60 or 70 r.p.m. during the maximal bicycle exercise 0.10 l./min. higher oxygen uptake was found compared to pedal frequencies of 50 or 80 r.p.m.

A69-80425

VENTILATION-PERFUSION RELATIONSHIPS DURING HIGH-ALTITUDE ADAPTATION.

P. Haab, D. R. Held, H. Ernst, and L. E. Farhi (Fribourg, U., Inst. of Physiol., Switzerland and N. Y., State U., Dept. of Physiol., Buffalo).

Journal of Applied Physiology, vol. 26, Jan. 1969, p. 77–81. 16 refs.

NSF and Swiss Natl. Fund for Sci. Res. supported research.

The degree of functional inhomogeneity of the human lung was assessed at low altitude (2,000 ft.) and during the first five days of exposure to an altitude of 11,500 ft. by measuring the arterial-alveolar N_2 and CO_2 differences ($(a-A)DN_2$) and $(a-A)D(CO_2)$. Neither one of these was modified by ascent to altitude and there was no significant change during the experimental period. Had \dot{V}_A/\dot{Q} distribution remained unchanged, the decrease in ambient pressure would have lowered substantially the $(a-A)DN_2$. It is concluded that the transition from low to high altitude alters the scatter of ventilation or perfusion, or both, in such a way as to decrease the gas exchange efficiency of the lung. This change offsets partly the benefits derived from the hyperventilation response.

A69-80426

RESPIRATORY HEAT EXCHANGE IN NORMAL SUBJECTS AND IN PATIENTS WITH PULMONARY DISEASE.

P. R. B. Caldwell, D. M. Gomez, and H. W. Fritts, Jr. (Columbia U., Coll. of Physicians and Surgeons, Dept. of Med., New York City, N. Y.).

Journal of Applied Physiology, vol. 26, Jan. 1969, p. 82–88. 17 refs.

Grants NHI HE-2001, NHI HE-05443, and NHI HE-05741.

A69-80427

Respiratory water loss was measured at rest and during exercise in normal subjects, patients with chronic airway obstruction, and patients with pulmonary sarcoidosis. Whereas in all three groups the average concentration of water in the expired gas was 29 mg./l., the calculated respiratory evaporative heat loss, expressed as a fraction of total body heat production, tended to be higher in the patients with lung disease during exercise. This observation was best explained by the high ratio of exercise ventilation to oxygen consumption which occurred in half the patients. The same mechanism probably accounted for the larger than normal total respiratory heat loss (h_T) seen in the patients, when h_T was defined as the sum of four components of heat exchange: (1) the evaporative loss; (2) the convective loss; (3) the loss due to the endothermic evolution of carbon dioxide; and (4) the gain resulting from the exothermic combination of oxygen with blood. These results indicate that lung disease does not interfere with the warming and humidification of respired air. Rather they demonstrate that the fraction of body heat dissipated via the respiratory tract may be higher in patients with lung disease.

A69-80427

REVERSAL IN PATTERNS OF SWEAT RECRUITMENT.

R. D. Wurster, C. R. Hassler, R. D. McCook, and W. C. Randall (Loyola U., Graduate School and Stritch School of Med., Dept. of Physiol., Chicago, Ill.).

Journal of Applied Physiology, vol. 26, Jan. 1969, p. 89-94. 17 refs.

Grants NIH GM-999 and Grant NHI HE 08682.

Sweating consistently first appears on the lower extremities with recruitment proceeding in a rostral direction during heat exposure. The onset of sweating appears to be independent of local skin temperature. Sweat recruitment has obvious importance to concepts of setpoint determination of sweating. Experiments were designed to test the influence of exposure of only the upper half of the body to high ambient temperature (60°C.) while the lower half of the body was exposed to cool environments (20°C.) and vice versa. Sweating was measured on seven cutaneous areas while oral, tympanic membrane, and rectal temperatures were recorded. Skin temperature was simultaneously measured from 12 different areas, and total, upper, and lower body mean skin temperatures were calculated. Heating of only the upper cutaneous areas markedly decreased the sweat recruitment time or reversed the normal order of recruitment. Heating of only the lower half elicited the usual caudal-to-rostral recruitment pattern. The interval between initial appearance of sweating on the lower and upper extremities could be extended to as much as 90 min.

A69-80428

EFFECT OF VIBRATION ON TOTAL VASCULAR RESISTANCE IN THE FORELIMB OF THE DOG.

A. James Liedtke and Phillip G. Schmid (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).

Journal of Applied Physiology, vol. 26, 1969, p. 95-100. 18 refs.

Whole-body, x-axis, mechanical vibration, defined in terms of frequency, peak acceleration, and displacement, was evaluated in six dogs to determine its effect on the peripheral circulation and vascular smooth muscle. Changes in total vascular resistance in the canine forelimb, perfused at constant flow rate, were used to measure alterations in smooth muscle tone. One forelimb in each animal remained neurally intact; the other forelimb was denervated. Vibration for each animal was varied to include frequencies of 9, 12, and 16 cycles/sec., at peak accelerations of 0.9, 1.2, and 1.6 g, and combined for a total of nine different runs. The order of assigning runs was randomized; each run lasted one min. followed by four to six min. recovery period. Vasodilation occurred in

response to all levels of vibration in both the intact and denervated forelimbs. The magnitude of response varied inversely with frequency, directly with peak acceleration and displacement, and was much greater in the neurally intact limb. The maximum response occurred at 9 cycles/sec., 1.6 g peak acceleration, and 0.35 in. displacement. These findings are related to the tissue deformation caused by sinusoidal oscillation and suggest that the dilator response is part of a nerve reflex involving stretch receptors.

A69-80429

INFLUENCE OF UNILATERAL HYPOVENTILATION ON DISTRIBUTION OF PULMONARY BLOOD FLOW IN MAN.

Måns Arborelius, Jr. (Allmänna Sjukhuset, Dept. of Clin. Physiol., Malmö, Sweden).

Journal of Applied Physiology, vol. 26, Jan. 1969, p. 101-104. 16 refs.

Unilateral hypoventilation during bronchspirometry was produced in five healthy volunteers by obstructing the airway of the right lung. The partition of the pulmonary blood flow was measured by the percent of ^{85}Kr exhaled by each lung after intravenous injection. During hypoventilation with air the perfusion of the right lung decreased significantly. Hypoventilation with oxygen only caused an insignificant decrease of the ipsilateral lung blood flow. Hypoxia in a hypoventilated lung thus is more important for the distribution of blood flow during local hypoventilation than are mechanical factors. The total ventilation significantly during unilateral hypoventilation with air but not with oxygen, probably due to a more effective elimination of carbon dioxide when both ventilation and perfusion are directed toward one lung. The demonstrated mechanism will counteract oxygen desaturation of arterial blood flow during local hypoventilation.

A69-80430

RADIANT AND CONVECTIVE HEAT TRANSFER OF NUDE MEN IN DRY AIR.

Duncan Mitchell, C. H. Wyndham, A. J. Vermeulen, T. Hodgson, A. R. Atkins, and H. S. Hofmeyr (South Africa, Chamber of Mines, Human Sci. Lab. and Phys. Sci. Lab., Johannesburg; Natl. Mech. Eng. Res. Inst., Pretoria, South Africa; and Dept. of Agr. Tech. Serv., Pretoria, South Africa).

Journal of Applied Physiology, vol. 26, Jan. 1969, p. 111-118. 27 refs.

Unique direct-measuring instruments in the climatic chamber at the Human Sciences Laboratory of the Chamber of Mines were used to measure the heat exchanges of nude resting men in a range of dry environments by direct calorimetry. The men sat on a bicycle facing the air stream. On the basis of the measurements equations were derived which quantitatively describe the sensible heat transfer between a nude man and his surroundings, for environments with ambient temperatures between 10 and 50°C. and with wind speeds between 0.5 m.p.s. and 5 m.p.s. The radiant heat transfer of the body was found to satisfy the theoretical equation $R = 4.88 \times 10^{-8} (T_s^4 - T_R^4) A_R / A$ kcal. m.⁻² hr.⁻¹, which confirms the accuracy of the measurements of mean skin temperature, mean radiant temperature, body area, and emissivity. An equation for the convective transfer rate was derived statistically from the observations: $C = 6.23(P_A/760)^{0.6} V^{0.6} (T_s - T_A) A_C / A$.

A69-80431

CO-11 RED CELL LABELING FOR BLOOD VOLUME AND TOTAL HEMOGLOBIN IN ATHLETES: EFFECT OF TRAINING.

H. I. Glass, R. H. T. Edwards, A. C. De Garreta, and J. C. Clark (Med. Res. Council, Cyclotron Unit, Roy. Postgraduate Med. School, Hammersmith Hosp., Depts. of Med. Physics and Med., London, Great Britain).

Journal of Applied Physiology, vol. 26, Jan. 1969, p. 131-134. 20 refs.

Med. Res. Council and Hammersmith Hosp. Clin. Res. Fund supported research.

Blood volume and total hemoglobin were measured in 10 male racing cyclists with a ^{11}CO red cell labeling technique. Venous blood (five ml.) was equilibrated with ^{11}CO and subsequently reinjected. The distribution volume was estimated for each of five timed blood samples, and an empirically selected single exponential function fitted to the data and the instantaneous dilution volume ^{11}CO -labeled red cells were calculated. The average blood volume of the group was 82.6 ± 4.2 ml./kg. and the average total hemoglobin 10.6 ± 0.7 g./kg. The average coefficient of variation in the estimation of the ^{11}CO dilution space was $\pm 3.4\%$. Estimation from a single timed sample instead of five samples did not significantly increase the error. The error in blood volume was estimated to be $\pm 5.2\%$ and $\pm 6.2\%$ for total hemoglobin. In five subjects after a two-mo. intensification of training resulting in improved working capacity there was no significant change in ^{11}CO space, total hemoglobin, or blood volume. This has been attributed to the high degree of physical fitness of the subjects at the start of the study.

A69-80432

A BALLOON-BURSTING SYSTEM TO GIVE A GAS BOLUS AT A PRESET VOLUME DURING INSPIRATION.

Gordon G. Power.

Journal of Applied Physiology, vol. 26, Jan. 1969, p. 135-136.

An apparatus is described for administering a small measured volume of a test gas to a subject at a preset volume during inspiration. The principle of the method is that a rubber balloon containing the test gas is broken inside tubing close to the mouthpiece. The main advantage of the system is that the injection is virtually instantaneous, thereby localizing the gas bolus to a small segment of the inspiratory stream. The point of injection is automatically recorded by a small irregularity in the spirometer tracing. The system is not suitable for a gas bolus larger than about 40 ml. since larger balloons tend to occlude the tubing.

A69-80433

A DIGITAL COMPUTER PROGRAM FOR CONSTRUCTING VENTILATION-PERFUSION LINES.

A. J. Olszowka and L. E. Farhi (N. Y., State U., Dept. of Physiol., Buffalo).

Journal of Applied Physiology, vol. 26, Jan. 1969, p. 141-146. 16 refs.

Contract ONR N00014-68-A-0216, Grants NIH FR-00126, NSF GP-7318, and US Air Force supported research.

This paper describes a digital computer program that will calculate the alveolar and capillary blood gas compositions corresponding to any given set of \dot{V}_A/\dot{Q} values. The program is applicable to subjects having abnormal hemoglobin concentrations or base excess, or both. Dissolved oxygen and inert gas exchange are considered in the calculations. The importance of nitrogen exchange at extremely low \dot{V}_A/\dot{Q} values is discussed.

A69-80434

CALIBRATION OF DYE-DILUTION CURVES BY A DYNAMIC METHOD.

Klaus R. Völlm and Ellis L. Rolett (N.C., U., School of Med., Dept. of Med., Chapel Hill).

Journal of Applied Physiology, vol. 26, Jan. 1969, p. 147-150. 10 refs.

Grants PHS HE-08580, PHS T1-HE-5486, and PHS 1-K3-HE-13,396.

A dynamic method for calibrating dye-dilution curves was evaluated for accuracy and reproducibility. Calibration factors determined by this method and by the standard serial-dilution method agreed closely in each of 13 comparisons, and the mean difference of $1.5 \pm 0.95\%$ (sd) between the two methods was insignificant ($P > 0.2$). The reproducibility of the dynamic method was tested by statistical analysis of sequential calibration dye curves. The coefficient of variance (standard deviation as a percent of the mean) ranged between 0.79% and 2.87% for 16 of the 18 series of calibration curves performed. At this level of reproducibility three or four serially performed calibration dye curves are sufficient to determine reliably the calibration factor.

A69-80435

STUDIES ON THE ROLE OF THE INTESTINAL MICROFLORA IN THE METABOLISM OF COUMARIN IN RATS.

Ronald R. Scheline (Bergen, U., Dept. of Pharmacol., Norway).

Acta Pharmacologica et Toxicologica, vol. 26, no. 4, 1968, p. 325-331. 11 refs.

Coumarin was metabolized by the rat cecal microflora to melilotic acid. The initial step involved reduction to dehydrocoumarin which underwent ring fission to give melilotic acid. No evidence was obtained for the participation of o-coumaric acid in the sequence. Melilotic acid was found to be a urinary metabolite of coumarin in rats. Its origin appears to be intestinal although the possibility that it may also arise in the tissues could not be excluded.

A69-80436

THE METABOLISM OF DRUGS AND OTHER ORGANIC COMPOUNDS BY THE INTESTINAL MICROFLORA.

Ronald R. Scheline (Bergen, U., Dept. of Pharmacol., Norway).

Acta Pharmacologica et Toxicologica, vol. 26, no. 4, 1968, p. 332-342. 33 refs.

The metabolism by the rat cecal microflora of a number of drugs, foreign organic compounds or their metabolites was studied. The following classes of test compounds were used: glucuronide, etheral sulphate, glycine conjugate, amide, acetyl conjugate ester, azo compound, phenol, heterocyclic compound and cyclohexane derivative. The intestinal microflora brought about hydrolysis with 4-methylumbelliferone glucuronide, phenyl- β -D-glucoside, hesperidin, rutin, p-aminohippuric acid, succinylsulphathiazole, p-acetamidobenzoic acid and methyl red, dehydroxylation with xanthurenic acid and pyrogallol, ring fission with (+)-catechin, hesperetin and quercetin and aromatization with shikimic acid and quinic acid. Hydrolysis of p-nitrocatechol sulphate and N⁴-acetylsulphanilamide by the flora was not observed. No metabolites were detected in the incubates containing cyanidin chloride.

A69-80437

A COMPARISON OF ENGLISH LANGUAGE TEST SCORE AND AIRCRAFT ACCIDENT.

Norifusa Iwataki and Yoshinori Kurihara.

Reports of Aeromedical Laboratory, vol. 9, Jun. 1968, p. 1-5. In Japanese.

A69-80438

English language training is required for the pilot candidates of the Japan Air Self Defence Force before flight training. The relationship between the English language test score and aircraft accidents due to pilot error was analyzed statistically with 1,977 samples. On the entry and final test scores, there was no significant difference between the accident group and the total samples. There was no marked trend among groups with higher, middle and lower scores on the entry test.

**A69-80438
ALTERATION OF MANUAL PERFORMANCE DURING
SUSTAINED ACCELERATION EXPOSURE BY MEANS OF
HAND-WRITING PRESSURE MEASUREMENT IN MAN.**

Masaaki Iwane, Mikio Ono, and Ryohei Yurugi.

Reports of Aeromedical Laboratory, vol. 9, Jun. 1968, p. 6-14. 9 refs. In Japanese.

A simple hand-writing pressure meter, which is made up strain gauges attached on a tip of ball point pen and preamplifier, was designed in order to test manual performance during exposure to abnormal environmental conditions. By means of this apparatus, 50 normal male and female adult subjects were tested for their hand-writing pressure pattern, maximum pressure, and writing speed for drawing the seven simple theme geometrical figures instead of conventional test words under normal environmental conditions. Sixteen subjects were given sustained acceleration force on +3Gz by human centrifuge, and performed the same test before, during, and after acceleration exposure. The results are summarized as follows: (1) The hand-writing meter designed specially for this experiment was well applicable for its light weight and no base-line drift under G exposure; (2) Maximum hand-writing pressure, writing speed, and pressure curve patterns of normal subjects under normal conditions were characteristic of theme figures. There were proper individual differences but no intra-individual alteration; (3) Maximum hand-writing pressure increased markedly during +3Gz exposure. This may possibly be due to the increased apparent weight in the pen in the acceleration field. Writing speed and pressure patterns did not show marked change during exposure; and (4) From the above mentioned results, very important problems arise for aircraft pilots when they are required to do delicate manual work during flight.

**A69-80439
EFFECT OF ABRUPT DECELERATION ON HEART RATE IN
MONKEYS.**

Isao Matsumoto, Masatomo Harada, Shoji Ogata, Yosuke Hashimoto, Mikio Ono, and Ryohei Yurugi.

Reports of Aeromedical Laboratory, vol. 9, Jun. 1968, p. 15-23. 7 refs. In Japanese.

The experimental study was performed to define some of the effects of abrupt deceleration upon the heart rate in monkeys. Thirty-four monkeys were exposed to abrupt deceleration of 20-120 g. for 0.06-0.10 sec. Relative bradycardia occurred in all cases of -Gx and +Gx group, however, the bradycardia in -Gx group was more significant. The degree of bradycardia increased in relation to the g stress levels. It is assumed that bradycardia may be due to a vagal reflex from the carotid sinus, which is stimulated by hydraulic ram effects of the cervical blood stream, and is activated by head movement or displacement of internal organs.

**A69-80440
COMPARISON OF JUMPING CAPACITY ON THE GROUND
LEVEL AND AT THE SIMULATED ALTITUDE OF 2,300 m
IN THE RATS.**

Hiroshi Fujiwara.

Reports of Aeromedical Laboratory, vol. 9, Jun. 1968, p. 24-29. 6 refs. In Japanese.

Two hundred and twenty rats were tested for their jumping capacity on the ground level and at simulated altitude of 2,300 m. by means of a specially designed device. Results obtained were as follows: (1) Almost all rats jumped along their trajectory curve both on the ground level and at altitude, and the initial ascending angle was about 20°. Top of the curve was about 10 cm. high. Jumping distances of the rats, which had been trained by conditioning for 20 days, distributed mostly (ca. 50%) around 45 cm.; (2) Female rats had a tendency to excel male rats in their jumping capacity. Light weight rats, weighing between 105 g. and 160 g. were superior to the heavier group in jumping; and (3) Jumping capacity of rats, which were being exposed to simulated altitude of 2,300 m. for short periods, was almost the same as that of control ground level groups. However, their jumping capacity increased day by day when daily exposure and training at the altitude were repeated.

**A69-80441
EXPERIMENTAL STUDY ON FINGER DEXTERITY WITH
PRESSURE GLOVES.**

Hiroko Hagihara, Yoshihisa Yamazaki, and Noriko Kato.

Reports of Aeromedical Laboratory, vol. 9, Jun. 1968, p. 30-43. 11 refs. In Japanese.

The following items were considered as countermeasures to the insufficiencies of the JMG-1 pressure glove: (1) cut off the top of finger of the glove (cut top); (2) improve the pressure glove; and (3) make a deerskin glove. Aiming, pegboard, switch-control and simulated radar-control as a finger dexterity check were compared with those of the ordinary glove in normal (eight mm. Hg) and emergency (120 mm. Hg) conditions. The comparison between the pressure glove in present use and the improved pressure glove in actual flight of a F-104 was done by means of a questionnaire. Results of the survey were the following: (1) "pressure-glove-cut-top" and "deerskin" were superior to "pressure-glove-in-present-use" and "pressure-glove-improved" in all performances, but had undesirable side effects in medical aspects; (2) "pressure-glove-improved" was better than "pressure-glove-in-present-use" especially in adjustment and aiming; and (3) results of questionnaire showed that "pressure-glove-improved" was good in all functions.

**A69-80442
CHARACTERISTICS OF PILOTS ON PERSONALITY TESTS.**

Sakurako Takigawa, Hayao Hori, Norimichi Takemoto, and Hirofumi Furuya.

Reports of Aeromedical Laboratory, vol. 9, Jun. 1968, p. 44-51. 7 refs. In JAPANESE.

Results of psychological analysis for cases that were examined on Aeromedical Evaluation Board for accident experienced-pilots are given. The results were as follows: (1) On the WAIS (Wechsler Adult Intelligence Scale); Mean total I.Q. was 129.62, mean verbal I.Q. was 130.22 and mean performance I.Q. was 123.38; (2) On the Y-G Test (Yatabe-Gilford Personality Inventory) the personality types of the pilots were D-types (stable, adaptable and active type) of 50%, C-type (stable, adaptable, and quiet type) of 31.84% A-type (average type) of 11.4%, B-type (unstable, inadaptible, and active type) of 0% and E-type (unstable, inadaptible and quiet type) of 6.8%; (3) On the M.M.P.I. two pilots on question scale and two pilots on the psychasthenia scale of M.M.P.I. were found in abnormal scale and the others were in the normal area; and

(4) From the three tests (WAIS, Y-G Personality Test, M.M.P.I.) pilots were on very high intelligence level and only a few pilots showed unstable, unsuitable, and inadaptible scores.

A69-80443

HEARING PROBLEMS IN AIR COMMUNICATION USING WORDS IN RADIO TELEPHONE PROCEDURE.

Kiyohisa Niwa and Yuko Nagasawa.

Reports of Aeromedical Laboratory, vol. 9, Jun. 1968, p. 52-61. 5 refs. In Japanese.

A study of hearing difficulty and of hearing errors in radio telephone procedures was made through questionnaires. The results obtained showed the following: (1) words were classified into groups; difficult-group and easy-group; (2) words in easy-group consisted of two syllables and of five to six vocal sounds; and (3) lack of consonants was considered to be the most frequent factor of hearing errors.

A69-80444

RELATIONSHIPS BETWEEN FLYING SAFETY AND HUMAN FACTORS FROM JOB-SATISFACTION IN JASDF. 1. METHODS AND OBJECTS OF THE SURVEY.

Isao Kuroda, Yoshinori Kurihara, and Yukiko Kakimoto.

Reports of Aeromedical Laboratory, vol. 9, Jun. 1968, p. 62-69. 8 refs. In Japanese.

The investigation on relationships between flying safety and human factors was administered by means of a job-satisfaction survey. A 44-item questionnaire was answered by 4,460 men (pilots, maintenance and administrative personnel). The main questionnaire consisted of the following five categories; (1) physical problems; (2) psychosomatic problems; (3) work surroundings (facilities, pay, promotion); (4) human relations problems, (supervisor, fellow worker, family); and (5) job problems. The frequency of items complained about was used as the measure scale of satisfaction.

A69-80445

VISUAL PROBLEMS CONCERNING LANDING ACCIDENTS.

Norifusa Iwataki.

Reports of Aeromedical Laboratory, vol. 9, Jun. 1968, p. 70-75. 15 refs. In Japanese.

Undershoot caused by pilot error is of a high frequency among landing accidents. There are some visual factors which contribute to misjudgments by pilots, e.g., fog, veiling glare of fog, smog layer on the terrain surface, rain on the windshield, glare of lights and visual illusions according to lighting, vertical position, runway size, and terrain slope. At the final stage of precision approach, careful maneuvers are necessary to avoid landing short.

A69-80446

JUMPING CAPACITY TEST DEVICE FOR RATS AND MICE.

Hiroshi Fujiwara.

Reports of Aeromedical Laboratory, vol. 9, Jun. 1968, p. 76-79. In Japanese.

Jumping capacity test device was designed and made up for small experimental animals, such as rats and mice, taking care of convenient handling, easy observation of dynamics of jumping, and the conditioning of the animals for maximum jumping. Measures of the device are 90 cm. in length, 120 cm. in width, 30 cm. in thickness, and 24.6 kg. in weight. Jumping height, and distance

as well as form of the animals during jumping can be observed and measured by means of distance mark and sectioned back panel. Movie pictures can also be taken through the transparent front wall. Conditioning of the animals to maximum capacity of jumping can be achieved by using electric shocks.

A69-80447

HOW TO REDUCE THE WEIGHT OF PRESSURE GARMENTS.

Yoshiro Hagiwara, Osamu Takahashi, and Yutaka Mine.

Reports of Aeromedical Laboratory, vol. 9, Jun. 1968, p. 80-89. 5 refs. In Japanese.

This report is a discussion on the way to reduce the weight of pressure garments by comparing various partial pressure systems equipped with capstan, bladder, air-pipe or foam rubber. The prototype bladder system is better than others but other systems are expected to be developed.

A69-80448

FURTHER STUDIES OF PHOTIC STIMULATION IN SUB-HUMAN PRIMATES.

L. G. Stark, R. M. Joy, A. J. Hance, and K. F. Killam (Stanford U., School of Med., Stanford Med. Center, Dept. of Pharmacol., Palo Alto, Calif.).

Life Sciences, vol. 7, part 1, Oct. 1968, p. 1037-1039. 6 refs.

Grants NIH MH03241 and NIH GM322.

Following the finding of a photomyoclonic syndrome in the baboon, *Papio papio*, systematic study of that syndrome began. In this investigation, five species of subhuman primates were tested for possible paroxysmal activity elicited by flashing light. In most animals some semblance of photic driving could be recorded from occipital derivatives. Unequivocal paroxysmal activity was seen in only two animals. From a comparative point of view, the establishment of the uniqueness of the syndrome of the *Papio papio* among subhuman primates is of great importance. The need for additional investigations to survey other primates was stressed.

A69-80449

OXYGEN CHANGES IN TISSUES OF GERM-FREE AND CONVENTIONAL MICE AFTER INOCULATION OF BACTERIAL ENDOTOXIN.

Raphael Wilson and Taiju Matsuzawa (Notre Dame, U., Lobund Lab., Ind.).

Life Sciences, vol. 7, part 1, Oct. 1968, p. 1075-1081. 10 refs.

Grant PHS RH-00239-01,02.

Fifty-two germ free and 52 conventional mice were studied in order to determine if the injection of bacterial endotoxin into mice can effect an alteration of the oxygen tension (pO₂) of the tissues and consequently afford some degree of radioprotection. Generally, throughout the period studied in the pO₂ values of germ-free mouse tissues were significantly lower than those of conventional mice. The greatest differences occurred during the first period of pO₂ depression and during a five day recovery period. Results supported in the view that anoxia is an important factor in increased survival of mice irradiated under hypothermic conditions. Thus it seemed probable that protection against whole-body ionizing radiation was conferred by the bacterial endotoxin by a mechanism that reduces the pO₂ of radiosensitive tissues to a level associated with protection.

A69-80450

A69-80450
EEG-EVOKED RESPONSE RELATIONSHIPS AND PERCEPTUAL PERFORMANCE.

Charles Shagass, Kjell Haseth, Enoch Callaway, and Reese Jones (Eastern Pa. Psychiat. Inst. and Temple U., Philadelphia, Pa. and Calif., U. and Langley Porter Clin., San Francisco).

Life Sciences, vol. 7, part 1, Oct. 1968, p. 1083-1091. 9 refs.
Contract NONR 2931(00), Grants NIMH MH 12507, and NIMH KS-MH-32,904.

Perceptual correlates of electroencephalographic (EEG)—evoked response relationships were investigated in subjects 18 or 19 yr. old. The two perceptual tests were lifted weight discrimination and recognition of tachistoscopically presented letters. A confirmation study was reported which involved psychotic patients who were using phenothiazines. The reliability of the findings relating EEG-evoked responses amplitude concordance to perceptual performance was supported by the similarity of results in two very different populations, employing different sensory stimuli and perceptual tests, and with EEG and evoked responses recorded under different conditions. It appeared that electrophysiological amplitude concordance is correlated with perceptual ability in a general way, independent of sensory modality. The methodological implications indicated that the concordance measure employed is a promising one for psychophysiological studies, and they also draw attention to the general value of employing experimental designs which permit study of concordance relationships.

A69-80451
SERUM LIPID CHANGES DURING PROGRESSIVE HYPERTHERMIA.

H. M. Franke (Rutgers—The State U., Dept. of Physiol., New Brunswick, N.J.).

Life Sciences, vol. 7, part 1, Nov. 1, 1968, p. 1203-1207. 13 refs.

Contract AF 41(609)2635.

Serum total lipids and fatty acids decrease in cats during progressive hyperthermia. Evidence is presented that the decreases represent an effect of elevated temperature on metabolism rather than a change secondary to hypocapnia, as is the case with lactate and pyruvate.

A69-80452
NOISE TRAUMA DUE TO RANGE PRACTICE. PROTECTION MEASURES. [LES TRAUMATISMES SONORES DUS AUX TIRS EN STAND. ESSAIS DE PROTECTION].

André Rigaud.

Revue des Corps de Santé des Armées terre mer Air, vol. 9, Feb. 1968, p. 39-60. 17 refs. In French.

Noise trauma due to small firearms, especially range practice, were extensively discussed. The lesions acquired being definitive appropriate measures should be taken to protect against the risk of damage to hearing. There existed two in theory, adequate clinical and audiometric examination to weed out the subjects unduly susceptible to noise trauma, and the reduction of the noise levels by preventing excessive sound from reaching the ear. This could be done by reducing the overall noise in the range practice stands and by the wear of protective helmets or ear plugs. These methods of protection should be adopted for all range practice activities, and could possibly eradicate this occupational disease and the medico-legal problems it entailed.

A69-80453
PROCEDURE FOR REDUCING ORIENTING REACTIONS IN GSR CONDITIONING.

Kenneth R. Burstein and Seymour Epstein (Mass., U., Amherst).
Journal of Experimental Psychology, vol. 78, Nov. 1968, p. 369-374. 8 refs.

Grant NIMH MH-01293.

Fifteen subjects received 16 adaptations, 16 conditioning, and 16 extinction trials with an apparatus designed to eliminate reflex orienting responses (ORs) to stimulus onset. The apparatus consisted of a dial with markings for conditioned stimulus (CS) intervals and a moving pointer. The unconditioned stimulus (UCS), an electric shock, occurred at CS offset. That the procedure effectively eliminated reflex ORs was exhibited by an extremely low rate of responses in the absence of threat of shock. Threat of shock increased responses to stimulus onset. During conditioning there was an early rise in responses for the conditioning interval only followed by a protracted decline. It was concluded that habituation of the CR during conditioning and implicit expectancies associated with the stimulus situation continue to complicate galvanic skin response conditioning when reflex ORs to the CS are eliminated.

A69-80454
DETECTION OF MOTION DURING BINOCULAR RIVALRY SUPPRESSION.

Robert Fox and Ronald Check (Vanderbilt U., Nashville, Tenn.).
Journal of Experimental Psychology, vol. 78, Nov. 1968, p. 388-395. 7 refs.

Grant NINDB NB-07619.

During binocular rivalry suppression of a static target, an element of the target was put in motion and detectability of the movement was assessed by reaction time (RT). Rate and pattern of movement and the method of rivalry induction were varied in four experiments. In all cases RT to movement during suppression was significantly increased relative to nonsuppression control conditions. The magnitude of the increase was inversely related to the strength of the movement stimulus. The results support the hypothesis that suppression is an inhibitory state that acts nonselectively on all stimulus attributes falling within the suppressed retinal region.

A69-80455
INFORMATION FEEDBACK, INSTRUCTIONS, AND INCENTIVES IN THE GUIDANCE OF HUMAN CHOICE BEHAVIOR.

William C. Howell and Joseph T. Emanuel (Ohio State U., Columbus).

Journal of Experimental Psychology, vol. 78, Nov. 1968, p. 410-416. 16 refs.

Contract AF 33(615)-2248.

Two experiments explored the influence of information feedback (IF) on choice behavior in a task requiring discrimination between two populations of meter readings. Sample information was provided through stimuli and IF, with the major objective being to determine the relative efficacy of these sources in guiding behavior under a variety of pertinent task conditions (% IF, specificity of instructional set, monetary payoff). Results supported the conclusions that IF is the only source of information made use of consistently in this situation; stimulus information seemed only to inhibit discrimination.

A69-80456
IMAGERY AND VERBAL MEDIATION INSTRUCTIONS IN PAIRED-ASSOCIATE LEARNING.

John C. Yuille (McGill U., Montreal, Canada) and Allan Paivio (Western Ontario, U., London, Canada).
Journal of Experimental Psychology, vol. 78, Nov. 1968, p. 436-441. 13 refs.
 Grant NRCAPA-87.

This study investigated the effects of mediation instructions and noun concreteness (C) on paired-associate (PA) learning. Subjects were given one of three sets of instructions to learn pairs: to employ imaginal mediators, verbal mediators, or simple repetition. The subject then practiced his technique with a PA list composed of either concrete or abstract nouns. Subsequent to the practice list, the subject was given four alternating learning and recall trials with one of four lists. Each list contained 16 pairs of one of the combinations of stimulus and response C; i.e., concrete-concrete, concrete-abstract, etc. Concrete nouns, particularly on the stimulus side of pairs, facilitated recall of the learned list. Noun C of the practice list did not affect performance on the learned list. Subjects instructed to use repetition showed poorer performance on the first two trials than subjects instructed to use mediators, and noun C affected the repetition group less on the first trial. Contrary to expectations, the imagery and verbal mediators set did not result in recall differences. However, latencies of mediator discovery obtained during the practice period did differ as a function of mediation instructions. These results were considered in terms of alternative interpretations, with the suggestion that imaginal mediators may be more effective than verbal mediators.

A69-80457

RECOGNITION AND FREE RECALL OF ORGANIZED LISTS.

Walter Kintsch (Calif., U., Riverside).
Journal of Experimental Psychology, vol. 78, Nov. 1968, p. 481-487. 16 refs.
 Grant NIMH MH 11-445.

Two experiments were performed which show that organization of the learning material facilitates recall, but has little effect upon recognition performance. In the first experiment subjects learned lists of 40 words, 10 each from four conceptual categories or unstructured control lists. In the second experiment the learning material consisted of less integrated learning materials (CVCs) which were constructed so that letter combinations were highly predictable in the experimental condition and unpredictable in the control groups. Intralist similarity was also varied by using either five or 10 different consonants to construct each set of CVCs. High intralist similarity depressed performance for both recall and recognition, but did not interact with list structure. The differential effect of organization upon recall and recognition was interpreted as supporting a two-process theory of recall and recognition.

A69-80458

ROLE OF AFFECT IN SHORT-TERM MEMORY FOR PAIRED ASSOCIATES.

Calvin F. Nodine and James H. Korn (Carnegie-Mellon U., Pittsburgh, Pa.).
Journal of Experimental Psychology, vol. 78, Nov. 1968, p. 494-501. 10 refs.
Psychonomic Soc., Meeting, Chicago, Oct. 1967.
 Grants PHS MH 11974-02 and PHS MH 07722.

Short-term memory (STM) for minimal paired associates (PA) was investigated by presenting to subjects two successive picture-trigram or picture-letter PA units. Affective content of one stimulus term was pleasant (P) and the other was unpleasant (U). After either a 3-, 9-, or 15-sec. retention interval, during which subjects engaged in number tracking, one of the two PA units was

tested for recall. Recall of U units was inferior to P units for both response classes. However, with letters, recall of P was higher than U at immediate recall (three sec.), but affect did not differentially influence at nine and 15 sec. With trigrams, differential recall extended from three to 15 sec. with U inferior to P at all retention intervals. These findings suggest that the differential influence of affect on STM varies directly with task difficulty which can be specified in the PA task by response availability.

A69-80459

CONTROLLED REHEARSAL AND RECALL ORDER IN SERIAL LIST RETENTION.

Herman Buschke (Stanford U., School of Med., Div. of Neurol., Palo Alto, Calif.) and James V. Hinrichs.
Journal of Experimental Psychology, vol. 78, Nov. 1968, p. 502-509. 15 refs.
 Grants PHS MH-08556 and PHS K3-MH-23,796.

The amount of rehearsal in 10 number sequences was manipulated by requiring eight subjects to recall all previously presented numbers as each new number was introduced. The recall order was forward (F), backward (B), free recall (FR), or natural serial (NS), and the type of presentation involved either overt cumulative rehearsal or no overt rehearsal. Type of presentation, recall order, and number of trials all yielded significant effects, but no interactions were significant. Rehearsal generally enhanced performance, but only in B recall was the shape of the serial position curve changed. In the F condition, the later the introduction of an item, the faster the rate of loss of retention. Forgetting in the F and B conditions was more rapid than in the FR and NS conditions.

A69-80460

AGE, JUDGMENT TIME, AND AMOUNT OF KINESTHETIC AFTEREFFECT.

R. Over and S. Griew (Otago, U., Dunedin, New Zealand).
Journal of Experimental Psychology, vol. 78, Nov. 1968, p. 527-528.
 Grant NIH HD-01691.

In this study 24 subjects of mean age 18.2 yr. and 24 subjects of mean age 75.9 yr. set a rod so that it felt horizontal following kinesthetic inspection of a tilted rod. Many old subjects took longer to complete postinspection judgments than young subjects, and these old subjects showed a smaller aftereffect than young subjects. Age differences in amount of aftereffect no longer occurred when judgment time was the same for young and old subject.

A69-80461

SIGNAL DETECTION APPROACH TO THE STUDY OF RETINAL LOCUS IN TACHISTOSCOPIC RECOGNITION.

Wilma A. Winnick and Gerard E. Bruder (N.Y., City U., Queens Coll., New York).
Journal of Experimental Psychology, vol. 78, Nov. 1968, p. 528-531. 11 refs.
Eastern Psychol. Assn., Meeting, Boston, Apr. 1967.
 Grant NIH 11580-02.

Using signal detection techniques, two experiments studied the variable of retinal locus in the recognition of arrays of letters. In the first horizontal rows of eight letters spanning the right and left visual fields were presented at 100 msec. duration. Subjects reported whether particular probe letters were or were not the

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ones seen in each of the eight positions. Ratings were made of the degree of confidence in that judgment. In the second experiment, the same judgments were required about vertical rows of letters exposed at 200 msec. Both experiments found no difference in accuracy in either the right and left or the north and south visual fields. The results corroborate the conclusion of a previous investigator that dominance of one field over the other is an artifact of the order of reporting.

A69-80462

CATEGORY SCALES AND CONTRAST EFFECTS WITH LIFTED WEIGHTS.

John Ross and Vincent Di Lollo (Western Australia, U., Perth).
Journal of Experimental Psychology, vol. 78, Dec. 1968, p. 547-550.
Grant AF-AFOSR-968-66.

Different series of weights were presented by the method of single stimuli: A $2 \times 2 \times 2$ design used preshift level, postshift level, and number of absolute categories of judgment as independent factors. The postshift judgments exhibited the usual contrast effects, the same series receiving "heavier" judgments after a lighter than after a heavier preshift series. Although the preshift judgments were independent of the stimulus level for the two-category scale, the heavier preshift series received "heavier" judgments on the six-category scale. Since category boundaries were shown to be relativistically determined, an irreducible confounding with contrast effects was shown to occur with the use of category estimation methods.

A69-80463

TRANSITIVITY OF VISUAL JUDGMENTS OF SIMULTANEITY.

Thomas R. Corwin and Robert M. Boynton (Rochester, U., Center for Visual Sci., N. Y.).
Journal of Experimental Psychology, vol. 78, Dec. 1968, p. 560-568. 6 refs.

Judgments of the simultaneity of pairs of brief light flashes are not in general veridical, i.e., objective and subjective simultaneity relations are not identical. To explain this discrepancy, it has been proposed that there exist a "simultaneity center" in the brain where paths of excitation from the visual system must coincide to produce the experience of simultaneity. The present experiment was designed to test an implication of the simultaneity center hypothesis; that simultaneity judgments are transitive. Three experienced subjects were monocularly presented with pairs of five-msec. light flashes. The three stimulus lights, F, N, and E, were presented pairwise in three sessions: F vs N, F vs. E, and N vs. E. Thresholds of simultaneity were obtained for each session in terms of the interstimulus interval required to produce subjective simultaneity. Within the experimental variability obtained, the transitivity relation was confirmed. This finding provides support for the simultaneity center hypothesis.

A69-80464

EFFECT OF METHOD OF PAYOFF ON THE DETECTION OF TARGETS IN A VISUAL SEARCH TASK.

Joseph F. Hearn and Stanley M. Moss (Mass., U., Amherst).
Journal of Experimental Psychology, vol. 78, Dec. 1968, p. 569-573.
Contract Nonr 3357(06).

The effects of different methods of payoff, ratios of value, and load upon the detection and report of targets were investigated

in a visual search task. Ratios of value were 2:1, 4:1, and 8:1 points; loads were 4, 8, and 12 letters; and methods of payoff were total amount of points accumulated (Method 1), total amount of points accumulated plus competition for most points accumulated (Method 2), and total amount of points accumulated plus penalties for incorrect responses (Method 3). The results indicated that subjects paid off under Methods 1 and 2 employed a strategy aimed at maximizing hit rate; while subjects paid off under Method 3 employed a strategy aimed at maximizing the hit/error ratio.

A69-80465

JUDGMENT OF RECENCY UNDER STEADY-STATE CONDITIONS.

James V. Hinrichs and Herman Buschke (Stanford U., Div. of Neurol., Palo Alto, Calif.).
Journal of Experimental Psychology, vol. 78, Dec. 1968, p. 574-597. 10 refs.
Grants PHS MH-08556 and PHS K3-MH-23,796.

Judgment of recency (JOR) of sequentially presented items was assessed in eight subjects. Each subject received eight different sequences of 250 items, each item being one of eight letters of the alphabet. The items were distributed within the sequences so that each of the possible intervals, one to 15, between successive presentations of the same item occurred approximately equally often. Mean JOR was found to be a negatively accelerated increasing function of the actual recency, with the proportion of perfect judgments declining from 100% to chance performance after about nine intervening presentations. The Weber-Fechner psychophysical function gave a very accurate description of the mean, median, and variance of recency judgments and of the proportional constant error function.

A69-80466

INITIAL IMPROVEMENT IN SIMPLE REACTION TIME.

In-Mao Liu and Shang-Wu Kuo (Natl. Taiwan U., Taipei, Rep. of China).
Journal of Experimental Psychology, vol. 78, Dec. 1968, p. 593-598. 7 refs.

In order to study the factors responsible for the improvement occurring in the initial few trials of a simple reaction time (RT) task nine experimental groups of 20 subjects each had three kinds (hearing alone, pressing alone, and responding to a light) and three degrees (1, 3, and 10 trials) of pretraining. A control group of 20 subjects was given 0 amount of pretraining. In the subsequent simple RT task, subjects had to press a key on hearing a tone. It was found that the groups that received three and ten hearing alone pretraining trials started with shorter mean RTs and then took about the same number of trials to reach the performance asymptote (compared with the control group) and that the groups given three and ten pretraining trials of responding to the light reached the asymptote on the second trial. The results pointed to the operation of two processes: information-checking mechanism and acquisition of responding to stimulus onset.

A69-80467

RESPONSE CHARACTERISTICS AND THE ORIENTING REFLEX.

Joseph Germana (Va. Polytech. Inst., Blacksburg).
Journal of Experimental Psychology, vol. 78, Dec. 1968, p. 610-616. 13 refs.

Habituation of the orienting reflex (OR) is typically treated as a kind of stimulus learning. The results of three experiments

employing the galvanic-skin response indicate, however, that: (a) stimuli which have behavioral associates produce greater ORs than those which do not; (b) "new" behavioral associations produce greater ORs than "old" associations, i.e., selective habituation occurs to response characteristics, and; (c) level of ORs across habituation trials is a direct function of the amount of response information to be encoded. It appears, therefore, that the "neuronal model" of a stimulus includes the characteristics of associated responses.

A69-80468**LOW-FREQUENCY VIBROTACTILE ADAPTATION.**

J. F. Hahn (Va., U., Charlottesville).

Journal of Experimental Psychology, vol. 78, Dec. 1968, p. 655-659. 9 refs.

Grant PHS NB-04177.

A comparison was made of the effects of two different vibrotactile adapting stimuli (10 or 200 Hz. each at 14 db. sensation level) designed to stimulate, in the index fingerpad, two different receptor populations. Cross-adaptation measurements indicated that two different receptor populations were indeed adapted, but there were no marked differences in their adaptation or recovery. Vibrotactile adaptation probably reflects sensorineural mechanisms rather than an effect of mechanical properties of tissue.

A69-80469**NUMBER OF DURATION DISCRIMINATION FOR AUDITORY PULSE TRAINS.**

Irwin Pollack (Mich., U., Mental Health Res. Inst., Ann Arbor).

Journal of Experimental Psychology, vol. 78, Dec. 1968, p. 660-665. 19 refs.

Subjects discriminated between pulse trains which differed in terms of the number of pulses. Pulse rates between ten and 2,000 pulses/sec., where perceived number does not follow the presented number, were employed. Over these rates, the relative discrimination of number was constant at about 10% and was relatively independent of the internal structure of the pulse trains. Since the perceived number of pulses is proportional to the number of elapsed 1/10-sec. periods, or "moments," and since number discrimination is possible within one such elapsed period, it is concluded that perceived duration—rather than perceived number—was the basis of discrimination in the present tests.

A69-80470**ARTICULATION AND ACOUSTIC CONFUSABILITY IN SHORT-TERM MEMORY.**

D. J. Murray (Queen's U., Kingston, Ontario, Canada).

Journal of Experimental Psychology, vol. 78, Dec. 1968, p. 679-684. 11 refs.

Grant NRC APB-126.

Lists of letters varying in length in acoustic confusability were presented for immediate probed recall. Presentation was either visual (with nonarticulation, silent articulation, or articulation aloud) or auditory (with nonarticulation or silent articulation). It was found that recent visual items which were articulated gave acoustic confusability effects intermediate between the heavy effects obtained when retrieval was ostensibly from an auditory afterecho and the negligible effects obtained when retrieval was ostensibly based on visual memory. These results suggest that articulation enhances the discriminability particularly of recent items in STM, and also that visual or auditory short-term memory (STM) can be investigated independently of STM for speech-coded information.

A69-80471**EFFECTS OF WAVELENGTH AND RETINAL LOCUS ON THE REACTION TIME TO ONSET AND OFFSET STIMULATION.**

Neil R. Bartlett (Ariz., U., Tucson), Thomas G. Sticht (Human Resources Res. Organ., Monterey, Calif.), and Victor P. Pease (St. Lawrence U., Canton, N. Y.).

Journal of Experimental Psychology, vol. 78, Dec. 1968, p. 699-701.

Grant NSF GB3955.

This study measured onset and offset reaction time (RT) to a long and short wave band in both the fovea and periphery. The wave bands were selected with the intention of isolating foveal and peripheral systems. RT to onset stimulation on the periphery is significantly faster than to offset. The difference between onset and offset RT in the fovea was not significant. On-off differences are independent of wavelength. Moreover, because a common function for intensity, independent of wavelength, existed in the periphery as well as in the fovea only when correction was made in the peripheral data for the peripheral luminosity function, it appears that those data, with their on-off differences, reflect the activity of the peripheral (rod) system.

A69-80472**SLEEP AND DEPRESSION.**

J. Mendels (Pa., U., Dept. of Psychiat., Depression Res. Unit, Philadelphia) and D. R. Hawkins (Va., U., Dept. of Psychiat., Charlottesville).

Archives of General Psychiatry, vol. 19, Oct. 1968, p. 445-452. 33 refs.

Grants NIMH MH-06633 and NIMH MH 7520.

The sleep pattern of 21 depressed patients was compared with that of a control group. The influence of age, severity of the illness, and the presence of psychotic features was determined. The specificity of the findings for depression is discussed. Consideration is given to the possible implications of the findings for further understanding of the pathophysiology and biochemistry of depression.

A69-80473**REPAIR OF ULTRAVIOLET LIGHT DAMAGE BY A FACULTATIVE AUTOTROPH: HYDROGENOMONAS FACILIS.**

C. F. Pootjes (Pa. State U., Dept. of Microbiol., University Park).

Canadian Journal of Microbiology, vol. 14, Nov. 1968, p. 1205-1210. 12 refs.

Grant NSF GB-4050.

Hydrogenomonas facilis ATCC 15376 was shown to possess a photoreactivation system which was able to repair ultraviolet radiation damage under both heterotrophic and autotrophic conditions. Acriflavine enhanced the lethal effect of ultraviolet radiation of *H. facilis*. Five strains of ultraviolet-irradiated bacteriophage specific for *H. facilis* were photoreactivated in infected bacteria. One strain, SH6, was markedly more resistant to ultraviolet inactivation. Visible light inhibited the synthesis of bacteriophage by *H. facilis* except for strain SH6. Incubation of SH6-infected bacteria in the light increased the titer more than 10-fold.

A69-80474**ENZYMES OF THE ENTNER-DOUDOROFF PATH IN FRUCTOSE-GROWN HYDROGENOMONAS EUTROPHA.**

G. D. Kuehn and B. A. McFadden (Wash. State U., Dept. of Chem., Pullman).

Canadian Journal of Microbiology, vol. 14, 1968, p. 1259 - 1260. 8 refs.

A69-80475

NASA Grant NGR 48-001-004 and Grant NIH 1-K3-AI-5268.

Evidence is provided for induction of key enzymes of the Entner-Doudoroff pathway during growth of *Hydrogenomonas eutropha* on fructose. In this and other respects the organism is closely similar to *Hydrogenomonas* H 16. In contrast to *H. facilis*, 6-phosphogluconate dehydrogenase is undetectable in extracts of fructose-grown *H. eutropha*.

A69-80475

CRITICAL FUSION FREQUENCY IN RHESUS MONKEYS.

Stephen A. Shumake, James C. Smith (Fla. State U., Tallahassee), and Henry L. Taylor (6571st Aeromed. Res. Lab., Holloman AFB, N. Mex.).

Psychological Record, vol. 18, Oct. 1968, p. 537-542. 8 refs.

Contracts AF F29600-67-C-0012 and AEC AT-(40-1)-2903.

By using a conditioned suppression technique, critical fusion frequencies for three rhesus monkeys were determined across 8.0 log units of intensity. Threshold values ranged from 10 c.p.s. for -5.9 log foot-lamberts to 90 c.p.s. for 4.1 log foot-lamberts. Although systematic individual differences were observed at each intensity value, the intrasubject variability did not exceed five c.p.s. upon replication.

A69-80476

VISUAL SEARCH TIME IN A STRUCTURED FIELD.

Daniel Landis, Robert M. Slivka (Franklin Inst. Res. Labs., Behavioral and Social Sci. Lab., Philadelphia, Pa.), James M. Jones (Yale U., New Haven, Conn.), and Carl A. Silver (Drexel Inst. of Technol., Philadelphia, Pa.).

Psychological Record, vol. 18, Oct. 1968, p. 543-552. 14 refs.

Contract Nonr-4832(00).

The primary purpose of the present experiment was to validate in a structured field several reported relationships which have been found in separate studies using search time in unstructured visual fields. A secondary aim was to assess the effect of compressing irrelevant information on search time. Thirty-six subjects searched for information on military-type maps differing in density, method of coding, and amount of compression. Results indicated that: (a) the relationship between density and search-time is J-shaped; (b) this relationship is primarily a function of the type of coding scheme used; and, (c) subjects insist on decoding irrelevant information. The results are sufficiently at variance with studies using unstructured fields to question the generalizability of those researches.

A69-80477

TRANSMISSION OF MORSE CODE BY ELECTROCU-TANEOUS STIMULATION.

Emerson Foulke and Alvin A. Brodbeck, Jr. (Louisville, U., Ky.).

Psychological Record, vol. 18, Oct. 1968, p. 617-622.

Contract DA-49-193-MD-2525.

Two Morse code operators who could receive code at the rate of 20 words per min. or faster were given training in the reception of four and five member groups of Morse code characters, presented by means of electrical stimulation of the skin. Near the end of the training, one subject demonstrated the ability to receive 10 five-character groups per min. with an accuracy of 96%. Results are promising enough to justify further exploration.

A69-80478

TASK FAMILIARITY AND RELIANCE ON THE ENVIRONMENT IN DECISION MAKING.

Richard Heslin and Siegfried Streufert (Purdue U., Lafayette, Ind.).

Psychological Record, vol. 18, Oct. 1968, p. 629-637. 24 refs.

ONR supported research.

The study investigated change in dependency on the environment as a function of increasing familiarity with the situation. Seventy-two students formed 36 dyads which played a complex tactical and negotiations game for six one-half h. periods. Over periods, all subjects reduced their use of the environment as a source of influence on their decisions. Cognitively complex subjects reduced their dependency on the environment sooner and more sharply than simple subjects. It was concluded that as a task situation is mastered, decision makers gain the confidence to take a more active role in structuring it. The implications of increased familiarity with a task situation for the shift to risk phenomenon were indicated.

A69-80479

THE CONTROL OF RESPIRATORY MUSCLES DURING VOLUNTARY BREATHING.

T. A. Sears and J. Newsom Davis (Inst. of Neurol. and Natl. Hosp., London, Great Britain).

Annals of the New York Academy of Sciences, vol. 155, Nov. 20, 1968, p. 183-190. 15 refs.

Med. Res. Council supported research.

The effects were investigated of sudden changes in mechanical load while respiratory muscles and muscles for phonation are under voluntary activation. The subjects breathed through a circuit consisting of a mouth piece, a pneumotachograph screen, and electrically controlled valves that permitted sudden changes in mechanical load during inspiration or expiration. Electromyographic (EMG) responses were recorded. The reflex nature of the responses was indicated, and it appeared that the reflex mechanism was sensitive to the change in lung volume as well as to its rate of change. The general properties of the reflexes were in accord with those demanded by the servo theory. It was implied that during voluntary activation the fusimotor neuron discharge was at least sufficient to offset the spindle unloading caused by the concurrent extra fused muscle fiber contraction. Evidence was also obtained that during phonation the chest movements were similarly controlled, the vigor of the responses to a pressure transient suggesting a considerable degree of dynamic sensitivity in the relevant receptors. It was concluded that the experiments provided positive evidence in conscious man of a reflex system that automatically extends to stabilize the voluntary demand for respiratory movement. It was thought that emphasis of certain neurophysiological aspects of the control of breathing was justified for a subject previously dominated by mechanical considerations alone.

A69-80480

SOME EFFECTS OF GAS DENSITY ON SPEECH PRODUCTION.

Weiart Wathen-Dunn and Sheldon B. Michaels (AF Cambridge Res. Labs., Data Sci. Lab., Bedford, Mass.).

Annals of the New York Academy of Sciences, vol. 155, Nov. 20, 1968, p. 368-378. 15 refs.

The mechanism for generating speech signals was discussed in order to understand the role that gas density plays in speech production. The values of pressures and alternating volumes were expressed mathematically. Sound spectrograms and sections that showed the formats (resonances) for the vowel /ae/ sustained in air and with mixtures of helium, argon and oxygen were presented. There was considerable variation in voicing frequency, and there were at least three possible contributing factors; (1) variation due to the gas; (2) subject variability; and (3) the order in which the gases were administered.

A69-80481**CONCERNING IMAGERY.**

D. O. Hebb (McGill U., Montreal, Canada).

Psychological Review, vol. 75, Nov. 1968, p. 466-477. 24 refs.
Grant DRB 9401-11.

An attempt is made to analyze imagery in physiological terms. It is proposed (a) that eye movement has an organizing function, (b) that first-order cell assemblies are the basis of vivid specific imagery, and (c) that higher-order assemblies are the basis of less specific imagery and nonrepresentational conceptual processes. Eidetic images, hallucinations, and hypnagogic imagery are compared with the memory image, and certain peculiarities of the memory image are discussed.

A69-80482**TOWARD A THEORY OF MEMORY AND ATTENTION.**

Donald A. Norman (Calif., U., San Diego).

Psychological Review, vol. 75, Nov. 1968, p. 522-536. 35 refs.
Grant NINDB NBO7454.

A theoretical structure is described to account for a variety of phenomena encountered in the study of perception, attention, and memory. A storage system is proposed which has two different modes of activation: A temporary excitation, called short-term or primary storage, and a permanent excitation, called long-term or secondary storage. The storage is assumed to be organized so that access to stored information can be made directly from a sensory code. Thus, the initial interpretation of sensory events can be performed automatically, allowing attention to be directed to events on the basis of their meaning and momentary psychological pertinence. A retrieval process is described to handle the problem of deciding when an item that is recovered from storage is that which was sought. The output from storage is accepted as valid only if it can lead back naturally to the original query of memory. If it cannot, the retrieval process continues, using the initial query together with each intermediate output to guide the direction of search.

A69-80483**ACUTE MOUNTAIN SICKNESS.**

Inder Singh, P. K. Khanna, D. M. Cardiology, M. C. Srivastava, Madan Lal, Sujoy B. Roy, and C. S. V. Subramanyam (Armed Forces Med. Serv., New Delhi, India).

New England Journal of Medicine, vol. 280, Jan. 23, 1969, p. 175-184. 44 refs.

Observations on acute mountain sickness occurring between 11,000 and 18,000 ft., in 1925 men, 18 to 53 yr. old, showed no direct relation between altitude and severity of illness; mild, moderate and severe cases occurred at all altitudes. A time lag of six to 96 hr. between arrival and onset of symptoms ruled out any direct relation between hypoxia and acute mountain sickness. During this period there was clinical evidence of respiratory dysfunction with slow, irregular or Cheyne-Stokes breathing, pulmonary congestion and antidiuresis. In one biopsy and two autopsy studies there was evidence of cerebral edema. Diuresis induced with furosemide provided effective routine therapy. Morphine and betamethasone were used as additional aids in severe cases. Clinical features of acute mountain sickness were ascribed to hypoxia, pulmonary congestion, increased cerebral blood flow, increased cerebrospinal-fluid pressure and cerebral edema.

A69-80484**ACID-BASE RESPONSE TO CHRONIC HYPERCAPNIA IN MAN.**

Newton C. Brackett, Jr., Charles F. Wingo, Orhan Muren, and Jose T. Solano (Va., Med. Coll., Dept. of Med., Div. of Renal Disease, Richmond).

New England Journal of Medicine, vol. 280, Jan. 16, 1969, p. 124-130. 27 refs.

Grants NIH HE 05684-01 and NIH HE 05684-02.

To define "steady-state" chronic hypercapnia in man, we studied 20 patients with stable carbon dioxide tensions from 34 to 103 mm. of mercury and with no apparent complicating disorders. The whole-body titration curve in chronic uncomplicated hypercapnia is characterized by a linear increase in estimated hydrogen ion activity as carbon dioxide tension increases. Over a range of carbon dioxide tensions from 34 to 103 mm. of mercury the arterial-blood hydrogen ion activity increased by 0.24 nM per liter per mm. of mercury increase in carbon dioxide tension. Thus, the whole-body defense of arterial-blood pH appears equally effective over the range of carbon dioxide tensions observed in this study. The physiologic response to chronic hypercapnia in man is defined by a zone that is approximately 11 nM per liter (0.10 pH unit) wide for hydrogen ion and 10 mEq. wide for bicarbonate. These significance bands may be used to separate mixed acid-base disorders in patients with chronic hypercapnia.

A69-80485**EFFECT OF BACTERIAL FLORA ON IRON ABSORPTION IN THE RAT.**

Erving F. Geever, Dorinne Kan, and Stanley M. Levenson (Albert Einstein Coll. of Med., Dept. of Surg. and Pathol., Bronx, N. Y.).

Gastroenterology, vol. 55, Dec. 1968, p. 690-694. 13 refs.
Grants NIH 5 PO1 AM05664-05-AMP and NIH 5 K6-GM-14,208-05.

Iron absorption was compared in groups of germ-free and conventionalized rats. Measurement of whole body reactivity following gastric instillation of a measured dose of Fe⁵⁹ sulfate revealed greater values in the germ-free animals. The importance of intestinal flora and coprophagy in experimental gastrointestinal absorption studies was discussed.

A69-80486**EFFECT OF NEOMYCIN ON CHOLESTEROL LEVELS AND BILE ACID EXCRETION IN GERMFREE AND CONVENTIONAL RATS.**

H. Eyssen, E. Sacquet, E. Evrard, and J. Van den Bosch (Rega Inst. for Med. Res., Leuven, Belgium and C.N.R.S., Gif-sur-Yvette, France).

Life Sciences, vol. 7, part 1, Nov. 1, 1968, p. 1155-1162. 17 refs.

I.W.O.N.L. and F.W.G.O. supported research.

Germfree rats on either a 1% cholesterol diet for 21 days or a 1% cholesterol-0.1% cholic acid diet for 17 days exhibited serum and liver cholesterol levels which were 50% to 100% higher than those of comparable conventional controls. Administration of neomycin to rats on a 1% cholesterol-0.1% cholic acid diet increased serum cholesterol levels by 100% and liver cholesterol levels by 50% in the conventional animals but was without effect on the high cholesterol levels of the germfree group. Neomycin did not affect the fecal bile acid or sterol output of germfree rats but significantly reduced the fecal bile acid loss of the conventional group.

A69-80487**ALTITUDE-INDUCED ALTERATIONS IN DRUG ACTION AND METABOLISM.**

A69-80488

James H. Merritt and Miguel A. Medina (USAF School of Aerospace Med., Biosci. Div., Pharmacol.-Biochem. Branch, Brooks AFB, Tex.). *Life Sciences*, vol. 7, part 1, Nov. 1, 1968, p. 1163-1169. 15 refs.

Mice maintained at 18,000 ft. for five days and then injected with 125 mg. hexobarbital/kg. were found to have decreased sleeping time, smaller concentrations of brain hexobarbital 50 min. after injection, and increased liver microsomal metabolism of the drug compared to ground level controls. Under the same conditions, brain levels of hexobarbital in awakening mice was the same for both groups. The significance of these observations is discussed in relation to changes in drug action at altitude.

A69-80488**INTERVAL FOR EFFECTIVE CHEMICAL PROTECTION AGAINST REPEATED SUPRALETHAL IRRADIATION.**

Richard I. H. Wang, William J. Dooley, Jr., and Andrew Hasegawa (Wood V.A. Center and Marquette Med. School, Milwaukee, Wis.). *Experimental Hematology*, no. 16, 1968, p. 7-10.

Am. Cancer Soc. supported research.

Mice were given a mixture containing 5-hydroxytryptamine, 2-mercaptoethylamine and the dithiocarbamate trithiocarbonate of cysteine preceding whole body radiation. After various time intervals, the mice were again treated and exposed to radiation. From the results it was thought that a mixture of radioprotective chemicals was effective not only against supralethal irradiation but also against repeated supralethal doses. The time interval between radiation exposures was an important factor in determining the degree of effectiveness of the mixture.

A69-80489**RADIOPROTECTIVE ACTION OF 6-N-HYDROXYLAMINOPURINE (6HAP) AND RELATED COMPOUNDS.**

John F. Bonner (Ind. U., School of Med., Indianapolis). *Experimental Hematology*, no. 16, 1968, p. 10-11.

The radioprotective action of 6-N-hydroxylaminopurine (6HAP) and related compounds were investigated in X-ray irradiated mice. Survival was tabulated after 30 days following the 700 r total body radiation. 6HAP and 6-chloropurine appeared to supply a moderate degree of protection.

A69-80490**EVIDENCE FOR A HUMORAL COMPONENT IN IRRADIATION RECOVERY.**

Richard O. Spertzel and Morris Pollard (Notre Dame U., Lobund Lab., Ind.).

Experimental Hematology, no. 16, 1968, p. 16-17.

Cell-impermeable diffusion chambers were used to demonstrate the production of a diffusible factor which promotes recovery in ⁶⁰Co-irradiated mice. This factor appeared to have a selective effect on white blood cell recovery. With a marginal dose of irradiation, this system was consistently reproducible.

A69-80491**ANTIBODY FORMATION IN RADIATION CHIMAERAS.**

Yulia M. Zaretskaya, E. I. Panteleyev, and L. V. Kovalchuk (USSR, Min. of Health, Inst. of Biophysics, Moscow).

Folia Biologica, vol. 14, no. 5, 1968, p. 386-389. 17 refs.

The recovery of antibody synthesis in syngeneic CBA mouse radiation chimaeras was observed for 100 days after irradiation. The reaction to sheep and rat red blood cells was observed in

parallel experiments. It was found that both the primary and the secondary reaction to rat red blood cells did not recover for three mos.

A69-80492**REGIONAL CIRCULATORY RESPONSES TO THE VALSALVA MANEUVER.**

James B. Earnest, McKamy Smith, and James K. Alexander (Baylor U., Coll. of Med., Dept. of Med., Houston, Tex.).

Cardiovascular Research Center Bulletin, vol. 7, Jul.-Sep. 1968, p. 26-33. 7 refs.

Grants PHS HE-5435, PHS HE-05345, and PHS GM-46/03; Med. Res. Found. supported research.

Several hemodynamic parameters were monitored in six dogs during 34 induced Valsalva maneuvers, with particular attention to carotid and femoral arterial blood flow. Other parameters included heart rate, and femoral venous and femoral arterial pressures. Carotid artery pressure-flow relationships during the late phase of the maneuver were unchanged from control levels, and alterations in carotid artery flow paralleled those in mean systemic arterial pressure. Thus the maneuver seemed to induce little change in vasomotor activity of the vascular bed supplied by the carotid artery. However, femoral artery pressure-flow relationships were greatly altered during the late phase of the maneuver, indicating that vasomotor activity plays an important role in the response of this regional vascular bed. It is suggested that the response to the Valsalva maneuver may be used to assess the integrity of the regulatory mechanisms for regional blood flow.

A69-80493**THE EFFECT OF SITTING AND GRADED EXERCISE ON THE DISTRIBUTION OF PULMONARY BLOOD FLOW IN HEALTHY SUBJECTS STUDIED WITH THE XENON 133 TECHNIQUE.**

B. Bake, J. Bjure, and J. Widimsky (Göteborg, U., Dept. of Clin. Physiol., Sweden).

Scandinavian Journal of Clinical and Laboratory Investigation, vol. 22, no. 2, 1968, p. 99-106. 13 refs.

Swed. Natl. Assn. against Heart and Chest Diseases supported research.

The distribution of pulmonary blood flow before, during and after graded exercise was studied in 13 healthy male volunteers. ¹³³Xe was injected intravenously and the counting activity measured with 10 scintillation detectors in the sitting position at total lung capacity. At rest, the unevenness in distribution of perfusion increased with time, the apical regions receiving a progressively smaller proportion of the pulmonary blood flow and the basal regions a progressively greater proportion. During exercise this unevenness in distribution of perfusion was successively reduced with increasing work load.

A69-80494**CARDIAC OUTPUT DURING BREATH-HOLDING IN MAN.**

P. Paulev and H. Wetterqvist (Copenhagen, U., Inst. of Med. Physiol. B, Denmark and Lund, U., Dept. of Clin. Physiol., Sweden).

Scandinavian Journal of Clinical and Laboratory Investigation, vol. 22, no. 2, 1968, p. 115-123. 25 refs.

Cardiac output was measured with the indicator dilution technique in eight healthy subjects. Four of the subjects held their breath with relatively high intrapulmonic pressures (Valsalva maneuvers). During breath-holding their cardiac output was 20 to 40% lower than the control values. In contrast, cardiac output was unchanged or increased in four other subjects who held their

breath with intrapulmonic pressures around zero. The changes in cardiac output were always in accordance with the simultaneously recorded alterations in the arterial blood pressure. The arterial oxygen tension and pH decreased, while the arterial carbon dioxide tension increased with the duration of the breath-hold. The results showed a small stroke volume during Valsalva maneuvers, and a slightly altered stroke volume during apnea.

A69-80495**DIURNAL VARIATIONS IN THE ACID-BASE BALANCE OF BLOOD.**

S. J. Rune and N. A. Lassen (Bispebjerg Hosp., Dept. of Clin. Physiol. and Rigshosp., Div. of Gastroenterol., Med. Dept. P, Copenhagen, Denmark).

Scandinavian Journal of Clinical and Laboratory Investigation, vol. 22, no. 2, 1968, p. 151-156. 12 refs.

Frequent measurements were made of pH and carbon dioxide tension (P_{CO_2}) in arterial blood samples from five subjects over many hours in the awake and sleeping state. Calculation of the concentration of non-volatile acid (i.e. base-excess, buffer-base or standard bicarbonate) showed that the diurnal variations are dominated by those induced by secretion of gastric acid and pancreatic bicarbonate after ingestion of food. Expressed as change in the base-excess, a post-prandial alkaline tide lasting several hours and amounting to one to two meq./l. was found in subjects with normal gastric secretory capacity of acid. Otherwise no significant variation was found, either in day-time or during the night. No systematic post-prandial change in P_{CO_2} was seen, but during sleep an increase was a constant finding. As a consequence of this variation also of the pH of arterial blood is subject to variations during day and night. In the post-prandial period and during sleep, the pH undergoes a systematic change, being higher after meals and lower during sleep.

A69-80496**REACTION OF THE LUNG CELLS TO A HIGH CONCENTRATION OF OXYGEN.**

Drummond H. Bowden, Ian Y. R. Adamson, and John P. Wyatt (Manitoba, U., Fac. of Med., Dept. of Pathol., Winnipeg, Canada). *Archives of Pathology*, vol. 86, Dec. 1968, p. 671-675. 6 refs. Med. Res. Council supported research.

The reactivity of the alveolar cells of mice exposed to 90% oxygen was studied by labeling deoxyribonucleic acid with tritium, and by cell counts and electron microscopy. The distinctive effect of this high concentration of oxygen involved in the capillary endothelium whereas the epithelial and macrophagic cells of the alveolus were unresponsive to the hyperoxic state. It appears that in the lung, as with other tissues, certain differential patterns of response to various agents may be discerned.

A69-80497**ACUTE RESPONSE OF GERM-FREE AND CONVENTIONAL MICE TO IONIZING RADIATION.**

Robert E. Anderson, John L. Howarth, and Robert S. Stone (N. Mex., U., Depts. of Pathol. and Physics, Albuquerque).

Archives of Pathology, vol. 86, Dec. 1968, p. 676-680. 6 refs.

Grant PHS HD-02194.

This report concerns the response of germ-free and conventional six-wk.-old virgin female mice to a single whole body exposure to a variable dose of ionizing radiation. The results demonstrate that the immediate response following such exposure is greatly modified in the germ-free state with differential survival

times favoring germ-free over conventional mice. Autopsy results confirm that this difference is primarily due to bacterial infection in the conventional group, while survival data suggest that such infection is of both endogenous and exogenous origin.

A69-80498**AIR HANDLING TECHNIQUES FOR THE STERILE WORK AREA.**

Joachim E. Gehrke-Manning (Riker Labs., Northridge, Calif.).

Air Conditioning, Heating and Ventilating, vol. 65, Dec. 1968, p. 38-39.

The high efficiency particulate air filtration and laminar air flow techniques used in the sterile work area of a lab were discussed. The design included a technique for aseptic nonturbulent airflow in an installation for animal quarters. Repeated testing proved the techniques to be effective against culturable organisms.

A69-80499**OCULAR STABILIZATION DURING OSCILLATORY HEAD MOVEMENTS.**

Adam Atkin and Morris B. Bender (Mt. Sinai Hosp., Dept. of Neurol. and N. Y., City U., Mt. Sinai School of Med., New York).

Archives of Neurology, vol. 19, Dec. 1968, p. 559-566. 30 refs. *Am. Physiol. Soc., 19th Ann. Meeting, Washington, D. C., Aug. 1967.*

Ocular stabilization reflexes of normal subjects were compared with those of patients with nonfunctioning vestibular systems by recording angular velocity of the head and velocity of compensatory eye movement during transient head rotations that fall within the normal physiologic frequency range. As was expected, ocular stabilization became defective at much lower head velocities in subjects lacking vestibular function than in normal subjects: nevertheless some of the former maintained accurate stabilization at the lowest head velocities used. It was concluded that: (a) the residual stabilization represented the optokinetic component of normal ocular stabilization; (b) optokinetic stimulation of peripheral retina is sufficient to evoke the stabilization performance observed; and (c) when head velocities left the region within which optokinetic mechanisms could maintain ocular stability without vestibular support, the resulting decompression led to the patient's clinical symptoms of oscillopsia and reduced visual acuity. It was noted that oscillopsia gradually disappeared over several months following loss of vestibular function, even though reduction of visual acuity during head movement persisted, implying perceptual adaptation independent of improvement in ocular stabilization.

A69-80500**TRAINING FOR VIGILANCE: COMBINED CUEING AND KNOWLEDGE OF RESULTS.**

Earl L. Wiener and Dennis A. Attwood (Miami, U., Dept. of Ind. Eng., Coral Gables).

Journal of Applied Psychology, vol. 52, Dec. 1968, p. 474-479. 18 refs.

Grant PHS UI00014.

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 2×2 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

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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 curing during training made significantly fewer during transfer. All four groups showed a decline in detection performance over time periods in the transfer sessions.

A69-80501

IN VIVO EXTRALUMINAL BIPOLAR RECORDINGS FROM THE CANINE URETER AND URINARY BLADDER.

Christopher M. Fredericks, Gordon F. Anderson, and James M. Pierce (Wayne State U., School of Med., Dept. of Urol. and Dept. of Physiol. and Pharmacol., Detroit, Mich.).

Investigative Urology, vol. 6, Nov. 1968, p. 284-293. 18 refs.

Grant NIH AM 10713-02 and NDEA-IV supported research.

Utilizing bipolar platinum recording electrodes, acute and chronic extraluminal recordings were made of the electrical activity of the intact canine ureter and urinary bladder. An indwelling catheter was used to monitor intravesical pressure and a strain gauge was used to record the tension developed during ureteral peristalsis. Rhythmic spike potentials were consistently recorded from the ureter and preceded each ureteral contraction. In some instances conduction of the ureteral spike potential onto the trigone was observed. Rapid spike potentials and slow wave changes were recorded in the bladder musculature during micturition but no manifestation of this activity was observed in the ureter.

A69-80502

A MINIATURE FILTER FOR STERILISATION OF SMALL QUANTITIES OF LIQUID.

S. Divakaran and S. H. Hasan (Central Leather Res. Inst., Indian Hides and Skins Improvement Soc., Adyar, Madras, India).

Current Science, vol. 37, Jul. 20, 1968, p. 407-408.

A simple inexpensive device which can be made either from glass or plastics for the sterilization of small quantities of liquids was described. The assembly may be sterilized by autoclaving or by ethylene oxide. Tested materials and results obtained were tabulated.

A69-80503

ON THE CORRELATION BETWEEN ABSOLUTE THRESHOLD AND FALSE ALARMS.

Marcella Bittini (Ist. Nazl. di Ottica, Florence, Italy) and Ercole M. Gloria (Pisa, U., Clin. Oculist., Italy).

Atti della Fondazione Giorgio Ronchi e Contributi dell' Istituto Nazionale di Ottica, vol. 23, Jul.-Aug. 1968, p. 487-495. 8 refs.

Contract AF F6 1052 67 C 0067.

Foveal absolute threshold was determined relative to a small, brief duration test-spot with the aid of a number of different procedures for a group of experienced observers. The validity of the statement according to which the greater the sensitivity, the greater the number of false alarms did not seem to be quite general.

A69-80504

PERCEPTUAL FLUCTUATION IN THE NEIGHBORHOOD OF ABSOLUTE THRESHOLD, AS REVEALED BY AN EXPERIMENT INVOLVING EIGHT RESPONSE CATEGORIES.

Lucia Ronchi (Ist. Nazl. di Ottica, Florence, Italy) and Ercole M. Gloria (Pisa, U., Clin. Oculist., Italy).

Atti della Fondazione Giorgio Ronchi e Contributi dell' Istituto Nazionale di Ottica, vol. 23, Jul.-Aug. 1968, p. 496-514. 18 refs. Contract AF F6 1052 67 C 0067.

Threshold determinations are usually performed by using two or even three response categories. However, the use of eight response categories, according to a previously elaborated scale, seems to give useful informations about the perceptual situation in that intensity range where vision becomes uncertain. The experiment reported below refers to various viewing conditions (monocular and binocular vision, different fixation targets, central and paracentral stimulation). A circular test-spot subtending at the eye 5.3 min. of arc is flashed on a dark background, at a frequency of 0.5 c.p.s. The plot of response-categories vs. time shows a rhythmical behavior, which seems to differ when passing from one individual to another.

A69-80505

CONTRAST THRESHOLD FOR MOVING LANDOLT RINGS.

Anna Maria Ercoles and Maria Teresa Zoli.

Atti della Fondazione Giorgio Ronchi e Contributi dell' Istituto Nazionale di Ottica, vol. 23, Jul.-Aug. 1968, p. 515-525. 14 refs.

Contract AF F6 1052 67 C 0067.

The aim of the investigation was to study the behavior of contrast sensitivity as a function of the target speed. The target moving along a horizontal direction at a low angular speed, was a Landolt ring brighter than the background. The observer did not follow the target movement, but kept the gaze stationary on a fixation point. The direction of target motion either crossed the fixation point or was vertically displaced one or two degrees from the fixation point. In all conditions of fixation, the contrast sensitivity for the target moving at a low speed is higher with respect to that found in the stationary condition; in particular the peak of sensitivity seems to occur at a speed of two to three degrees/sec.

A69-80506

INDIVIDUAL DIFFERENCES IN THE SPREAD OF APPARENT LOCATION OF A POINT.

Arnaldo Dall'era (Ist. Nazl. di Ottica, Florence, Italy) and Rosario Brancato (Florence, U., Clin. Oculist., Italy).

Atti della Fondazione Giorgio Ronchi e Contributi dell' Istituto Nazionale di Ottica, vol. 23, Jul.-Aug. 1968, p. 526-539. 5 refs.

Contract AF F6 1052 67 C 0067.

The investigation dealt with the changes in apparent location of a point-like source, which occurs when a ringsubtending at the eye about 25' is flashed in such a way that the center of the ring coincides with the point source. Eight individuals were tested. They were found to differ from one another as far as both frequency of occurrence of the apparent displacement and direction are concerned. The effect was discussed.

A69-80507

HEART DISEASE WILL IT GROUND YOU?

David A. Vermiere.

Air Line Pilot, vol. 37, Nov. 1968, p. 20-22.

Causes of coronary heart disease (CHD) as well as programs designed to prevent CHD and those for rehabilitation of persons showing evidence of CHD were discussed. The importance of early discovery and rehabilitation in airline pilots was stressed. Among the most important causes of CHD were: (1) heredity; (2) high blood cholesterol; (3) high blood pressure; (4) diabetics mellitus; (5)

obesity; (6) cigarette smoking; and (7) inactivity. Exercises such as brisk walking, jogging, trotting and running were suggested as programs for CHD prevention. These exercise programs were also found to be useful for rehabilitation of persons showing early signs of CHD and in those with manifestations of the disease.

A69-80508
CLINICAL IMPORTANCE OF CONSTRUCTION OF VECTORCARDIOGRAMS BASED ON STANDARD ELECTROCARDIOGRAMS.

B. Jazienicki, J. Styperik, and P. Olejniczak (Med. Acad., Third Dept. of Internal Diseases, Poznań, Poland).
Bulletin de la Société des Amis des Sciences et des Lettres de Poznań, vol. 17, 1968, p. 111-119. 12 refs.

Vectorcardiograms constructed graphically by means of electrocardiograms (ECG) registered in leads I, II, V_2 were compared with vectorcardiograms obtained by the electronic method. Sixty-eight people were examined, their electrocardiograms, especially spatiocardiograms and frontal planigrams, were similar. This refers mainly to left ventricular overloadings and right branch blocks. It is much easier to compare graphic picture with oscillographic vectorcardiograms in McFee's than in Grishman's system. In spite of some methodical reservations the construction of vectorcardiograms based on standard ECG leads appears to be very useful from the clinical point of view.

A69-80509
CHANGES IN THE ACTION OF THE CIRCULATORY SYSTEM AND IN THE CONCENTRATION OF SOME BIOCHEMICAL COMPONENTS IN THE BLOOD OF OLD PEOPLE (AGED 58-78) AFTER ENDURANCE EFFORT.

E. Preisler and J. Rachlewicz (Med. Acad., Dept. of Sport Med. and Raszeja's Hosp. of Internal Med., Poznań, Poland).
Bulletin de la Société des Amis des Sciences et des Lettres de Poznań, vol. 17, 1968, p. 121-132. 11 refs.

The reaction of the circulatory system in old people of the bordering age groups (58 to 65 and 66 to 78) to several kinds of loading with work on cycloergometers was studied. The following were determined: pulse, blood pressure, oxygen pulse capacity based on Douglas-Haldane's method, as well as the concentrations of glucose, lactic acid and alkali reserve in blood. As a result of examinations it was found that the oxygen pulse capacity rose up to a certain limit, parallel to the increasing loading of the organism (360 kgm./min.). When this limit was overrun the oxygen pulse capacity became lower. In people of the more advanced age group a considerable increase of systolic blood pressure was observed during work.

A69-80510
BACTERIOLOGICAL ASPECTS OF AIR-CONDITIONING PLANTS.

W. Whyte (Glasgow, U., Building Serv. Res. Unit and U. Dept. of Bacteriol. and Immunol., Western Infirmary, Glasgow, Great Britain).
Journal of Hygiene, vol. 66, Dec. 1968, p. 567-584. 18 refs.
 Nuffield Prov. Hosp. Trust supported research.

An investigation was carried out into the bacteriological performance of three air-conditioning plants in a hospital ward. Two of these plants had the facility for recirculating part of the ward air. An equation was derived comparing the concentration of bacteria which would be expected to be given off by the humidifiers in the ventilation system, with the concentration of bacteria in the recirculatory tank. The bacterial particles given off by these

humidifiers were of nuclei droplet size, and were found to penetrate the filters used with a fair degree of ease. Although the number of bacteria in the humidifier water remained insignificant with a constant overflow of water into the recirculatory tank, on one occasion a build-up of bacteria was demonstrated when the overflow ceased. For hospital use humidifiers of a nonrecirculatory type should be used. The concentration of bacteria on the surface of the recirculatory ducts was assessed, as also were those on the surface of the supply ducts under full fresh air and recirculation. The concentration of bacteria in the supply ducts was low and the use of terminal filters was not merited, although care should be taken to prevent the build-up of bacteria in inlet grills and diffusers. The bacterial concentration in the exhaust ducts was found to be quite high. It was therefore thought that in critical areas, where the ventilation plant may be shut off, the use of some device to prevent reversed air flow may be necessary. The count of various types of micro-organisms in the fresh air and two-thirds recirculated air are given along with their size distribution. The results of the effect of filtration on the concentration of bacterial particles throughout the air-conditioning plant is given under full fresh air and recirculation. The concentrations appear quite satisfactory. It was found that one set of filters had been overgrown by mould because of free water being brought over from the humidifier. Measures were suggested to overcome this. When primary or prefinal filtration was approximately 90% efficient to Aloxite 50 (B.S. 2831 Test Dust no. 2) it was demonstrated that a fair approximation to the final filtration figure could be obtained by reference to the quoted efficiency of the final filter to Aloxite 50. After similar primary filtration it was demonstrated that the final filtration of filters against recirculated and fresh air was approximately the same. Owing to the higher number of *Staph. aureus* in recirculated air, higher efficiency filtration may be required. Standards of filtration efficiency for critical and non-critical zones are suggested.

A69-80511
COMPARATIVE EFFECTS OF ORGANIC AND MINERAL ACID ON ACID-BASE BALANCE AND GAS EXCHANGE.

John C. Mithoefer and Monroe S. Karetzky (Mary Imogene Bassett Hosp., Cardiopulmonary Lab., Cooperstown, N. Y.).
Journal of Laboratory and Clinical Medicine, vol. 72, Dec. 1968, p. 924-932. 26 refs.
 Grants NIH HE-09130-02, NIH HE-09130-03, NIH HE-5503-03, and NIH HE 5503-04.

A quantitative comparison was made between metabolic acidosis produced by the infusion of lactic acid and hydrochloric acid in anesthetized dogs at constant pulmonary ventilation. The major differences between the effect of equivalent amounts of acid were that HCl produced a greater and more prolonged decrease in pH and bicarbonate concentration, a greater suppression of oxygen uptake, and a larger fraction of the administered acid eliminated by the lungs as CO_2 . Lactic acid was rapidly distributed, in total body water, whereas the distribution of HCl was confined to extracellular fluid. There was no evidence of tissue buffering of HCl in these experiments. The observed differences in gas exchange and acid-base balance can be explained by the difference in volume of distribution of the two acids and by the fact that lactic acid, unlike HCl, is rapidly metabolized in the process of which an equivalent amount of bicarbonate is generated.

A69-80512
EFFECT OF VARIATIONS IN CALCIUM INTAKE ON THE SKELETON OF FLUORIDE-FED KITTENS.

A69-80513

James M. Burkhart and Jenifer Jowsey (Minn., U., Mayo Graduate School of Med., Sect. of Surg. Res. Orthoped. and Mayo Clin. and Mayo Found., Rochester).
Journal of Laboratory and Clinical Medicine, vol. 72, Dec. 1968, p. 943-950. 23 refs.
Grant NIH AM-8658.

Kittens were fed fluoride (2.5 mg/kg. of body weight) for two mo. In one group of animals the addition of calcium (20 mg./kg.) to an otherwise calcium-deficient diet resulted in a depressed serum calcium, abnormally wide osteoid tissue, and increased formation and resorption of bone. In a second group, the addition of calcium (100 mg./kg.) to the diet prevented the decrease in serum calcium and the development of wide osteoid borders, and it reduced both the resorption and, to a lesser extent, the formation of bone tissue. The study shows that elevated levels of calcium in the diet are capable of preventing the osteomalacic effects of high levels of fluoride.

A69-80513

EFFECTS OF HYPERVENTILATION ON THE CIRCULATORY RESPONSE OF THE RABBIT TO ARTERIAL HYPOXIA.

E. F. Crocker, R. O. Johnson, P. I. Korner, J. B. Uther, and S. W. White (New South Wales, U., School of Physiol., Sydney, Australia).
Journal of Physiology, vol. 199, Dec. 1968, p. 267; 282. 22 refs.
Australian Res. Grants Comm., Natl. Heart Found. and Life Insurance Med. Res. Fund supported research.

The circulatory effects of artificial hyperventilation with air and low oxygen mixtures were studied in rabbits anesthetized with chloraloseurethane and given decamethonium iodide. The role of vagal afferents in the response to hypoxia was also assessed in spontaneously breathing unanesthetized and anesthetized animals. The effects of hyperventilation during hypoxia were mediated chiefly through vagal afferents rather than through the effects of hypocapnia. In the absence of changes in autonomic activity (e.g., during artificial hyperventilation with air) the circulatory effects were small and less clearly related to afferent vagal activity. In the spontaneously breathing anesthetized and unanesthetized rabbit vagal afferent activity resulting from the respiratory response to hypoxia inhibits sympatho-adrenal activity in the same way as during hypoxia with artificial hyperventilation. The importance of the vagal afferent input in the rabbit is discussed in relation to the qualitative differences in circulatory response with increasing severity of hypoxia, and in relation to the effects of anesthesia.

A69-80514

LASER IRRADIATION OF THE ANTERIOR SEGMENT OF THE EYE: RABBIT EYES.

Vivienne L. Hallman, E. S. Perkins, G. K. Watts, and C. B. Wheeler (London, U., Inst. of Ophthalmol., Great Britain).
Experimental Eye Research, vol. 7, Oct. 1968, p. 481-486.

Ruby lasers with power outputs of 230 and 800 mJ caused no detectable lesions in the transparent media of the eye but produced marked changes in the iris of pigmented animals. Repeated exposures were required to produce a hole in brown irides but a hole resulted from a single exposure in a blue iris. A three-mW continuous argon laser caused corneal edema after one and one-half min. exposure. The histological appearances of the ruby laser lesions on the iris are described, and the possible clinical applications discussed.

A69-80515

AIR FILTERS FOR GERM-FREE ISOLATORS.

Charles E. Yale and Alapakkam R. Vivek (Wis., U., Med. School, Dept. of Surg., Madison).

Applied Microbiology, vol. 16, Nov. 1968, p. 1650-1654. 10 refs.
Grant PHS AI 06956.

A germ-free isolator must have a perfect bacterial filter. This paper describes a new, relatively inexpensive, stainless-steel filter frame, which is easily and quickly assembled and protects the enclosed filter material at all times. Resistance to the flow of air was less than four in. of water at an airflow of 30 ft.³/min. through the filter frame with 204 in. of surface area and four, one-half in. thick pieces of fiberglass filter material. This filter performed satisfactorily in our gnotobiotic laboratory and was found to be consistently 100% efficient in removing an aerosol containing *Serratia marcescens* from an air stream under a variety of operating conditions.

A69-80516

SPORICIDAL EFFECT OF PERACETIC ACID VAPOR.

Dorothy M. Portner and Robert K. Hoffman (Army, Dept., Fort Detrick, Frederick, Md.).

Applied Microbiology, vol. 16, Nov. 1968, p. 1782-1785. 11 refs.

The sporicidal activity of peracetic acid (PAA) vapor at 20, 40, 60, and 80% relative humidity (RH) and 25° C. was determined on *Bacillus subtilis* var. *niger* spores on paper and glass surfaces. Appreciable activity occurred within 10 min. of exposure to one mg. of PAA per liter and 40% or higher RH. The sporicidal rate decreased from the optimum at 80% RH to a slight effect at 20% RH. Spores on an impermeable surface were more difficult to kill than those on a porous one, probably because the cells tend to pile up on an impermeable surface and the vapor penetrates poorly through the layer of covering cells.

A69-80517

WORK RHYTHM AND POSTURE [CADENCE DE TRAVAIL ET POSTURE].

A. Laville (C.N.A.M., Lab. de Physiol. du Travail, Paris, France).
Le Travail Humain, vol. 31, Jan.-Jun. 1968, p. 73-94. 30 refs.
In French.

Twenty-six subjects were observed during 94 experiments one and a half or two hr. long. The task consisted in dotting holes with a stylet at different speeds. When the work pace increased the number of right dottings increased as well as the number of mistakes; the distance between eyes and the task was reduced, and the number of head movements decreased; the electromyogram activity of the neck muscles was higher; the blinking rate decreased. During each experiment, the performance, eye-task distance and rate of blinking remained stable, but the electromyogram activity increased. The distance between the eyes and the task, the blinking rate and the value of the electromyogram of the postural muscles were the speed-sensitive variables in precision tasks.

A69-80518

IMPORTANCE OF THE LEVEL OF PHYSIOLOGICAL VIGILANCE IN THE PERFORMANCE OF A WATCH-KEEPING TASK [IMPORTANCE DU NIVEAU DE VIGILANCE PHYSIOLOGIQUE DANS L'EXECUTION D'UNE TACHE DE SURVEILLANCE].

C. Tarière and F. Hartemann (Lab. de Physiol. de la Régie Renault, Rueil-Malmaison, France).

Le Travail Humain, vol. 31, Jan.-Jun. 1968, p. 125-156. 36 refs.
In French.

The information given by the electroencephalogram and the pulse rate were correlated with the performance carried out

by 126 subjects in a visual vigilance task of 150 min. This study aimed to answer the following questions: to what degree was the efficiency of subjects related, on the one hand, with the activation level of their central nervous system, and, on the other hand, with the focusing of their attention which was drawn at varying frequencies and for various lengths of time to other distracting points than the signal to be detected.

A69-80519

SOME ASPECTS OF NOISE PREVENTION IN MILITARY AERONAUTICS [ASPECTS PARTICULIERS DE LA PREVENTION CONTRE LE BRUIT EN AERONAUTIQUE MILITAIRE].

R. Vedel (Lab. d'Etudes Méd.-Physiol., Marsan, France).

Le Travail Humain, vol. 31, Jan.-Jun. 1968, p. 157-163. In French.

In military aeronautics the problem of noise prevention must necessarily take into account the operational requirements, the system. This example shows that although ergonomic data provides extremely useful advice and general ideas it must be adapted to each individual case.

A69-80520

INITIATION AND EVAPORATION RATE OF SWEATING DUE TO HEAT [DECLenchement et Rendement Evaporatoire de la Sudation Thermique].

J.-J. Vogt (C.N.R.S., Centre d'Etudes Bioclimatiques, Strasbourg, France).

Le Travail Humain, vol. 31, Jan.-Jun. 1968, p. 165-174. In French.

The changes of the sweat and evaporation rates during various exposures and under various heat stresses showed that the sweat rate, during the initiation stage rises within 40 to 45 min. to its steady-state level. After three hr. of exposure, the sweat gland fatigue may appear; the sweat rate seems to be maximum during the initiation stage and to decrease to its final value during the steady-state period. After three hr. of exposure the sweat rate may increase above its previous steady-state value.

A69-80521

NOMOGRAPHIC ESTIMATION OF THE REQUIRED SWEATING RATE OR OF THE PERMISSIBLE EXPOSURE TIME AS A FUNCTION OF THE ENVIRONMENTAL TEMPERATURE [NOMOGRAMMES DE PREDICTION DU DEBIT SUDORAL REQUIS OU DE LA DUREE-LIMITE D'EXPOSITION EN FONCTION DES CARACTERISTIQUES PHYSIQUES D'UNE AMBIANCE THERMIQUE].

J. J. Vogt and B. Metz (C.N.R.S., Centre d'Etudes Bioclimatiques, Strasbourg, France).

Le Travail Humain, vol. 31, Jan.-Jun. 1968, p. 175-179. In French.

In order to estimate the required sweating rate or the permissible exposure time during work in heat, the numerical computation of a dozen equations is necessary. A series of nomographs which allow an easy graphical solution of these equations in a wide range of muscular work levels and climatic conditions were developed.

A69-80522

HEMATOLOGICAL CHANGES DURING HYPERBARIC OXYGENATION THERAPY [MODIFICAZIONI CITOEMATICHE IN CORSO DI OSSIGENOTERAPIA IPERBARICA].

M. Valbonesi and R. Cataldi (Genova, U., Ist. di Med. del Lavoro, Italy).

Lavoro e Medicina, vol. 22, Jan.-Feb. 1968, p. 33-42. 22 refs. In Italian.

The variations in the hematological parameters of 17 human subjects were studied after both a single and a series of seven to 10 exposures of two hr. each to hyperbaric oxygenation therapy at a pressure of 2-2.2 absolute atm. with 98% oxygen. The modifications after a single exposure consisted of a light erythrocytosis, reticulocytosis leukocytosis, and thrombocytosis and were referred to nonspecific stress effects. The absence of signs of hematopoietic inhibition after seven to ten exposures to hyperbaric environment pointed out the harmlessness of this therapeutic method.

A69-80523

EFFECT OF "DECONDITIONING" IN THE ADJUSTMENT OF THE CARDIOVASCULAR SYSTEM TO PHYSICAL WORK [VLIIANIE "RASTRENIROVANNOSTI" NA ADAPTATSIU SERDECHNO-SOSUDISTOI SISTEMY K MYSHECHNOI RABOTE].

L. A. Ioffe, M. A. Abrikosova, and I. U. M. Stoida.

Teoriia i Praktika Fizicheskoi Kul'tury, no. 2, Feb. 1968, p. 33-40. In Russian.

The influence of 40 days of bed rest upon the adjustment of some cardiovascular parameters during muscular work was studied in five middle and long distance runners 25 to 40 yr. old, and five heavy-weight lifters, 24 to 36 yr. old. The electrocardiograms, phonocardiograms and sphygmograms were recorded during work performed on the treadmill and bicycle ergometer, and for five min. in the recovery period. It was found that prolonged bed rest was accompanied by various changes in the functional state of the circulatory system, reflecting a decrease in the effective functioning of the regulatory mechanism and the cardiac muscle contraction (increase in the resting heart rate, the heart minute output, decrease of the diastolic time, and alteration of the peripheral vascular circulation). A rapid recovery of the work capacity was observed in all the subjects. With regular training they recovered and even in some cases improved their former conditions ten days after the bed rest.

A69-80524

FITNESS TO REPEATED MUSCULAR ACTIVITY [O GOTOVNOSTI K POVTORNOI MYSHECHNOI DEIATEL'NOSTI].

V. M. Volkov and A. V. Romashov (Smolensk State Inst. of Phys. Cult. USSR).

Teoriia i Praktika Fizicheskoi Kul'tury, no. 2, Feb. 1968, p. 40-43. In Russian.

An attempt was made to study the alterations occurring in muscular work capacity, motor and vegetative parameters subsequent to static work, strength exercises and exercises of maximum intensity. The findings showed that after static exercises the strength, respiratory and circulatory parameters were restored faster than the muscular work capacity. After strength exercises the time required for the respiratory minute volume and oxygen consumption to return to pre-exercise state corresponded to the greatest extent to the time of recovery of the muscular work capacity, allowing it to be used as a criteria of the readiness for these types of exercise. After violent exercises such as sprinting

A69-80525

the restorative period of the muscular work capacity was best correlated with the restoration of pulmonary ventilation and oxygen consumption and less with the pulse rate recovery, the latter showed that in the given work conditions the lung ventilation and oxygen consumption reflected the recovery of work capacity to a greater extent than the pulse rate.

A69-80525

RESEARCH ON DISINFECTANT PREPARATIONS FOR WEARING APPARELS [IZYSKANIE DEZINFJEKANTOV DLIA OBEZZARAZHIVANIIA BEL'IA].

V. V. Korotkov and N. A. Kamennov (Central Sci.-Res. Disinfectant Inst., Moscow, USSR).

Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, no. 9, Sep. 1968, p. 13-18. In Russian.

Five complex phenyl esters and four benzyl derivatives of phenol combined with synthetic surface-active substances were tested for disinfection of wearing apparel. At definite conditions (0.3-0.5% concentration, exposure 15 to 30 min., temperature of solution 45° C.) benzylchlorphenol, benzylphenol, phenyltrichloracetate and phenylacetate proved to be effective against *Staphylococcus aureus* and *E. coli* in disinfection of wearing apparel together with (1:1 ratio) surface active agents such as sulfanole B, sulfanole NF-1, olefinsulfate, synthol, sulfanate, etc. The color of the materials and their durability did not change after treatment with the preparations studied. This concerned such materials as natural and artificial silk, cotton, wool and linen. Single treatment with benzylchlorphenol and benzylphenol (0.3% concentration) reduced the capron durability by 38.5%. Capron disintegrated completely after three treatments. Phenyltrichloracetate and phenylacetate had no effect on capron and other materials under study. High bactericidal activity of the preparations tested in the presence of surface-active substances allows the combination of disinfection and hygienic washing of wearing apparel.

A69-80526

OCCUPATIONAL DERMATOSES IN ARMORED UNITS [PROFESIONALNE DERMATOZE U OKLOPNOJ JEDINICI].

Branislava Petrović Poljak and Petar Mladenović.

Vojnosanitetski Pregled, vol. 25, Apr. 1968, p. 185-188. 7 refs. In Yugoslavian.

The results of studies on the effect of naphtha and its derivatives on the skin of 149 soldiers from an armored unit and 198 soldiers used as controls were presented. Together with skin diseases which could be observed in every military group, a morbidity rate of 15.4% from detritional dermatitis (dry skin, rhagades and excoriations) and 26.1% from folliculitis were found. In 14.6% of cases the professional etiology of these diseases was confirmed. They were characteristic of professional dermatoses caused by fuels and lubricants.

A69-80527

ADAPTATION CHANGES OCCURRING IN THE CEREBELLUM AND SPINAL MOTOR STRUCTURES UNDER VARIOUS CONDITIONS OF HYPOXIA [OB ADAPTACIONNYKH IZMENENIIAKH V MOZZHECHKE I DVIKATEL'NYKH STRUKTURAKH SPINNOGO MOZGA PRI RAZNYKH REZHIMAKH GIPOKSII].

O. G. Gazenko, N. N. Demin, V. B. Malkin, and L. Z. Pevzner.

Doklady Akademii Nauk SSSR, vol. 179, Apr. 1968, p. 997-1000. 17 refs. In Russian.

Experiments were conducted on rats to study the adaptation mechanisms of the animals in a low oxygen environment. The

animals were exposed in pressure chambers to temporary simulated altitudes of 8,700 m. for two hr. to gradually increasing altitudes (3,000 to 7,000 m.) everyday for two wk., and to chronic exposure to an altitude of 5,500 m. for two wk. The nucleic acid levels in the cytoplasm of nerve and satellite glia cells of the central nervous system were determined. It was found that during gradual and chronic exposures there was an increase in the number of erythrocytes, in the content of hemoglobin and the number of reticulocytes. These changes were considerably more marked during the chronic stay in an oxygen deficient atmosphere. Consequently, the general increase of the oxygen capacity resulting from hematopoiesis stimulation during chronic exposure of the central nervous system were determined. It was found that during gradual and chronic exposures there was an increase in the number of erythrocytes, in the content of hemoglobin and the number of reticulocytes. These changes were considerably more marked during the chronic stay in an oxygen deficient atmosphere. Consequently, the general increase of the oxygen capacity resulting from hematopoiesis stimulation during chronic exposure of the animals to altitudes of 5,500 m. was more marked, and seemed to be related to the duration of the exposure. This reaction promoted an increased oxygen supply to the tissues. The absence or the small changes in the concentration of nucleic acids in the rats at the end of 21 days exposure to 5,500 m. were probably conditioned by the fact that after some time the changes occurring at the beginning of the exposure leveled out. It could be assumed that the changes in RNA content in the nervous system cells (as exemplified by the cerebellum and spinal cord) represented a particular metabolic reflex, directed toward the preservation of their structure.

A69-80528

DYNAMICS OF GLUTAMIC, ASPARTIC AND GAMMA-AMINOBUTYRIC ACIDS IN THE BRAIN DURING HIBERNATION [DINAMIKA GLUTAMINOVOI, ASPARAGINOVOI I GAMMA-AMINOMASLIANOI KISLOT GOLOVNOGO MOZGA VO VREMIA ZIMNEI SPIACHKI].

E. Z. Emirbekov.

Doklady Akademii Nauk SSSR, vol. 179, Apr. 21, 1968, p. 1485-1486. 17 refs. In Russian.

The changes in the amino acid content in the brain were studied in *Citellus pygmaeus* Pallas during hibernation in relation to its length and the degree of temperature drop. From the findings it was inferred that the glutamic, aspartic and gamma-aminobutyric acids were used in the brain energy metabolism. The changes in the content of amino acids in the cerebral hemispheres and cerebellum coincided with the rate of oxygen consumption in the brain at different body temperatures during hibernation. Even though the glutamic decarboxylase was 30% higher in the hibernating brain there was no corresponding change in the content of glutamic and gamma-aminobutyric acids. Therefore the glutamic and gamma-aminobutyric changes seemed to be regulated more by different metabolic pathways than by the glutamic decarboxylase activity. During prolonged hibernation the gamma-aminobutyric content in the brain tissues was much lower (19.3 ± 1.00 and 15 ± 0.59 mg. -%) than during a week hibernation (26.2 ± 1.13 and 42.9 ± 2.1 mg. -%). It would be considered that the gamma-aminobutyric acid content in the brain did not determine stimulation or inhibition. Glutamic, aspartic and gamma-aminobutyric acids participated actively in the brain regulatory mechanism, determining the metabolic adaptation during prolonged hibernation.

A69-80529

EFFICIENCY OF OXYGEN RELEASE BY ALGAE DURING ILLUMINATION WITH LONG WAVELENGTH (GAMMA

GREATER THAN SEVEN HUNDRED MILLIMICRONS) [OB EFFEKTIVNOSTI VYDELENIIA KISLORODA VODOROSLIAMI PRI IKH OSVESHCHENII DLINNOVOLNOVYM SVETOM (GAMMA GREATER THAN 700 MILLIMICRONS)].

V. M. Kutiurin, N. M. Nazarov, and I. N. Anisimova. *Doklady Akademii Nauk SSSR*, vol. 181, Aug. 11, 1968, p. 1270-1273. 7 refs. In Russian.

The efficiency of long wavelength light on the water decomposition process and oxygen (O₂) production were investigated when O₂ absorption was slowed down or disappeared entirely, as it might happen in anaerobic conditions. The relationship between the rate of apparent photosynthesis and the O₂ concentration in the medium of *Scenedesmus obliquus* and *Chlorella pyrenoidosa* was studied during illumination with monochromatic light in the spectrum range of 620 to 760 mμ. The comparison between the intensity of O₂ release in the 700 to 760 mμ range showed that under anaerobic conditions there was no decrease in efficiency up to 720 to 730 mμ in *Scenedesmus obliquus* whereas in *Chlorella pyrenoidosa* this decrease was observed even under anaerobic conditions. This difference was related to the type of exchange of these algae, since comparison of the absorption spectra in single cases did not reveal marked differences. With 10⁻⁵ mol./l. and higher O₂ content this difference disappeared and the usual picture of decrease in the quantum of O₂ production in plants was seen. The potential capability to release O₂ in the long wave range was markedly higher than it appeared from measurement of the spectra activity in presence of O₂. This capacity was related to the long wave chlorophyll *a*, since the chlorophyll *a* in the 710 to 760 mμ range did not absorb light.

A69-80530

PHOSPHORYLATION OF THYMIDINE IN THE THYROID AND SPLEEN OF RATS IN THE EARLY PERIOD FOLLOWING TOTAL GAMMA-IRRADIATION [FOSFORILIROVANIE TIMIDINA V ZOBNOI ZHELEZE I SELEZENKE KRYV V RANNIE SROKI POSLE OBSHCHEGO GAMMA-OBLUCHENIIA].

I. V. Filippovich and E. F. Romantsev (USSR, Min. of Health, Inst. of Biophysics, Moscow). *Radiobiologiya*, vol. 8, Sep.-Oct. 1968, p. 680-683. 17 refs. In Russian.

Total body irradiation of rats exposed to 1000 r of gamma rays produced a sharp decrease in the thymidine kinase activity in the thyroid tissues within three min. following irradiation. Subsequently, the enzyme activity gradually reached the control values. The decrease of the thymidine phosphate level was not connected with the activation of thymidylic acids and thymidine catabolic processes in the exposed tissues. In the spleen, within the same time intervals after exposure, the decrease observed in the thymidine phosphorylation level was less pronounced. It was possible that the marked decrease of thymidinekinase activity in the thyroid was related with the radiation damage of the cell microstructure or single macromolecules (e.g., deoxyribose-1-P). At the same time the hormonal effect could play a definite role in the decrease of thymidinekinase activity.

A69-80531

CHANGES IN THE SYNAPTIC DELAY OF THE NEUROMUSCULAR SYNAPSES IN RATS AT VARIOUS TIMES OF ACUTE RADIATION SICKNESS [IZMENENIE SINAPTICHESKOI ZADERZHKI NERVENO-MYSHECHNYKH SINAPSOV KRYV V RAZLICHNYE PERIODY OSTROI LUCHEVOI BOLEZNI].

V. F. Cherkasov, V. S. Nesterenko, and V. D. Kudriavtsev (USSR, Acad. of Med. Sci., Inst. of Med. Radiol., Obninsk). *Radiobiologiya*, vol. 8, Sep.-Oct. 1968, p. 700-703. 13 refs. In Russian.

Rats exposed to a single total gamma irradiation of 900 r presented a lowered threshold of stimulus intensity of the neuromuscular synapses with a simultaneous decrease in the synaptic delay to a single stimulus, which seemed to demonstrate the increased reactivity of the cholinergic structures of the post synaptic membrane. The marked increase of the synaptic delay in the animals exposed to radiation, subsequent to stimulation with a frequency of 200 c.p.s. probably occurred as a result of the inhibition of acetylcholine synthesis.

A69-80532

ACID BASE BALANCE IN THE BRAIN MEDIA OF IRRADIATED ANIMALS AFTER PREVENTIVE ADMINISTRATION OF CYSTAMINE [KISLOTNO-SHCHELOCHNOE RAVNOVESIE VNUTRENNIKH SRED MOZGA U ZHIVOTNYKH, OBLUCHENNYKH NA FONE PROFILAKTICHESKI VVEDENNOGO IM TSISTAMINA].

A. G. Kuzovkov and B. M. Ivanov (S. M. Kirov Mil.-Med. Acad., Leningrad, USSR). *Radiobiologiya*, vol. 8, Sep.-Oct. 1968, p. 717-720. 11 refs. In Russian.

The actual pH, the partial carbon dioxide (CO₂) tension, the sum of the anionic buffers, the standard bicarbonates and the loss of alkalinity in arterial (carotid), and venous blood (cerebral sinus) plasma were determined in rabbits. Animals exposed to 800 r of x-rays showed an uncompensated metabolic acidosis in the blood, while the alkalosis was maintained in the fluids by an increase in the permeability of the blood cerebral barrier for standard bicarbonates and an enhanced elimination of CO₂. An even higher increase of blood acidosis and fluid alkalosis was found in animals which received cystamine intravenously prior to irradiation.

A69-80533

EFFECT OF CHEMICAL PROTECTION IN FRACTIONATED IRRADIATION CONDITIONS. 5. COMPARATIVE STUDY OF ANIMALS RESISTANCE TO IRRADIATION AND THE TOXIC EFFECTS OF PROTECTORS IN RELATIONSHIP TO AN OPTIMUM RADIOPROTECTIVE DOSE OF THE PREPARATION [DEISTVIE SREDSTV KHIMICHESKOI ZASHCHITY V USLOVIIAKH FRAKTSIONIROVANNOGO OBLUCHENIIA. 5. SRVINITEL'NOE IZUCHENIE RADIOREZISTENTNOSTI ZHIVOTNYKH I IKH USTOICHIVOSTI K TOKSICHESKOMU DEISTVIU PROTEKTOROV V SVIAZI S PODBOROM OPTIMAL'NOI RADIOZASHCHITNOI DOZIROVKI PREPARATA].

S. P. Armonenko and V. N. Ivanov (USSR, Acad. of Med. Sci., Inst. of Labor Hyg. and Occupational Diseases, Moscow). *Radiobiologiya*, vol. 8, Sep.-Oct. 1968, p. 725-730. 13 refs. In Russian.

A comparative study of the radiosensitivity and resistance to radioprotectors S, beta-aminoethylisothionium (AET), 5-methoxytryptamine (mexamine) and beta-aminoethylthiophosphate (cystaphos) toxicity was carried out in eight different mice strains. A positive correlation was observed among the parameters investigated, and the data could be considered as additional proof of the genetic relationship between radiosensitivity and the general nonspecific resistance. It was also shown that in the mice exposed to a single or fractionated irradiation of median lethal doses, the maximum protection effect was achieved with an optimum, sufficiently high but not toxic, dosage of AET and cystaphos. This dosage was found to be lower than the amounts of the same preparations generally used in experimental radiobiology.

A69-80534

A69-80534

CHANGES IN THE RADIATION RESISTANCE OF RATS DURING HYPOTHERMIA INDUCED BY DIFFERENT METHODS [IZMENENIE RADIOREZISTENTNOSTI KRYSA V USLOVIAKH GIPOTERMII PRI RAZNYKH METHODAKH EE POLUCHENIIA].

N. V. Gordeicheva and T. P. Strokova (USSR, Min. of Health, Inst. of Med.-Biol. Problems, Moscow).

Radiobiologiya, vol. 8, Sep.-Oct. 1968, 747-749. 18 refs. In Russian.

A hypothermic state induced by the artificial hibernation method or by hypercapnic hypoxia increased the radiation resistance in rats exposed to 800 r doses of gamma irradiation, but had no effect when the animals were exposed to doses of 1,500 r. The most marked radiation resistance was observed in the hypothermic state produced by hypercapnic hypoxia.

A69-80535

MECHANISM OF THE RADIOPROTECTIVE EFFECT OF AMINOTHIOLS [K MEKHANIZMU RADIOZASHCHITNOGO DEISTVIA AMINOTIOLOV].

L. A. Tiunov and G. A. Vasil'ev.

Radiobiologiya, vol. 8, Sep.-Oct. 1968, p. 756-757. 16 refs. In Russian.

Experiments conducted on white mice exposed to X-radiation showed that the radioprotective effect of L-cysteine could be enhanced when this aminothiols was combined with a xanthine oxidase inhibitor, 2-amino-4-methyl-1,2,3,4-tetrahydro-5,6-diazole (5,6,4,5) pyrimidine. The data suggested that in the aminothiols radioprotective action mechanism the endogenous sulfhydryl group played a definite role, since the inhibition of xanthine oxidase restrained the oxidation process in the reduced glutathione.

A69-80536

CORRELATION BETWEEN THE RADIOPROTECTIVE EFFECT OF ANDROGENS AND THEIR ANABOLIC ACTION [O SVIAZI MEZH DU RADIOZASHCHITNYM DEISTVIEM ANDROGENOV I IKH ANABOLICHESKIM DEISTVIEM].

I. N. Efimov (USSR, Min. of Health, Inst. of Biophysics, Moscow).

Radiobiologiya, vol. 8, Sep.-Oct. 1968, p. 758-760. 12 refs. In Russian.

Testosterone-propionate or oxymetholone were administered to male rats at a dose of 50 mg/kg. of body weight 10 days before exposure to doses of 650 r gamma-radiation. The administration of the hormones increased the survival time of the irradiated animals, and relieved the radiation sickness, prevented a decrease of the labeled amino acids incorporation in the organs (small intestines, spleen, etc.) of proteins at various time during the radiation sickness, and accelerated the weight recovery processes. The changes in the incorporation rate of labeled amino acids in the proteins and in the animals weight expressing the anabolic effect of these hormones could be one of the radioprotective mechanisms.

A69-80537

STATE OF THE VESTIBULAR SYSTEM IN DOGS SUBJECTED TO SMALL DOSES OF PROLONGED CHRONIC IRRADIATION [SOSTOIANIE VESTIBULIARNOGO ANALIZATORA SOBAK, PODVERGAVSHIKHSIA DLITEL'NOMU KHONICHESKOMU OBLUCHENIIU V MALYKH DOZAKH].

IU. G. Grigor'ev and P. I. Kumets.

Radiobiologiya, vol. 8, Sep.-Oct. 1968, p. 767-768. In Russian.

Presented were some of the results of a study on the functional state of the vestibular analyzers in dogs subjected to chronic irradiation for a year with doses corresponding to the amounts of radiation that could be expected during extended space flights. Thirty-two animals were exposed to yearly total doses of chronic irradiation of 25, 75, 150 and 225 r. During the experiment the sensitivity and reactivity of the vestibular apparatus was evaluated by negative acceleration from 5 to 90°/sec.², the excitation of the cupular apparatus was combined with adequate excitation of the visual analyzers. The findings showed a decrease in the sensitivity threshold of dogs exposed to yearly cumulative doses of 225 r, and similar changes also occurred in the excitation threshold of animals exposed to doses of 150 r per yr.; however, the reactivity and the interaction of the visual and vestibular analyzers remained unchanged in all the dogs.

A69-80538

A SYSTEM FOR MACHINE IDENTIFICATION OF BACTERIA.

Howard M. Hochberg, James K. Cooper, Cesar A. Caceres (HEW, Dept., Div. of Chronic Diseases, Heart Disease Control Program, Washington, D. C.), and J. J. Redys (Conn. State Dept. of Health, Div. of Labs., Hartford).

Medical Research Engineering, vol. 7, Second quarter, 1968, p. 20-29. 17 refs.

An example of the entry of electronics into the clinical laboratory is the grouping of bacteria by use of fluorometry. Fluorescein-isothiocyanate-labelled antibody is an easily identifiable tag which provides a high degree of serological specificity. Test tubes of broth cultures of throat swab specimens are enzymatically prepared and stained with fluorescent antibody (FA) vs. Group A streptococci. The FA is then dissociated and the solution is assayed fluorometrically. The level of non-specific staining is measured by staining the cells with fluorescein-conjugated globulin and again dissociating and measuring fluorescence. The two fluorescences are subtracted and the difference is a measure of the amount of FA which has been bound to any group A cells in the culture. A preliminary clinical trial of 644 specimens has shown this method to agree 92% with the microscopist.

A69-80539

RANDOM GATE COMPUTER FOR IN-LINE BIOMEDICAL APPLICATIONS.

George R. Stibitz (Dartmouth Med. School, Dept. of Physiol., Hanover, N. H.).

Medical Research Engineering, vol. 7, Second quarter, 1968, p. 36-38. 7 refs.

A class of in-line computers for the multiplication and integration of analog inputs uses pulse-counting and the multiplicative properties of independent random events. The theory and logical design of a computer of this class was applied to nitrogen-washout procedures. A generator emits pulses at a fixed rate, through an AND gate, to pulse-counter. The expected number of counts measures the integral of the probability and the AND gate is open. The AND gate is coincident opening of two or more gates actuated by independent random signals, the probabilities of which are made proportional to the given analog inputs by feedback circuits. A brief outline of formulas for estimating the variation of counts about their expected values is included.

A69-80540

INSTRUMENT FOR READING IONIZATION CHAMBER DOSIMETERS.

Neil C. Hoitink and Edwin M. Sheen (Battelle Mem. Inst.-Pacific Northwest Lab., Appl. Physics and Electron. Dept., Richland Wash.). *Medical Research Engineering*, vol. 7, Second quarter, 1968, p. 39-42.

Contract AEC AT(45-1)-1830.

An instrument is described which permits accurate reading of condenser ionization chamber dosimeters. It measures peak voltage developed across a resistor by the charging current. Peak voltage is a measurement of the amount of ionizing radiation to which the chamber has been exposed. Measurements of peak voltage are accurate to better than $\pm 1\%$ and are displayed on digital readout. Actual dose calibration depends on characteristics of chamber used. Dynamic range of the instrument covers three decades with automatic range selection, which makes it unnecessary to estimate dose prior to measurement.

A69-80541

COMPARATIVE STUDIES ON PLASTOQUINONES. 4. PLASTOQUINONES IN ALGAE.

Elena Sun, Rita Barr, and F. L. Crane (Purdue U., Dept. of Biol. Sci., Lafayette, Ind.).

Plant Physiology, vol. 43, Dec. 1968, p. 1935-1940. 23 refs.

Grant NSF GB02920.

Plastoquinones A and C have been found in all classes of algae, including representatives of greens, yellow-greens, blue-greens, reds, browns and the flagellate, *Euglena*. Plastoquinone C from red and brown algae can be separated into six different types. An additional plastoquinone C has been found in *Gigartina* and *Rhodomela*. From chromatographic evidence this may be equivalent to plastoquinone Co, and C type with a hydroxyl group on the first isoprene unit of the terpenoid sidechain of this substituted benzo-quinone. The biquinone, vitamin K and α -tocopherylquinone content of several algae is also reported. The presence of plastoquinone A in all green plants and many algae indicates that it may be a functional element in photosynthesis. The study shows that plastoquinone C is more regularly present in algae than has been previously shown.

A69-80542

INHIBITION OF CHLOROPLASTS BY UV-IRRADIATION AND HEAT-TREATMENT.

Takashi Yamashita and Warren L. Bulter (Calif., U., Dept. of Biol., San Diego, La Jolla).

Plant Physiology, vol. 43, Dec. 1968, p. 2037-2040. 11 refs.

Grant NIH GM-15048 and Charles F. Kettering Res. supported research.

The site of inhibition in UV-irradiated and heat-treated chloroplasts was examined by using artificial electron donor compounds such as p-phenylenediamine and hydroquinone which donated electrons specifically to photosystem II. In both cases the electron donors restored the photoreduction of nicotinamide adenine dinucleotide phosphate and the restored activity was inhibited by 3-(e,4-dichlorophenyl) -1,1-dimethyl urea. The fluorescence of variable yield was eliminated by both inhibitory treatments and was partially restored by the electron donors in the heat-treated but not the UV-irradiated chloroplasts. The results suggest that the sites of inhibition of UV-radiation and heat treatment are in the photosynthetic electron transport chain between water and photosystem II.

A69-80543

HYPOXIA AND RENAL FUNCTION.

H. G. Pauli (Berne, U., Inselspital, Dept. of Internal Med., Switzerland).

Minnesota Medicine, vol. 52, Jan. 1969, p. 29-31.

Experimental and clinical evidence was gathered in order to determine the influence of hypoxia on glomerular filtration rate, effective renal plasma flow and renal handling of sodium. A distinction between acute and chronic effects was indicated.

A69-80544

EFFECTS OF A REDUCTION IN ENVIRONMENTAL TEMPERATURE ON THE CIRCULATORY RESPONSE TO EXERCISE IN MAN.

Stephen E. Epstein, Morris Stampfer, G. David Beiser, Robert E. Goldstein, and Eugene Braunwald (NIH, Natl. Heart Inst., Cardiol. Branch, Bethesda, Md.).

New England Journal of Medicine, vol. 280, Jan. 2, 1969, p. 7-11. 19 refs.

The physiologic basis for the frequent complaint of worsening of symptoms in a cold environment was investigated in six patients with and five without coronary-artery disease, at rest and during identical levels of mild upright exercise at 25 and 15° C., with similar results. Significantly higher at the lower temperature were mean systemic arterial pressure (105 vs 92 mm. of mercury at rest and 110 vs 92 during exercise; p less than 0.001), total peripheral resistance (1821 vs 1609 dynes-sec-cm⁻⁵ at rest, 1213 vs 993 during exercise; p less than 0.02) and left ventricular minute work (6.5 vs 5.7 kg-m.at rest, 10.9 vs 9.0 during exercise; p less than 0.001). Exposure to cold did not change heart rate, cardiac output or stroke volume at rest or during exercise. These results indicate that a cold environment increases peripheral resistance at rest and during exercise. The consequent rise in arterial pressure, by augmenting myocardial oxygen requirements, would thus more readily provoke an attack of angina.

A69-80545

DIETARY PERTURBATION OF CALCIUM METABOLISM IN NORMAL MAN: COMPARTMENTAL ANALYSIS.

James M. Phang, Mones Berman, Gerald A. Finerman, Robert M. Neer, Leon E. Rosenberg, and Theodore J. Hahn (NIH, Natl. Inst. of Arthritis and Metab. Diseases, Math. Res. Branch and Natl. Cancer Inst., Metab. Branch, Bethesda, Md.).

Journal of Clinical Investigation, vol. 48, Jan. 1969, p. 67-77. 35 refs.

The effect of dietary calcium intake on calcium metabolism was studied in eight normal volunteers by multicompartmental analysis of radiocalcium and balance data. In paired studies of six normal subjects on normal and high or low calcium intakes, necessary and sufficient criteria were used to determine changes in calcium metabolic parameters produced by alterations in dietary calcium. These changes involved gastrointestinal calcium absorption rate, renal and endogenous fecal rate constants, and bone resorption rate. Bone accretion rate and compartment sizes need not change between the paired studies. The changes or parameters involving kidney, gut, and bone were in a direction to support calcium homeostasis and were compatible with the pattern of changes produced by parathyroid hormone. However, the source of the stimulus for hormone secretion was not apparent since plasma calcium concentrations showed no significant difference between paired studies. The implications of these findings relative to control of hormone secretion, calcium regulatory mechanisms, and metabolic bone disease are discussed.

A69-80546

TISSUE TOLERANCE: CENTRAL NERVOUS SYSTEM.

Gordon L. Verity.

Radiology, vol. 91, Dec. 1968, p. 1221-1225. 22 refs.

Radiol. Soc. of N. Am., 53rd Sci. Assembly and Ann. Meeting, Chicago, Nov. 26-Dec. 1, 1967.

A69-80547

Precise limits of central nervous system tissue tolerance are not known, although ranges of tolerance have been fairly well established. Experience has shown that the incidence of clinically identifiable damage is low as long as the dose rate is kept around 900 rads/week in four to six fractions and the total dose does not exceed the approximate level of 6,000 rads. Variations from this time-dose-fraction relationship as well as some other factors may cause a rise in the risk of irreversible damage.

A69-80547

INFLUENCE OF DIETARY PROTEIN ON CALCIUM METABOLISM IN YOUNG RATS.

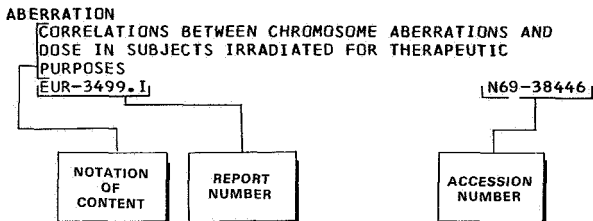
I. S. Shenolikar and B. S. Narasinga Rao (Indian Council of Med. Res., Nutr. Res. Labs., Tarnaka, India).

Indian Journal of Medical Research, vol. 56, Sep. 1968, p. 1412-1422. 18 refs.

Three groups of rats were put on low protein, high protein and restricted high protein diets respectively and were investigated for the chemical composition of their bones, calcium balance and the distribution of radioactive calcium in femora and body fluids following Ca^{45} injection. There was a slower rate of skeletal growth in the rats receiving low level of protein than in the weight control rats receiving high level of protein in the diet. The rats receiving low level of protein (5 per cent) showed a higher level of ash in their bones as compared to their weight controls receiving high level of protein (32 per cent) with the same level of calcium intake. The fecal calcium was higher in the rats fed low protein diet than the rats fed high level of protein. Not much difference was obtained in the percentage absorption of dietary calcium in the rats fed a low or high level of protein. The excessive fecal loss of calcium in the rats fed a low protein diet was shown to be of endogenous origin rather than to dietary origin.

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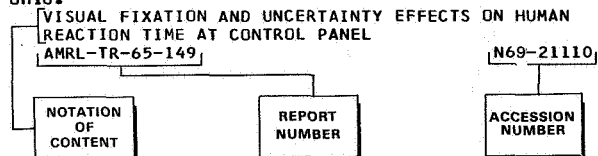
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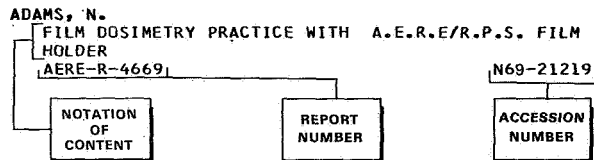
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