NASA SP-7011 (34)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

1136

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NASA SP-7011 (34)

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 January, 1967

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. **FEBRUARY 1967**

INTRODUCTION

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

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

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

a. NASA entries identified by their *STAR* accession numbers (N67-10000 series),
b. AIAA entries identified by their *IAA* accession numbers (A67-10000 series); and
c. LC entries identified by a number in the A67-80000 series.

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(continued)

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

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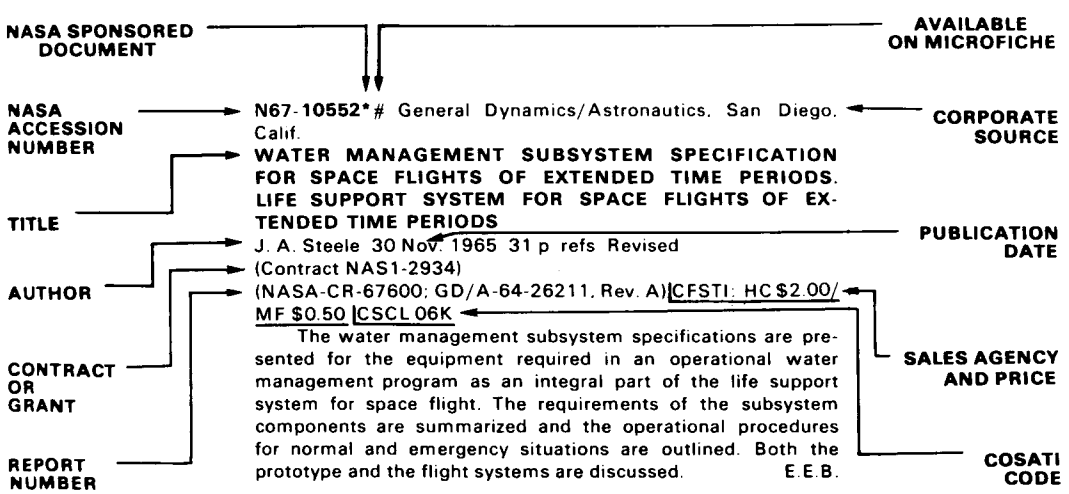

AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography FEBRUARY 1967

STAR ENTRIES

N67-10013# Southwest Research Inst., San Antonio, Tex. Dept. of Physical and Biological Sciences.
A STUDY OF CALCIUM, PHOSPHORUS AND NITROGEN MOBILIZATION RESULTING FROM CONDITIONS OF INACTIVITY Final Report
Arthur L. Gross, Kenneth T. Roberson, Louis H. Krough, Jr., and John W. Miesse 30 Apr. 1966 104 p
(Contract AF 41(609)-2749)

CONTENTS:
1. A STUDY OF CALCIUM, PHOSPHORUS AND NITROGEN MOBILIZATION RESULTING FROM CONDITIONS OF INACTIVITY 97 p
APPENDIXES
2. COMPARATIVELY RAPID ANALYTICAL PROCEDURE FOR ANALYSIS OF CALCIUM, NITROGEN AND PHOSPHORUS IN BODY FLUIDS, FECES AND FOOD SAMPLES K. T. Roberson, A. L. Gross, L. Krough, and J. W. Miesse 3 p (See N67-10014 01-04)
3. CALCIUM, NITROGEN AND PHOSPHORUS MOBILIZATION RESULTING FROM INACTIVITY A. L. Gross, L. Krough, J. W. Miesse, and K. T. Roberson 3 p (See N67-10015 01-04)

N67-10014# Southwest Research Inst., San Antonio, Tex. Dept. of Physical and Biological Sciences.
COMPARATIVELY RAPID ANALYTICAL PROCEDURE FOR ANALYSIS OF CALCIUM, NITROGEN AND PHOSPHORUS IN BODY FLUIDS, FECES AND FOOD SAMPLES
Kenneth T. Roberson, Arthur L. Gross, Louis H. Krough, Jr., and John W. Miesse *In its* A Study of Calcium, Phosphorus and Nitrogen Mobilization Resulting from Conditions of Inactivity 30 Apr. 1966 3 p Presented at the Aerospace Med. Assoc. Meeting, Las Vegas, Nev., Apr. 1966 Submitted for Publication (See N67-10013 01-04)

Consideration is given to the daily calcium, nitrogen, and phosphorus balance of monkeys in various conditions of inactivity. The analytical method developed allowed the determination of these materials from a single perchloric acid digestion. It is noted that this procedure has proven to be very reliable and simple for the determination of large numbers of samples. A.G.O.

N67-10015# Southwest Research Inst., San Antonio, Tex. Dept. of Physical and Biological Sciences.
CALCIUM, NITROGEN AND PHOSPHORUS MOBILIZATION RESULTING FROM INACTIVITY
Kenneth T. Roberson, Arthur L. Gross, John W. Miesse, and Louis H. Krough, Jr. *In its* A Study of Calcium, Phosphorus and Nitrogen Mobilization Resulting from Conditions of Inactivity 30 Apr. 1966 3 p Presented at the Aerospace Med. Assoc. Meeting, Las Vegas, Nev., Apr. 1966 (See N67-10013 01-04)

Immobilization effects were studied by following calcium, phosphorus, and nitrogen balances in monkeys that were inactivated for periods as long as eight weeks. Methods of immobilization used were surgical denervation, tranquilization, and plaster casts. The results of the balance studies indicate that there is no apparent loss of calcium but that there is a marked increase in the urinary excretion of phosphorus with a concomitant decrease in fecal excretion of phosphorus resulting in no net loss. Animals immobilized by means of plaster casts and denervation exhibited a marked negative nitrogen balance. A.G.O.

N67-10017# Oxford Univ. (England). Dept. of the Regius Professor of Medicine.
PULSATILE PRESSURE-FLOW RELATIONSHIPS IN THE PULMONARY ARTERIAL SYSTEM OF MAN
G. de J. Lee Jan. 1964 53 p refs
(Grant AF-EOAR-62-21)
(AD-635991) CFSTI: HC $3.00/MF $0.50

CONTENTS:
1. THE EFFECT OF PULSATILE CAPILLARY BLOODFLOW UPON GAS EXCHANGE WITHIN THE LUNGS OF MAN A. R. Bosman, G. de J. Lee, and R. Marshall 21 p refs (See N67-10018 01-04)
2. THE EFFECTS OF CARDIAC ACTION UPON LUNG GAS VOLUME A. R. Bosman and G. de J. Lee 20 p refs (See N67-10019 01-04)

N67-10018# Oxford Univ. (England). Dept. of the Regius Professor of Medicine.
THE EFFECT OF PULSATILE CAPILLARY BLOODFLOW UPON GAS EXCHANGE WITHIN THE LUNGS OF MAN
A. R. Bosman, G. de J. Lee, and R. Marshall *In its* Pulsatile Pressure-Flow Relationships in the Pulmonary Arterial System of Man Jan. 1964 21 p refs (See N67-10018 01-04) CFSTI: HC $3.00/MF $0.50

A study to determine the effects of pulsatile pulmonary capillary blood flow upon alveolar-capillary gas exchange in man is described. Oxygen and carbon dioxide exchange within the lungs was measured individually and instantaneously throughout the cardiac cycle using the whole body plethysmograph. Special gas mixtures were breathed in order to obtain O_2 and CO_2 tensions at mixed venous levels in turn within the lungs to measure the alveolar-capillary exchange of each gas individually, and to compare these with the pulmonary capillary blood flow rate measured by

an N_2O method. Oxygen uptake within the lungs was linearly related to the pulmonary capillary blood flow rate. Carbon dioxide elimination occurred at two rates dependent upon the pulmonary capillary blood flow rate and upon the rate of discharge of CO_2 stored within the lung tissue itself. C.T.C.

N67-10019# Oxford Univ. (England). Dept. of the Regius Professor of Medicine.

THE EFFECTS OF CARDIAC ACTION UPON LUNG GAS VOLUME

A. R. Bosman and G. de J. Lee *In its* Pulsatile Pressure-flow Relationships in the Pulmonary Arterial System of Man Jan. 1964 20 p refs (See N67-10018 01-04) CFSTI: HC $3.00/MF $0.50

An examination was made of the causes of variations which take place in the gas volume of the lungs during each cardiac contraction as a result of events within the thorax, other than those to alveolar-capillary gas exchange. Also examined were various cardiovascular conditions which might be expected to produce alterations in the normal relationships of arterial and venous blood flow with the thorax in an attempt to analyze the mechanisms involved. It was found that during systole, aortic outflow from the thorax exceeds venous inflow. This leads to a transient fall in thoracic blood volume resulting in a rarefaction of lung gases accompanied by air entry at the mouth, and a transient increase in apparent body volume. During diastole, venous inflow to the thorax exceeds arterial outflow. As a result gas flow reverses in the airways and the total body volume shows an apparent shrinkage. C.T.C.

N67-10023# Central Lab. for Radiological Protection, Warsaw (Poland)

DOSIMETRY OF ENVIRONMENTAL GAMMA-RADIATION IN POLAND BY MEANS OF GAMMA-RAY SPECTRA IN THE FIELD

J. Pensko, T. Olkowska, and M. Wilk 1966 30 p refs Submitted for Publication

(CLOR-48/D) CFSTI: HC $2.00/MF $0.50

The direct measurements of the gamma-ray background exposure rate was carried out up to date by means of ionization chambers or Geiger-Müller counters. These methods are very sensitive and accurate but they do not allow to separate natural gamma background from the fallout components. The exposure rate caused by fallout was usually determined by the concentration measurements of the more important fission products in the soil or plants. In this paper some of our experiences with the spectrometric method are presented which makes possible direct evaluation of dose-rates from the main gamma emitters of background radiation in Poland. Some results obtained were compared with the exposure rate computation after the estimation of potassium, uranium and thorium concentration in the soil samples. The 1962-1965 results of environmental dose rate measurements of more important gamma emitters (natural and fission products) for 20 different places in Poland were presented and discussed. Author

N67-10032# Strasbourg Univ. (France).

EXPERIMENTAL STUDY OF THE TREATMENT OF RADIATION INJURIES BY PADUTIN (KALLICREINE) [ETUDE EXPERIMENTALE DU TRAITEMENT DES RADIO-LESIONS PAR LA PADUTINE-DEPOT (KALLICREINE)] Activity Report, 1 Apr.–1 Oct. 1965

P. Mandel, J. M. Mantz, M. Delemen, P. Michaelidis, J. Rodesch (EURATOM) et al. Brussels, EURATOM, Jul. 1966 23 p refs In FRENCH; ENGLISH summary

(Contract EURATOM-054-63-10 BIOF)

(EUR-2477.F, vol. III) CFSTI: HC $1.00/MF $0.50

Further experiments carried out on the rat show that following a treatment with kallicreine the cicatrization period for cutaneous radiolesions is considerably lower in the treated animals than in the controls (60,000 r.). The same phenomenon has been demonstrated with the guinea-pig and the rabbit (80,000 r). Experiments are at present in progress to corroborate these findings. Study of the optimum treatment conditions led to the following therapeutic doses: 5 BU for the rat, 10 BU for the guinea-pig and 20 BU for the rabbit. The best time to begin the treatment is the clear ulceration stage, i.e. 3rd week after irradiation for the rat and the guinea-pig, and 4th or 5th week for the rabbit. Kallicreine administered as a preventive injection after whole-body irradiation (800 r) appears to have no effect on the survival rate of the animals. However, quantitative determinations of nucleic acids and a cytological study of the marrow of a bone system show a protective effect which is particularly marked at about the 7th day after irradiation. From the recovery angle (treatment after whole-body irradiation at 800 r) it is observed that the life of the animals is considerably prolonged, particularly by the repeated intraperitoneal administration of kallicreine. Quantitative determinations of bone-marrow nucleic acids permit the inference of a regeneration of the medullary cells which is especially active from the 4th day after irradiation. Author

N67-10033# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

EXPERIMENTS ON TONE PERCEPTION

R. Plomp 1966 76 p refs

(TDCK-45965) CFSTI: HC $3.00/MF $0.75

The manner in which simultaneously sounding tones are perceived and discriminated by the ear suggests that both frequency analysis and periodicity analysis are involved. Experiments are described which were performed to determine the role of both types of analysis in audition and the way in which they are related. The limit of the ear's ability to discriminate the harmonics of a complex tone is treated, and the appearance of combination tones is studied. The interference of simple tones with a small frequency difference is investigated in relation to the origin of tonal consonance. The phenomenon that two simple tones may also interfere for frequency differences much larger than critical bandwidth is discussed, and the idea that the pitch of complex tones is based on the frequency of the fundamental or on the periodicity of the sound as a whole is studied. The experimental results are discussed in the light of the physiological data, and the conclusions drawn are examined. H.S.W.

N67-10141# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE JOURNAL OF HIGHEST NERVOUS ACTIVITY

Apr. 1966 76 p refs Transl. into ENGLISH from Zh. Vysshei Nervnoi Deyatel'nosti (Moscow), v. 12, Issue 1, 1962 p 7-36, 128-134

(FTD-MT-65-308; AD-637376) CFSTI: HC $3.00/MF $0.75

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1. THE REFLEX OF PURPOSE AS AN OBJECT OF PHYSIOLOGICAL ANALYSIS P. K. Anokhin p 1-27 refs (See N67-10142 01-04)
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3. ON THE FORMATION OF CONDITIONED REFLEXES OF HIGHER ORDERS IN ADULTS G. A. Shichko p 43-54 refs (See N67-10144 01-04)
4. CHANGE OF THE RESPIRATORY COMPONENT OF THE MOTOR DEFENSIVE CONDITIONAL REACTION DURING DIFFERENT FUNCTIONAL STATES OF THE RESPIRATORY CENTER I. I. Tokarenko p 55-67 refs (See N67-10145 01-04)

N67-10142# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE REFLEX OF PURPOSE AS AN OBJECT OF PHYSIOLOGICAL ANALYSIS

P. K. Anokhin *In its* The J. of Highest Nervous Activity 22 Apr. 1966 p 1-27 refs (See N67-10141 01-04) CFSTI: HC $3.00/MF $0.75

A literature review is presented on the reflex of purpose, the basic form of individual vital energy. Examples are mentioned of the great role that the nerve complexes of purpose play (e.g., the anthropomorphic apes constructing a pyramid of boxes to obtain fruit). It is concluded that the problem of reflex of purpose must be studied on the basis of modern achievements of higher nervous activity, and the general physiology of the central nervous system. The mechanism of attracting in concrete behavorial acts (e.g., salivation of dogs before feeding) is briefly covered. Emphasis is placed on further investigation of the universal activating force at the highest levels of the nervous system. R.Ll.

N67-10143# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CONDITIONED REFLEX CHANGES OF BREATHING AGAINST A BACKGROUND OF SLEEP INHIBITION

D. A. Biryukov, T. P. Shlyafer, and M. I. Yakovlev *In its* J. of Highest Nervous Activity 22 Apr. 1966 p 29-42 refs (See N67-10141 01-04) CFSTI: HC $3.00/MF $0.75

Studies of conditioned reflex activity in newborn children and animals are reviewed in connection with respiratory and heart reflexes against a background of sleep disturbances. Conclusions reported are: (1) Conditioned reflex changes in children's breathing and heart activity in the first months of life, and in kittens in the early periods of postnatal ontogenesis against a background of shallow sleep inhibition, are easily formed and do not differ essentially from conditioned reflexes developed in a state of wakefulness. (2) These conditioned reflex changes in children older than one year do not develop. The already secured conditioned reflex vegetative changes in these children are characterized, against a background of sleep inhibition, by their inconstancy of appearance. (3) Deep sleep prevents the production as well as the reproduction of conditioned reflex changes in breathing and heart activity. R.Ll.

N67-10144# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE FORMATION OF CONDITIONED REFLEXES OF HIGHER ORDERS IN ADULTS

G. A. Shichko *In its* J. of Highest Nervous Activity 22 Apr. 1966 p 43-54 refs (See N67-10141 01-04) CFSTI: HC $3.00/MF $0.75

The method and experimental results of the formation of nervous system conditioned reflexes in higher orders of adult humans are discussed. It was found that in a healthy adult, the formation of conditioned reflexes from the 2nd to the 20th orders by a conventional method, and conditioned reflexes from the 2nd to the 5th orders through the second signal system is possible; this testifies to the extraordinarily high efficiency of the cortex of the large hemispheres of man. Experimental results show that conditioned reactions to a stimulus, or signal, are usually lower in quantity than reactions to a conditioned reinforcement. It is considered that the formation mechanism of reflexes of higher orders does not differ essentially from the formation mechanism of the conditioned reflexes of the first order; the basic distiction is in the method of excitation of the cortex representation of an unconditioned reflex. R.Ll.

N67-10145# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CHANGE OF THE RESPIRATORY COMPONENT OF THE MOTOR DEFENSIVE CONDITIONAL REACTION DURING DIFFERENT FUNCTIONAL STATES OF THE RESPIRATORY CENTER

I. I. Tokarenko *In its* The J. of Highest Nervous Activity 22 Apr. 1966 p 55-67 refs (See N67-10141 01-04) CFSTI: HC $3.00/MF $0.75

Respiratory change of a motor defensive conditoned reaction in answer to reinforced and unreinforced conditioned stimuli during various functional states of the respiratory center is discussed. Results of experiments on dogs led to the following generalizations: (1) Respiratory characteristics of a motor defensive conditioned reaction depend on the initial functional state of the respiratory center; a strengthening as well as a suppression of respiration may result. (2) Positive conditioned stimuli in most animals during initial weak breathing cause an increase of the amplitude and frequency of respiratory movements, while during deep breathing, they hinder respiration. (3) Protective and differential inhibitions appear primarily not in the cortical cells of the cerebral end of the analyzer, perceiving the stimulation, but apparently somewhere on the subsequent instances of the conditioned reflex arc. R.Ll.

N67-10149# Dunlap and Associates, Inc., Santa Monica, Calif.

ADAPTIVE SIMULATION Final Report

Charles R. Kelley 15 Aug. 1966 94 p refs

(Contract Nonr-4986(00))

(AD-637658) CFSTI: HC $3.00/MF $0.75

CONTENTS:

1. INTRODUCTION (PROJECT REPORT) C. R. Kelley 2 p
2. DESIGN APPLICATIONS OF ADAPTIVE (SELF-ADJUSTING) SIMULATORS C. R. Kelley 36 p refs (See N67-10150 01-05)
3. CROSS-ADAPTIVE OPERATOR LOADING TASKS C. R. Kelley and M. J. Wargo 21 p refs (See N67-10151 01-05)
4. SELF-ADJUSTING VEHICLE SIMULATORS C. R. Kelley 21 p refs (See N67-10152 01-05)

N67-10150# Dunlap and Associates, Inc., Santa Monica, Calif.

DESIGN APPLICATIONS OF ADAPTIVE (SELF-ADJUSTING) SIMULATORS

Charles R. Kelley *In its* Adaptive Simulation 15 Aug. 1966 36 p refs Presented at the MIT-NASA Working Conf. on Manual Control, Cambridge, Mass., 28 Feb.-2 Mar. 1966 Submitted for Publication (See N67-10149 01-05) CFSTI: HC $3.00/MF $0.75

The usefulness for manual control system design of adaptive (self-adjusting) simulators is reviewed. The history of adaptive simulation is outlined, and an analytical development presented. Recommended equations and procedures for adaptive applications are reported with respect to display gain, continuous versus on-off control, and one versus two versus three-axis tasks. Data were gathered in each case on an acceleration control task, in which forcing function amplitude was varied adaptively. The relation of each design variable to forcing function amplitude, with operator error constant, is described for the example task. R.Ll.

N67-10151# Dunlap and Associates, Inc., Santa Monica, Calif.

CROSS-ADAPTIVE OPERATOR LOADING TASKS

Charles R. Kelley and Michael J. Wargo *In its* Adaptive Simulation 15 Aug. 1966 21 p refs (See N67-10149 01-05) CFSTI: HC $3.00/MF $0.75

Various methods dealing with the homeostatic tendency in task activity and other factors affecting human performance are reviewed. Described are the cross-adaptive operator loading tasks illustrating adaptive techniques by means of which performance on one (primary) task modifies a second (operator loading) task in such a way that primary task performance is standardized, and all of the variance transferred to the loading task score. Experimental data are compared for: performance with a primary task alone, a primary plus independent loading task, and a primary plus cross-adaptive loading task. Rules for the application of cross-adaptive loading tasks are included. R.Ll.

N67-10152# Dunlap and Associates, Inc., Santa Monica, Calif.
SELF-ADJUSTING VEHICLE SIMULATORS
Charles R. Kelley *In its* Adaptive Simulation 15 Aug. 1966 21 p refs Presented at the Intern. Congr. on Human Factors in Electron., Long Beach, Calif., 3–4 May 1962 (See N67-10149 01-05) CFSTI: HC $3.00/MF $0.75

The general concept and techniques for employing operator performance measurements to adjust the internal characteristics of a vehicle simulator or tracking system are examined. A proposed vehicle simulator was set up in the laboratory as a part of the predictor instrument research program, and proved useful not only for training, but also for research on design problems, and for selection of operators (pilots). A figure depicts an analog computer circuit used for obtaining S, the score which brings about the variation in the self-adjusting simulator. A block diagram portrays the self-adjusting system to vary the amplitude of a forcing function in proportion to S. While the usefulness of the self-adjusting vehicle simulator for selection is dependent on measuring a threshold of skill simply and accurately, the usefulness of the device as a trainer rests with keeping the trainee performing at the margin of his skill, whatever this skill level may be. R.Ll.

N67-10156# Joint Publications Research Service, Washington, D. C.
SOME ASPECTS OF INFORMATION THEORY AND ITS RELATION TO LIVING ORGANISMS
16 Nov. 1965 42 p refs Transl. into ENGLISH from Vopr. Filosofii (Moscow), no. 9, 1965
(JPRS-32876; TT-65-33454) CFSTI: $2.00

CONTENTS:

1. THE SUBJECT MATTER OF SEMIOTICS A. A. Vetrov p 1–16 refs (See N67-10157 01-05)
2. LIVING ORGANISMS AND THE ANTI-ENTROPY EFFECT OF INFORMATION A. I. Bykhovskiy p 17–25 refs (See N67-10158 01-04)
3. CAN LIVING MATTER BE CREATED ARTIFICIALLY K. S. Trincher p 26–36 refs (See N67-10159 01-04)

N67-10157# Joint Publications Research Service, Washington, D. C.
THE SUBJECT MATTER OF SEMIOTICS
A. A. Vetrov *In its* Some Aspects of Inform. Theory and its Relation to Living Organisms 16 Nov. 1965 p 1–16 refs
(See N67-10156 01-04) CFSTI: $2.00

A definition of the science of semiotics is proposed, and its three divisions (pragmatics, semantics, and syntactics) are discussed. It is considered that semiotics is the general science of signs (both language and non-language), the meanings of signs, and those properties of sign systems in which the specific nature of the functioning of signs in those systems is revealed. It is suggested that this definition of semiotics establishes a precise boundary between semiotics as a special science, and other sciences (logic, mathematics, linguistics, etc.). R.Ll.

N67-10158# Joint Publications Research Service, Washington, D. C.
LIVING ORGANISMS AND THE ANTI-ENTROPY EFFECT OF INFORMATION
A. I. Bykhovskiy *In its* Some Aspects of Inform. Theory and its Relation to Living Organisms 16 Nov. 1965 p 17–25 refs (See N67-10156 01-04) CFSTI: $2.00

The application of the physical theory of information to the problems of existence and evolution of living systems is presented. The unelaborated state of certain propositions of this theory is apparent from the literature review. Consideration is given to the question of the applicability of the second law of thermodynamics to living organisms and ways to solve questions regarding the diminution of entropy from generation to generation in the process of the evolutionary development and multiplication of living systems. R.Ll.

N67-10159# Joint Publications Research Service, Washington, D. C.
CAN LIVING MATTER BE CREATED ARTIFICIALLY
K. S. Trincher *In its* Some Aspects of Inform. Theory and its Relation to Living Organisms 16 Nov. 1965 p 26–36 refs (See N67-10156 01-04) CFSTI: $2.00

The problem of artificial creation of living matter is reviewed and evaluated. Mentioned are the cybernetic devices especially created to perform biologic functions and intellectual activity in exactly the same way as a living organism. The anti-cybernetic viewpoint concedes that those functions of the living organism that lend themselves to imitation by cybernetic devices, to any desired degree of precision, represent working processes which do not contradict the second law of thermodynamics. Following an analytical examination of the second law of thermodynamics, it is suggested that the presence of the negentropic state of the intracellular water (i.e., the thermally unstable state of the structure of living matter) contradicts this law. Consequently, it is stated, biologic metabolism (the specific function of the living organism) represents a peculiar working process characteristic only of living matter and cannot be imitated. R.Ll.

N67-10160# National Aerospace Lab., Tokyo (Japan).
A PSYCHOLOGICAL STUDY ON THE MENTAL STRESS OF PILOTS (I). PULSE AND RESPIRATORY RATE DURING FLIGHT
Noriko Miyoshi, Moriyuki Momona, and Masanori Okabe 1966 15 p refs *In* JAPANESE; ENGLISH summary
(NAL-TR-105) CFSTI: HC $1.00/MF $0.50

The usefulness of measuring changes in pulse and respiratory rates as the indices to monitoring the mental stress of pilots in flight is reported. Continuous measurements during one hour flight were carried out with nine experienced pilot subjects. The flight profile included 14 different maneuvers in a twin-engine aircraft. Recordings were made with both the main pilot and the co-pilot flight situation. As the control data, a rating scale for their mental stress level when performing the above 14 tasks was prepared. Author

N67-10173*# University of Southern Calif., Los Angeles. Electronic Sciences Lab.
RESEARCH ON NEW TECHNIQUES FOR THE ANALYSIS OF MANUAL CONTROL SYSTEMS Progress Report, 15 Dec. 1965–15 Jun. 1966
George A. Bekey 15 Jun. 1966 24 p refs
(Grant NGR-05-018-022)
(NASA-CR-79386; USCEE-177; PR-2) CFSTI: HC $1.00/MF $0.50 CSCL 05H
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N67-10175*# University of Southern Calif., Los Angeles. Electronic Sciences Lab.
PULSE MODELS OF HUMAN OPERATORS PERFORMING COMPENSATORY TRACKING WITH COORDINATED MULTIPLE INPUTS
M. J. Merritt, C. Jacobs, and G. A. Bekey *In its* Res. on New Tech. for the Analysis of Manual Control Systems 15 Jun. 1966 p 4–10 (See N67-10173 01-05) CFSTI: HC $1.00/MF $0.50

An asynchronous, pulse-amplitude, pulse-width model of a human operator was synthesized, and an attempt made to extend the same general approach to compensatory tracking systems with more than one input. During the control task training, the operator was instructed to maintain constant altitude while flying over bumpy terrain. The operator inputs were obtained from two display devices separated by 30° of eye rotation which present pitch angle and altitude error. The technique for determining the eye motion by measuring the subject's electro-ocular potential was considered successful. R.Ll.

N67-10176*# University of Southern Calif., Los Angeles. Electronic Sciences Lab.

RANDOM PARAMETER MODELS OF HUMAN CONTROLLERS

S. M. Brainin and G. A. Bekey *In its* Res. on New Tech. for the Analysis of Manual Control Systems 15 Jun. 1966 p 11–15 (See N67-10173 01-05) CFSTI: HC $1.00/MF $0.50

Tentative results are presented on a research project to identify random variables used in modeling manual control tracking performance. The statistical properties of human operator models with random parameters were studied, and regression analysis and digital computer methods for solving the problem are mentioned. Tables show the digital processing of eight-second samples of the tracking data. R.Ll.

N67-10177*# University of Southern Calif., Los Angeles. Electronic Sciences Lab.

FINITE-STATE MODELS OF MANUAL CONTROL SYSTEMS

E. S. Angel and G. A. Bekey *In its* Res. on New Tech. for the Analysis of Manual Control Systems 15 Jun. 1966 p 16–17 (See N67-10173 01-05) CFSTI: HC $1.00/MF $0.50

The finite-state machine theory application to manual control, and the development of models of tracking behavior are reported. The adaptation procedure described involves setting more sensitive threshold levels on the error and error rate gates in response to decreasing errors. It is stated that this new model is simulated by a computer. R.Ll.

N67-10197*# National Aeronautics and Space Administration, Washington, D. C.

STUDY OF THE FUNDAMENTAL VIBRATION OF THE ARTERIAL PULSE WAVE

Jiro Sato Oct. 1965 29 p refs Transl. into ENGLISH from J. Phys. Soc. Japan (Tokyo), v. 23, no. 3, 1961 p 133–146 (NASA-TT-F-9572) CFSTI: HC $2.00/MF $0.50 CSCL 06P

The cause of the fundamental vibration of the arterial pulse wave was studied on the arterial pressure pulse of aorta and femoral artery in dogs and rabbits. It was observed that the wavelength of the fundamental vibration changes with the pattern of ejection and the dynamical state of the vascular system. It was concluded that this vibration mainly originates from the ejection of blood from left ventricle to arterial system. Author

N67-10217*# National Aeronautics and Space Administration, Washington, D. C.

UTILIZATION OF FRUCTOSE BY HYDROGENOMONAS H 16 (PART I) [VERWERTUNG VON FRUCTOSE DURCH HYDROGENOMONAS H 16 (I)]

G. Gottschalk, U. Eberhardt, and H. G. Schlegel Oct. 1966 23 p refs Transl. into ENGLISH from Arch. Mikrobiol. (Berlin), v. 48, 1964 p 95–108 (NASA-TT-F-10309) CFSTI: HC $1.00/MF $0.50 CSCL 06M

Experiments on the utilization of fructose by chemolithotrophically grown cells of Hydrogenomonas strain H 16 showed oxidation of this sugar after a lag of 20 min. The fructose is metabolized over the Entner–Doudoroff pathway. During adaptation to fructose, the content of phosphoglucose isomerase, glucose-6-phosphate dehydrogenase, and enzymes characteristic for the Entner–Doudoroff pathway increases in the cells. During the change from chemolithotrophic to organotrophic growth, with fructose as substrate, the activity of ribulosediphosphate carboxylase is reduced by 75% within 2 hrs, but decreases only slowly during fructose passages. Thus, fructose-grown Hydrogenomonas H 16 is able to fix carbon dioxide over the Calvin cycle. Author

N67-10218*# National Aeronautics and Space Administration, Washington, D. C.

A SUBMERSION METHOD FOR THE CULTURE OF HYDROGEN-OXIDIZING BACTERIA: GROWTH-PHYSIOLOGICAL INVESTIGATIONS [EIN SUBMERSVERFAHREN ZUR KULTUR WASSERSTOFF-OXYDIERENDER BAKTERIEN: WACHSTUMSPHYSIOLO GISCHE UNTERSUCHUNGEN]

H. G. Schlegel, H. Kaltwasser, and G. Gottschalk Oct. 1966 21 p refs Transl. into ENGLISH from Arch. Mikrobiol. (Berlin), v. 38, 1961 p 209–222 (NASA-TT-F-10310) CFSTI: HC $1.00/MF $0.50 CSCL 06M

A method for submersion culture of knallgas bacteria is described, in which the nutrient solution is agitated magnetically under a mixture of H_2, O_2, and CO_2 and the high O_2-sensitivity of the cells is allowed for by "gradient gassing". The facultative chemolithotrophic Hydrogenomonas strain 20 was bacteriologically characterized and growth-physiologically investigated. During the logarithmic phase, the generation time was 2-1/6 hrs, and the apparent doubling time was 3-1/5 hrs (28°C). Author

N67-10223*# National Aeronautics and Space Administration, Washington, D. C.

THE PARTICIPATION OF PROTEIN PRECURSORS IN THE MECHANISM OF THE SYNTHESIS OF SPECIFIC PROTEINS [OB UCHASTII BELKOV-PREDSHESTVENNIKOV V MEKHANIZME SINTEZA SPETSIFICHESKIKH BELKOV]

I. I. Ivanov, V. V. Rudakov, I. A. Baryshnikov, and A. G. Taranenko Oct. 1966 4 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 168, no. 4, 1966 p 942–943 (NASA-TT-F-10348) CFSTI: HC $2.00/MF $0.50 CSCL 06A

Experiments were conducted on intact and isolated lactating mammary glands of goats. Amino acids and blood plasma proteins were washed off isolated mammary glands. It was found that isolated glands maintained their capacity to synthesize lactic proteins under these conditions. It was concluded that these proteins emanated from amino acids present in tissue proteins of the mammary gland. Author

N67-10224*# National Aeronautics and Space Administration, Washington, D. C.

ENDURANCE OF EXTERNAL ACCELERATION INCREASED AS A RESULT OF EXPOSURE TO IONIZING RADIATION [PERENOSIMOST EKSTREMAL'NOGO USKORENIYA POSLE VOZDEYSTVIYA IONIZIRUYUSHCHEY RADIATSII]

B. I. Davydov Oct. 1966 5 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSR (Moscow), v. 168, no. 3, 1966 p 691–693 (NASA-TT-F-10349) CFSTI: HC $1.00/MF $0.50 CSCL 06R

White mice were used to investigate post-radiation resistance (doses ranged from 100–4000 R) to 3 min back–chest accelerations of 42–44 G. In 1–8 days after irradiation, experimental animals were more resistant to accelerations than control animals and that the degree of post-radiation resistance depended on radiation dose. It was speculated that shifts in blood clotting function and cell membrane permeability during certain stages of radiation sickness might improve hemodynamic conditions for exposure to critical accelerations. Author

N67-10226*# National Aeronautics and Space Administration, Washington, D. C.

THE STATE OF HEARING IN RADIATION SICKNESS [SOSTOYANIYE SLUKHA PRI LUCHEVOY BOLEZNI]

M. Ya. Kozlov Oct. 1966 8 p refs Transl. into ENGLISH from Med. Radiol. (Moscow), v. 3, no. 4, Jul.–Aug. 1958 p 64–69
(NASA-TT-F-10352) CFSTI: HC $1.00/MF $0.50 CSCL 06R

The state of the peripheral ending of the auditory analyzer of the internal ear was investigated during radiation sickness caused by a sublethal dose of X-ray radiation (350 R.). Experiments were performed on guinea pigs. An objective method of recording the cochlear currents was used. It was established that when guinea pigs are irradiated with X-rays with a dose of 350 R an acute radiation sickness of the average degree is produced with a mortality of 50 percent. During the peak of the radiation sickness there is a decrease in the auricular reflex and a decrease in the bioelectric potentials of the cochlea at all frequencies by 3.9 to 9.1 decibels. Author

N67-10227*# National Aeronautics and Space Administration, Washington, D. C.

OLFACTORY DISTURBANCES IN MAN FOLLOWING EXPOSURE TO RADIATION [OBONYATEL'NYYE NARUSHENIYA U LYUDEY PRI LUCHEVOM VOZDEYSTVII]

L. B. Koznova Oct. 1966 8 p refs Transl. into ENGLISH from Med. Radiol. (Moscow), v. 2, 1957 p 26–30
(NASA-TT-F-10353) CFSTI: HC $1.00/MF $0.50 CSCL 06R

Disruptions in olfaction have been studied based on the observation of the general reaction of the human organism subjected to X-ray radiation in connection with mammary gland tumors. Changes in the olfactory analyzer were recorded by means of an olfactometer. Additional experiments were conducted with patients who were given caffeine to accentuate the sensitivity of their olfactory analyzer. The results of the investigations correlated with the complaints of patients subjected to radiation who experienced olfactory disturbances have convinced the author that such disturbances involve changes in the central nervous system and do not represent true hyperosmia since the subjective accentuation of olfaction during radiation treatment is not accompanied by a decrease in the thresholds of olfaction. Author

N67-10228*# National Aeronautics and Space Administration, Washington, D. C.

GRAPHIC METHOD OF RECORDING PULSE [METOD GRAFICHESKOY REGISTRATSII PUL'SA]

V. V. Sychev Oct. 1966 4 p Transl. into ENGLISH from Voenno-Med. Zh. (Moscow), v. 12, 1956 p 83–84
(NASA-TT-F-10362) CFSTI: HC $1.00/MF $0.50 CSCL 06B

A brief description is given of an inertialess method of recording pulse which utilizes the electronic cardioscope and a piezoelectric sensor as the receptor. Author

N67-10278# Technology, Inc., Dayton, Ohio.

THE MOTION OF THE HUMAN CENTER OF MASS AND ITS RELATIONSHIP TO THE MECHANICAL IMPEDANCE Final Report, 1 Jan.–31 Dec. 1964

Edmund B. Weis, Jr. (AMRL) and Frank P. Primiano, Jr. Wright-Patterson AFB, Ohio, AMRL, Jun. 1966 25 p refs Prepared jointly with AMRL
(Contract AF 33(657)-10010)
(AMRL-TR-65-50; AD-637182) CFSTI: HC $1.00/MF $0.50

The report concerns the development of a relationship between the human mechanical impedance and the coupling of the human center of mass to the environment. The mechanical impedance is a common analysis tool in biomechanics while the analysis of the coupling of the center of mass to the environment is technically more difficult, if not impossible. The development is based on linear, passive, isotropic theory and shows that the transfer function which expresses the relation between the motion of the center of mass and the motion of the source is similar to a linear second order mechanical system in each of the translational spatial degrees of freedom. Author (TAB)

N67-10289# Pittsburgh Univ., Pa.

EFFECTS OF COLD STRESS ON CELLULAR STRUCTURE AND FUNCTION Final Report, Nov. 1963–Nov. 1965

Ralph Buchsbaum, Monte Buchsbaum, and Thomas Linsenmayer Wright-Patterson AFB, Ohio, AMRL, May 1966 16 p ref
(Contract AF 33(615)-1076)
(AMRL-TR-66-30; AD-638327) CFSTI: HC $1.00/MF $0.50

The purpose of this investigation was to ascertain more precisely the limits of tolerance of cells in vitro to cold, as a basis for investigations on the cellular mechanisms affected. Mouse kidney cells were maintained in a perfusion chamber arranged for cooling and warming at various rates. Normal tissue culture media were used. Nearly all cells exposed to −0.3°C for 10 minutes, then warmed to 37°C, lived. Nearly all cells exposed to −1°C or lower for 10 minutes, and warmed to 37°C, died. The critical lethal cold shock seems to produce little obvious change in cells, but mitochondrial breaks and swelling are obvious in electron micrographs. Also, nuclear ground substance appeared more granular than normal. One hypothesis was that microcrystallization probably occurs in certain organelles, particularly the mitochondria because these organelles are in constant motion. Similar results were obtained in experiments with human neutrophiles. Author (TAB)

N67-10292# Geoscience, Ltd., La Jolla, Calif.

WHOLE ORGAN FREEZING AND THAWING HEAT TRANSFER AND THERMAL PROPERTIES Quarterly Report, 1 Apr.–30 Jun. 1966

Heinz F. Poppendiek, Norman D. Greene, and R. Randall 30 Jun. 1966 19 p refs
(Contract Nonr-4095(00))
(GLR-46; AD-638648) CFSTI: HC $1.00/MF $0.50

Progress of research in the following areas is summarized: thermal conductivity and heat capacity of biological fluids and tissues; freeze-thaw heat transfer analysis; rapid thawing of stored organs. TAB

N67-10295# Solano Labs., Berkeley, Calif.

BIOCHEMICAL PROPERTIES OF INNER EAR FLUIDS: METHODS OF MICROCHEMISTRY AND FLUID WITHDRAWAL Final Report, May 1961–Apr. 1964

Marion T. Ulrich, J. R. Mundie, Jr., (AMRL), and Sheldon Margen Wright-Patterson AFB, Ohio, AMRL, Mar. 1966 32 p refs Prepared jointly with AMRL
(Contracts AF 33(616)-8083; AF 33(657)-9373)
(AMRL-TR-65-177; AD-638387) CFSTI: HC $2.00/MF $0.50

Biochemical assay of fluids of the inner ear is pertinent to understanding mechanisms of electrical current generation by living tissue and could elucidate the physiology of acoustic trauma. Quantity of fluid available is limited to a few microliters per sample. A method is presented for collecting fluids from the cochlea while simultaneously measuring DC electrical potentials to identify endolymph. Ultra-micro biochemical and enzyme analyses were developed with adaptations in equipment and procedure. Techniques for assay of sodium, potassium, chloride, sugar, protein, adenosine triphosphate, hexokinase, phosphocreatine, diphosphopyridine nucleotide, lactic dehydrogenase, malic dehydrogenase and adenosine diphosphate in sample volumes of 1-2 microliters are outlined. Data on sodium, potassium, chloride and protein content of endolymph and perilymph agreed with results obtained by other investigators. Sugar averaged 117 mg/100 ml in perilymph and 183 mg/100 ml in endolymph. The enzyme compounds, investigated only in perilymph, were not detectable by these methods on 1 microliter samples Author (TAB)

N67-10297# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

BIOLOGICAL EFFECTS OF BLAST AND SHOCK Technical Progress Report

Donald R. Richmond and Clayton S. White Apr. 1966 58 p refs

(Contract DA-49-146-XZ-055; AT(29-1)-1242)

(DASA-1777; AD-638342) CFSTI: HC $3.00/MF $0.50

The scope of blast and shock biology was set forth as covering effects resulting from overpressure (primary), flying debris (secondary), and displacement (tertiary). Procedures employed in the laboratory for simulating the blast wave forms as they varied within structures on nuclear tests were described. For each effect, a selected summary of current information relating the physical parameters to given levels of biological response was presented. From this, the blast and shock hazards estimated for personnel, as a function of range and yield, were illustrated in the form of curves. The range-yield-effects relationship for the biological criteria was discussed in terms of free-field and other exposure situations. They were compared with similar range-effects data for thermal and nuclear radiation Author (TAB)

N67-10308# Cedars of Lebanon Hospital, Los Angeles, Calif. Polymer Div.

THEORETICAL STUDY OF THE FLUID TRANSPORT AND THE HYDRATION OF THE CORNEA

H Yasuda [1963] 43 p refs Submitted for Publication

(Contract Nonr-3662(01); Grant NIH NB-4281)

(AD-624039) CFSTI: HC $2.00/MF $0.50

An attempt is made to analyze available data in the transport, the swelling and the imbibition property of the corneal stroma from the basis of the barrier properties of a substance and of thermodynamics of the processes. TAB

N67-10310# Gottingen Univ. (West Germany). Inst. for Plant Physiology.

ON THE ROLE OF PLASTOCYANIN IN PHOTOSYNTHESIS AND A NEW INHIBITOR OF FERREDOXIN DEPENDENT REACTIONS Annual Summary Report

A. Trebst 1 May 1966 17 p refs

(Contract AF 61(052)-716)

(ASR-3; AFCRL-66-606; AD-637991) CFSTI: HC $1.00/MF $0.50

By digitonin treatment of chloroplasts, followed by differential ultracentrifugation, stable particles are obtained which reduce NADP in illumination only if plastocyanin is added. The system requires ferredoxin, ferredoxin-NADP-reductase, an electron donor system and is saturated by 0.002 micromoles plastocyanin. KCN and salicylaldoxime inhibit the system. An effective inhibitor of ferredoxin dependent reactions was found in disalicylidene-propanediamine (DSPD) as shown by its behavior in photosynthetic reactions of isolated chloroplasts. DSPD inhibits photosynthesis and light-dependent glucose uptake, but not the Hill reaction with quinone, by intact Chlorella cells. This strongly supports the view that ferredoxin is the natural cofactor of cyclic photophosphorylation in vivo. Unexpectedly, however, DSPD does not inhibit photosynthetic nitrite reduction in Chlorella, which is also assumed to require ferredoxin. Author (TAB)

N67-10321# Naval Personnel Research Activity, San Diego, Calif. Navy Training Research Lab.

A REVIEW OF ELECTRONICS TRAINING RESEARCH LITERATURE

Eugene A. Hooprich and John H. Steinemann Aug. 1966 28 p refs

(STB-67-1; AD-638681) CFSTI: HC $2.00/MF $0.50

The review of electronics training literature is designed to augment and update information obtained from a previous evaluative survey of military and civilian electronics training programs. The review is based primarily on available research reports published during recent years and pertaining to the training of electronics personnel in the military services. Five major areas of electronics training research are considered in the review: troubleshooting approaches and trainers, maintenance manuals and other job aids, training course variables, experimental electronics training courses, and training evaluation. General trends in electronics training research are noted, and their relationship to the findings of the previous evaluative survey is discussed. TAB

N67-10322# New York Medical Coll., N. Y.

REHARDENING OF SOFTENED ENAMEL SURFACES Final Report, Jul. 1, 1964–May 31, 1966

Ward Pigman 1 Oct. 1966 26 p refs Submitted for Publication

(Contract Nonr-4628(00))

(AD-638357) CFSTI: HC $2.00/MF $0.50

The calcification ability of body fluids was measured by the techniques developed for studying remineralization of softened tooth surfaces. Human submaxillary, parotid and whole salivas had marked calcifying properties and individual differences were evident. Human blood serums had considerably less calcification ability and were similar to the extracellular fluid synovial fluid. Some of these serums and synovial fluids had no ability. The method offers a new and unique approach to the direct measurement of the calcifying powers of body fluids and of correlating these properties with pathological conditions affecting calcification processes. The method was used for both in vivo and in vitro work. For the latter, small slabs of softened tooth enamel were inserted subdermally in guinea pigs. After eight days, the slabs were removed and the hardness determined. Extensive rehardening occurred. This variation of the method should be useful for the vitro controlled experiments with animals, and possibly even humans Author (TAB)

N67-10339# Washington Univ., Seattle.

[ADMINISTRATION, RESEARCH AND SUPPORT IN PSYCHOPHYSICS AND PSYCHOPHYSIOLOGY] Progress Report No. 4

Eugene Galanter 1 Jun. 1966 18 p refs

(Contract Nonr-477(34))

(PRP-23N; AD-638628) CFSTI: HC $1.00/MF $0.50

The report contains current personnel, types of research accomplished during the past year, plans for the coming year, both administrative and scientific, and a bibliography of technical reports. In addition the report contains a discussion of the role of computer simulation in psychology from a critical point of view Author (TAB)

N67-10343# Naval Medical Research Inst., Bethesda, Md.

A TECHNIQUE FOR AUTOMATED AUDITORY PRESENTATION AND SCORING OF MULTIPLE-CHOICE TESTS

Seward Smith Jul. 1966 16 p

(Rept.-16; AD-638227) CFSTI: HC $1.00/MF $0.50

The purpose of this paper is to provide information about a technique which permits auditory presentation and automatic factor scoring of pre-recorded multiple choice test items. The technique is described in detail. Advantages and applications are indicated. (Author)TAB

N67-10372# Naval Medical Research Inst., Bethesda, Md.

DEVELOPMENT OF A COMPLEX, TIME-SHARED, PERCEPTUAL-MOTOR SKILLS TASK FOR USE IN STUDIES OF ISOLATION AND CONFINEMENT

Seward Smith Aug. 1966 24 p refs

(Rept.-15; AD-637817) CFSTI: HC $1.00/MF $0.50

Detailed information is presented about a complex perceptual-motor skills task designed for use in the Naval Medical Research Institute's studies of isolation and confinement. Pilot data

are presented demonstrating: (1) that the fully automated task is equally suitable for use during experimental conditions employing darkened or lighted test rooms, and (2) that typical performances are in a range such that either increments or decrements should be easily measurable. Author (TAB)

N67-10376# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
PROCEDURE TO ASSESS ENERGY EXPENDED DURING A SHORT-PERIOD TASK Technical Report, May–Aug. 1964
Dieter E. Walk and Edwin H. Sasaki Dec. 1965 20 p refs
(AMRL-TR-65-205; AD-637692) CFSTI: HC $1.00/MF $0.50

A procedure was developed to measure the energy expended in a rowing task completed during a 12-second zero-G parabola. The technique was based on completed expired air samples. The subject's expired air was collected under three conditions: (1) 30 seconds of rest, (2) 12 seconds of rowing, and (3) 15 seconds of recovery. The conditions were repeated 10 times, and the subject's expired air was cumulated separately in three bags to obtain, in essence, a 5-minute collection for rest, a 2-minute collection for work, and a 2-1/2 minute collection for recovery. This procedure was replicated in four environments: laboratory, aircraft 1G level flights, aircraft 2G-1G-2G bank maneuvers, and aircraft 2G-0G-2G parabolic maneuvers. The results showed that the body reacted to a change in physical activity and returned to a state of equilibrium much more quickly than previously reported in the literature. The volumes of expired air, oxygen, and carbon dioxide in each condition (rest, work, and recovery) were similar in the four environments, but the specific effects, if any, of the differential gravity levels were negligible and unsystematic. Author (TAB)

N67-10399# Joint Publications Research Service, Washington, D. C.
MAN-MACHINE RELATIONSHIPS IN RAILROAD CONTROL
G. A. Krasovskiy 24 Oct 1966 11 p Transl. into ENGLISH from Avtomat., Telemekhan. i Svyaz (Moscow), no. 4, 1966 p 8–11
(JPRS-38298; TT-66-34724) CFSTI: $1.00

Operational and technological problems affecting the reliability of man-machine interaction in automatic railroad transportation systems are discussed. Proposed is the use of the methods and basic principles of engineering psychology for improving existing systems, and establishing highly efficient railroad automatic systems which focus on the optimization of man and machine functions. S.C.W.

N67-10404# Ritchie and Associates, Inc., Dayton, Ohio.
MANUAL CONTROL OF REMOTE MANIPULATORS: EXPERIMENTS USING ANALOG SIMULATION Final Report, Feb. 1964–Mar. 1965
Sidney Seidenstein and A. G. Berbert, Jr. Wright-Patterson AFB, Ohio, AMRL, Feb. 1966 153 p refs
(Contract AF 33(615)-1456)
(AMRL-TR-66-21; AD-638500) CFSTI: HC $5.00/MF $1.00

An analog simulation of a remote manipulator was developed and used to investigate operator performance as a function of machine design parameters. Independent variables included control order, rate of motion, manipulator dynamics, positioning error tolerance, distance traversed, and duration for which final arm position had to be maintained. Dependent variables were travel time, adjustment time, time on target and total task time. Principal results were as follows: Increasing the complexity of system dynamics produced a decrement in operator performance which was greater for fixed rate than for proportional rate control. Proportional rate control was found to be superior to fixed rate control afforded no advantage over the optimum single level of rate control Author (TAB)

N67-10410# George Washington Univ., Washington, D. C. Human Resources Research Office.
PURSUIT ROTOR PERFORMANCE. I: EFFECTS OF REINFORCING THE LONGER INTERVALS OF CONTINUOUS TRACKING WITHIN EACH TRIAL
Richard W. Sheldon and John F. Bjorklund Jun. 1966 30 p refs
(Contract DA-44-188-ARO-2)
(HumRRO-TR-66-11; AD-638015) CFSTI: HC $2.00/MF $0.50

To determine whether selective reinforcement of pursuit rotor performance facilitates acquisition of skill and promotes its retention, five groups of subjects were individually trained for ten sessions of 15 trials each. Selective reinforcement of longer than average target contacts was introduced for one group of subjects during Sessions 6 and 7 and for another during Sessions 4 to 7. Continuous reinforcement of target contacts was introduced for two other groups. A control group received no reinforcement. Dependable improvements in time-on-target scores were obtained for all four sessions, but the superior performances were not maintained when reinforcement was withdrawn. The results suggest that this improvement as a function of feedback was attributable to motivational rather than learning or informational effects Author (TAB)

N67-10412# Washington Univ., Seattle.
SOME EXPERIMENTS ON SIMPLE AND CHOICE REACTION TIME
Joan Gay Snodgrass (New York Univ.), R. Duncan Luce (Pa. Univ.), and Eugene Galanter 1 Aug. 1966 55 p refs
(Contract Nonr-477(34))
(PRP-26N; AD-638619) CFSTI: HC $3.00/MF $0.50

The report concerns four problems on simple and choice reaction time (RT). First, in Experiments 1 and 2, the authors examine the role of time estimation in the manipulation of responses in simple reaction time experiments by means of payoffs and information feedback. Second, in Experiment 3, they ask whether the changes in the shape and location of choice RT distributions as compared with simple ones are due primarily to the increase in the number of signals, in the number of responses, or in some more basic difference between the two tasks. Third, in Experiment 4, they investigate the relation between RT and signal presentation probability in choice situations. And, finally, using all of the empirical distributions obtained in Experiments 2, 3, and 4, an attempt is made to see if any of several theoretical distributions appear to give a satisfactory description of the data. Author (TAB)

N67-10413# Washington Univ., Seattle.
SIGNAL DETECTION
Eugene Galanter 1 Aug. 1966 16 p refs
(Contract Nonr-477(34))
(PRP-25N; AD-638618) CFSTI: HC $1.00/MF $0.50

The report is a didactic exposition of the two major theories of signal detection, the limited-state theshold theory and the infinite state signal detectability theory. The report was prepared for inclusion in the 1967 Yearbook of Science and Technology edited by McGraw-Hill Author (TAB)

N67-10417# Chicago Univ., Ill. Toxicity Lab.
STUDIES ON SPLEEN OXYGEN TENSION AND RADIOPROTECTION IN MICE WITH HYPOXIA, SEROTONIN AND P-AMINOPROPIOPHENONE Formal Report, Dec. 1, 1965–May 31, 1966
Andrew T. Hasegawa and H. D. Landahl Jun. 1966 24 p refs
(Contract AF 41(609)-2977)
(AD-638372) CFSTI: HC $1.00/MF $0.50

Polarographic measurements of the oxygen tension in the spleen and vena cava, as well as radioprotection studies, were carried out in mice forced to breathe an atmosphere of low oxygen

(10%, 7%, and 4.6%) or injected with serotonic (90 mg./kg.) or p-aminopropiophenone (30 mg./kg.). The spleen oxygen levels at 10%, 7%, and 4.6% oxygen were 0.36, 0.27, and 0.10 of normal respectively. The dose reduction factors at the corresponding levels were 1.24, 1.73, and 1.96. Serotonin reduced the oxygen tension to 0.53 of normal and a dose reduction factor of 1.77 was obtained. A dose reduction factor of 1.74 was obtained in PAPP-treated mice irradiated 15 minutes after injection and when the oxygen tension level was 0.35 of normal. A dose reduction factor of 2.92 was obtained in serotonin-treated mice irradiated while breathing an atmosphere of 4.6% oxygen. The greatest decline in oxygen tension occurred in these mice when the level in the vena cava declined to 0.06 of normal. If one plots the relative effectiveness of the radiation (y = 1/DRF) versus the relative oxygen tension (x) of the spleen and vena cava for each of the experimental situations, there exists an approximate linear relationship. The results indicate that there is a small amount of protection by both serotonin and PAPP which is independent of hypoxia. This relationship is given as $Fiy = 0.42 + 0.60\ x$, in which the values of Fi are 1.4, 1.2, and 1.12, where i refers respectively to serotonin, sodium nitrite, and PAPP. Author (TAB)

N67-10445# Bureau of Mines, Pittsburgh, Pa. Health and Safety Research and Testing Center.

A MACHINE-TEST METHOD FOR MEASURING CARBON DIOXIDE IN THE INSPIRED AIR OF SELF-CONTAINED BREATHING APPARATUS

Edwin J. Kloos and Joseph A. Lamonica 1966 14 p refs (BM-RI-6865)

A new machine test method for measuring carbon dioxide inspired by a wearer of self-contained breathing apparatus was devised. The new method compares favorably in speed and precision with standard man tests in which the apparatus is tested while actually worn, and is scheduled for use in future approval tests for facepiece carbon dioxide measurements. However, man tests will still be used to measure the efficiency of the carbon dioxide sorbent materials in closed circuit breathing apparatus. Author

N67-10466# Medical Biological Lab., RVO-TNO, Rijswijk (Netherlands).

THE EFFICIENCY OF ELECTROSTATIC AIR FILTERS IN A SPF RAT BREEDING UNIT

J. L. F. Gerbrandy, D. van der Waay, and H. C. Bartlema Aug. 1966 8 p refs Supported by EURATOM (TDCK-46285; MBL-1966-8; RI-1966-8) CFSTI: HC $1.00/MF $0.50

The efficiency of two electrostatic filters supplying two different animal rooms in a SPF rat breeding unit have been tested. Samples taken from filtered, experimentally contaminated, air demonstrated a sufficiently high efficiency of the filters. Author

N67-10469# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

THE FIRE HAZARDS TO MAN IN COMPRESSED-AIR ENVIRONMENTS

J. Ernsting, A. W. Cresswell and D. M. Denison London, Flying Personnel Res. Comm., Jan. 1966 6 p ref (FPRC/1249) CFSTI: HC $1.00/MF $0.50

Previous work showed a greatly increased fire hazard to man when the ambient partial pressure of oxygen exceeds 0.4 atm. This increase was uninfluenced by the presence of up to 0.6 atm of nitrogen. Present experiments, in compressed air at 2.0 to 5.0 atm, show a significant damping effect of concomitant nitrogen, that prevents the flash-propagation seen previously. Author

N67-10471# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

THE FIRE RISKS TO MAN OF OXYGEN RICH GAS ENVIRONMENTS

D. Denison, J. Ernsting, and A. W. Cresswell London, Flying Personnel Res. Comm., Jul. 1965 12 p refs (FPRC/Memo-223) CFSTI: HC $1.00/MF $0.50

Igniting clothing fires were studied in gas environments with oxygen partial pressures ranging from 0.2 to 1.0 atmospheres. The effects of variations in the type, fit and proofing of clothing and in the detailed use of the water spray extinguishing system were noted. These experiments strongly suggest that: (a) The risks of igniting a man are greatly increased in these environments. (b) Fires in oxygen-rich environments are of a fundamentally different character to those in air. (c) Igniting a clothed man in these environments may lead to fatal damage within 5 to 20 sec of onset. (d) A dense local water spray can control this fire. (e) The damage to the man is critically dependent upon the type, fit and proofing of his clothing and on the timing density and distribution of the extinguishing water sprays. Author

N67-10473# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine

THE EFFECTS OF INVERSION UPON LUNG VOLUME AND VENTILATION

D. Denison London, Flying Personnel Res. Comm., Jan. 1965 12 p refs (FPRC/Memo-222) CFSTI: HC $1.00/MF $0.50

Lung volumes and lung ventilation have been measured in the upright and in an inverted position by a combination of spirometry and a helium dilution technique. Consistent changes in lung volume were seen comprising mean changes of a 14% decrease in total lung capacity and vital capacity, and a 6% increase in inspiratory capacity, a 24% decrease in functional residual capacity, a 38% decrease in expiratory reserve volume and a 12% fall in residual volume. Changes in lung ventilation were variable but showed a mean increase of 13% in respiratory rate, tidal volume, minute volume and calculated alveolar ventilation. The relevance of these findings to the problem of weightlessness is discussed. A method of calibrating the helium katharometer is described that is of more general applicability. Author

N67-10479# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

FURTHER ASSESSMENT OF CLOTHING COMBINATIONS FOR PROTECTION AT AN ALTITUDE OF 75,000 FEET

D. I. Fryer and P. R. Wagner London, Flying Personnel Res. Comm., Jan. 1965 47 p refs (FPRC/1232) CFSTI: HC $2.00/MF $0.50

Experiments have been carried out to assess the feasibility of protection against rapid decompression from 25,000 feet to 75,000 feet, and maintenance of that altitude for 1 minute followed by descent at 10,000 ft/min, using readily available garments and equipment. The use of a de-rated Mk 20 regulator, sleeved jerkin and anti-g suit proved unsatisfactory. Analysis of respiratory gas composition by use of the mass spectrometer, recorded that the combination of slight nitrogen contamination of inspired gas from the garment bladders and very low alveolar P_{CO_2} levels following decompression is likely to have summated with the lower breathing pressure given by the de-rated regulator, to give rise to quite severe cerebral hypoxia. Raising the breathing pressure and adoption of the slightly more effective counter-pressure of the new combined sleeved jerkin/anti-g suit, enabled the problem of protection under the specified conditions to be achieved without difficulty. Author

N67-10480# United Kingdom Atomic Energy Authority, Harwell (England). Radiological Protection Div.

ENVIRONMENTAL MONITORING ASSOCIATED WITH DISCHARGES OF RADIOACTIVE WASTE DURING 1965 FROM U.K.A.E.A. ESTABLISHMENTS

Aug. 1966 30 p refs
(AHSB/RP/-R-72)

This report describes the results of the environmental monitoring undertaken to confirm that the discharges of radioactive waste during 1965 from each of the principal UKAEA establishments produced no hazard in the environment. The results of this monitoring are summarised and are compared with derived working limits to facilitate an appreciation of the standards of safety achieved. Author

N67-10483# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
A COLLAR AND CHAIN PROCEDURE FOR HANDLING AND SEATING MACACA MULATTA
Charles M. Hurst Aug. 1966 19 p refs
(ARL-TR-66-14; AD-638488) CFSTI: HC $1.00/MF $0.50

A collar and chain procedure for transporting Macaca mulatta from living cages to pillory neck plate type restraint chairs, is described. The relative merits of this procedure are discussed in comparison with standard handling techniques. The application of this procedure was demonstrated with 14 Macaca mulatta (7 males and 7 females) ranging in weight from 3.4 to 6.6 kilograms Author (TAB)

N67-10527# Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
HEALTH PHYSICS TECHNICIAN TRAINING MANUAL
H. W. Stroschein and P. H. Maeser, ed. Jun. 1966 304 p refs
(Contract AT(10-1)-205)
(IDO-17182) CFSTI: HC $7.00/MF $1.50

The general principles of radiation safety covered include the basic principles of radiation, dose determination and limits, biological effects of radiation, radiation detection instrumentation, contamination control, decontamination, and emergency actions. General information is also included on non-radiological safety often associated with health physics work. Author (NSA)

N67-10546# Flying Personnel Research Committee, London (England).
A COMPARISON OF THE PERFORMANCE OF FIVE AIR VENTILATED SUITS AS HEAT EXCHANGERS, MEASURED ON A HEATED MANIKIN
D. Mc K. Kerslake and J. M. Clifford Apr. 1965 25 p refs
(FPRC/1239) CFSTI: HC $1.00/MF $0.50

The thermal performances of five types of air ventilated suit have been compared. Direct measurements were made of effectiveness as an exchanger of sensible heat, and of the skin temperature distribution produced with cool air supplies. Evaporative performance was inferred from these results and consideration of suit design. Attention is drawn to the possibility of making use of the overlying clothing to simplify the ventilating garment and improve the ventilating performance of the assembly. Author

N67-10556# Radiobiological Inst. TNO, Rijswijk (Netherlands).
INVESTIGATIONS ON BONE MARROW TRANSPLANTATION IN IRRADIATED ANIMALS AND THE PRODUCTION OF SPECIFIC PATHOGEN FREE ANIMALS AND THEIR APPLICATION IN RADIOBIOLOGY, 1 DECEMBER 1962–31 DECEMBER 1965
Brussels, EURATOM, Sep. 1966 41 p refs
(Contract EURATOM-029-63-1 BIAN)
(EUR-3122.e) CFSTI: HC $2.00/MF $0.50

The program on bone marrow transplantation has consisted of fundamental studies which were performed with mice and rats, as well as preclinical experiments with monkeys. Among the most notable results are the successful homologous bone marrow transplantation in irradiated rats, which is partly to be ascribed to the use of specific pathogen free animals; the successful suppression of the acute secondary disease in monkeys following transplantation of homologous marrow; the development of an effective method of preservation of monkey bone marrow at low temperatures; the identification of leukocyte antigen groups probably representing tissue transplantation antigens in Rhesus monkeys; the introduction of a new technique for the identification of antibody forming cells *in vitro* and the interpretation of the post-thymectomy wasting syndrome as a form of autoimmune disease. Author

N67-10591# United Kingdom Atomic Energy Authority, Amersham (England). Radiochemical Centre.
THE PULMONARY EXCRETION OF CARBON-14 DIOXIDE FOLLOWING CONTAMINATION OF THE SKIN BY LABELLED CHLORELLA EXTRACT
D. A. Cook Jun. 1966 12 p refs
(RCC-R-179) HMSO: 2s 6d

The results are given of some measurements of the specific activity of exhaled Carbon-14 dioxide following accidental skin contamination by labelled Chlorella extract. Curves showing the variation of specific activity with time and the time integral of the excretion are given. A comparison of these results with those obtained by urine sampling is included. Author

N67-10578# United Kingdom Atomic Energy Authority, Harwell (England). Health Physics and Medical Div.
PERSONNEL DOSIMETRY FOR NEUTRONS
J. W. Smith Jul. 1966 28 p refs
(AERE-R-5125) CFSTI: HC $2.00/MF $0.50

An experimental determination has been made of the neutron flux backscattered by a phantom. This work formed part of a search for an intermediate energy neutron dosimeter to fill the wide gap in personnel dosimetry between thermal (0.025 eV) and fast (300 keV). The backscattered flux was found to fall only very slowly with energy so that a thermal neutron detector on the surface of the body may be used to measure dose-equivalent up to 5 keV. The measurement or assessment of dose-equivalent and fluence in the region 5 keV to 300 keV is discussed in some detail with the object of providing a complete system of personnel dosimetry for neutrons. Author

N67-10588# United Kingdom Atomic Energy Authority, Harwell (England). Radiological Protection Div.
A FEASIBILITY STUDY OF THE USE OF P.V.C. PRESSURISED SUITS IN WORKPLACE AT TEMPERATURES OF 40 TO 50°C
R. P. Rowlands Aug. 1966 11 p refs
(AHSB(RP)-M-43)

Formulas derived from experiments in which men worked in pressurized suits at ambient temperatures are extrapolated to workplace temperatures in the range 40 to 50°C. It is shown that coating a standard pressurized suit with radiant heat reflecting material and using a vortex tube to cool a dehumidified breathing air supply makes moderate work feasible. At the lower end of the workplace temperature range considered, the thermal conditions for the suit wearer are comfortable. With increasing workplace temperature the thermal stress on the man increases through a zone of modest discomfort to a zone marked discomfort which is barely tolerable. Up to about 46°C exposures of a few hours appear feasible, but between 46 and 50°C it would appear prudent to limit exposures to an hour or so. Above 50°C brief exposures only are indicated. Likely values of the physiological responses, body temperature, heart rate and weight loss through sweating, are given corresponding to the different zones of thermal stress. Author

N67-10596# Library of Congress, Washington, D. C. Aerospace Technology Div.
SPACECRAFT STERILIZATION PROCEDURES IN THE USSR
Boris Mandrovsky 5 Aug. 1966 19 p

An information letter is presented which discusses Soviet sterilization procedures as they have been described at various meetings. It is noted that in the course of the discussions it became apparent that the Soviets did not use a shroud and that they used heat plus some chemical. Abstracted data from four papers by Soviet scientists on sterilization factors are also included. A.G.O.

N67-10671# Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.

DEVELOPMENT AND APPLICATIONS OF THERMOLUMINESCENT DOSIMETERS

R. M. Hall 25 May 1966 16 p refs Presented at the Symp. on Med. Phys., Madison, Wis., 9–11 Jun. 1966

(Contract AT(07-2)-1)

(DP-MS-66-29; CONF-660623-1) CFSTI: HC $1.00/MF $0.50

Thermoluminescent dosimeters are being developed at the Savannah River Laboratory for various research programs, environmental surveillance, and personnel monitoring. The upper range of LiF dosimeters was extended to 10^8 R by using a secondary glow peak between 270 and 350°C. From 10 to 10^8 R, the primary glow peak (between 25 and 270°C) and the secondary peak can be used to obtain duplicate results from each dosimeter. With single LiF crystals, exposures as low as 1 mR are measured with an accuracy of ±15% (at the 95% confidence level). Laboratory and field tests showed that thermoluminescent dosimeters were more accurate, reliable, and economical than instruments used previously for measuring environmental radiation. Fading (loss of thermally stimulated luminescence) was found to be primarily due to exposure to sunlight. Laboratory tests indicated LiF faded 13% in 12 days and 21% in 45 days when illuminated by simulated sunlight at 2.5×10^3 foot-candles for 10 hours per day. Dosimeters stored in opaque containers at outdoor stations had faded 4% after one month and 20% after one year. Humidity did not affect response. Thin single crystals (0.1 mm) or a layer of LiF powder (20 mg/cm^2) have the same response for radium gamma and beta radiation over a range of maximum energies, (0.7 to 2.2 Mev). Rings fabricated from 3 mil polyethylene containing a thin layer of LiF are used to measure hand dose. Capsules containing LiF powder were used at the Medical College of Georgia to measure the radiation doses received during cancer therapy. These small dosimeters accurately measured the dose to the tumor or adjacent tissue. They are also used to measure the dose distribution in tissue equivalent material from new radioactive sources proposed for radiotherapy. Author (NSA)

N67-10751*# Massachusetts Inst. of Tech., Cambridge.

THE VESTIBULAR SYSTEM AND HUMAN DYNAMIC SPACE ORIENTATION

Jacob L. Meiry (Ph.D. Thesis) Washington, NASA, Oct. 1966 204 p refs

(Grant NsG-577)

(NASA-CR-628) CFSTI: HC $3.75/MF $1.25 CSCL 06S

The motion sensors were studied to determine their role in human dynamic space orientation and manual vehicle control. Control models for the sensors, descriptions of the subsystems for eye stabilization, and motion cue effects on closed loop manual control were obtained. The subjects' abilities to perceive a variety of linear motions provided data on the dynamic characteristics of the otoliths, and angular acceleration threshold measurements were made. The contributions of the vestibular system, the neck rotation proprioceptors, and the visual system were identified. Compensatory eye movements in response to neck rotation were demonstrated. In human compensatory tracking investigations, motion cues sensed by the vestibular system and tactile sensation were found to enable the operator to generate more lead compensation than in simulation with visual input only. Tracking performance in an unstable control system was shown to depend heavily on the rate information provided by the vestibular sensors. N.E.N.

N67-10769# Battelle-Northwest, Richland, Wash. Environmental Health and Engineering Dept.

PERSONNEL NEUTRON DOSIMETER DEVELOPMENTS

C. M. Unruh, W. V. Baumgartner, L. F. Kocher, L. W. Brackenbush, and G. W. R. Endres 27 Jul. 1966 20 p refs Presented at Symp. for Neutron Monitoring for Radiological Protect., Vienna

(Contract AT(45-1)-1830)

(BNWL-SA-537) CONF-660807-1) CFSTI: HC $1.00/MF $0.50

Three approaches to the problem of personnel neutron dosimetry are discussed. These are thermoluminescence, solid state track detection, and activation analysis. NSA

N67-10841# Oak Ridge National Lab., Tenn. Biology Div.

REPAIR OF DNA

R. B. Setlow [1966] 31 p refs Presented at the Intern. Symp. on Regulatory Mech. in Nucleic Acid and Protein Biosyn., Lunteren, Netherlands, 5–10 Jun. 1966

(Contract W-7405-ENG-26)

(ORNL-P-2240; CONF-660620-1) CFSTI: HC $2.00/MF $0.50

Biological and physico-chemical evidence for the existence of repair systems for DNA is reviewed. Results of studies of the response of viruses, bacteria, and mammalian cells to uv and X-radiation are summarized. It is concluded that the biological data indicate that repair systems operate to remove damage from DNA. Reaction mechanisms involved are discussed and the biological systems and the physico-chemical lesions that have been related to the various steps involved in repair by excision are cataloged. NSA

N67-10844# Philadelphia General Hospital, Pa.

THE EFFECT OF X-RAY IRRADIATION ON PHOSPHOLIPID METABOLISM Progress Report, 1 Oct. 1965–31 May 1966

Henry P. Schwarz 31 May 1966 18 p ref

(Contract AT(30-1)-1864)

(NYO-1864-23) CFSTI: HC $1.00/MF $0.50

Progress is reported in studies on the phospholipid content and chemical composition of phospholipids in blood plasma of men and rats; the effects of X-radiation doses of 2000 to 3000 R on the total phospholipids in rat liver fractions and blood plasma; and the effects of stress caused by acceleration of healthy men at 3 to 4 G for 10 sec on total phospholipid and phosphatidylglycerol content in plasma. The syntheses of phosphatidylglyceral, tritium-labeled phosphatidylglycerophosphate, and a new cardiolipin are described. NSA

N67-10852# Massachusetts General Hospital, Boston. John Collins Warren Labs.

AN INVESTIGATION ON THE MECHANISMS AND REGULATIONS OF NUCLEIC ACID AND PROTEIN SYNTHESIS, AND THEIR POSSIBLE RELATIONSHIP TO RADIATION DAMAGE Progress Report, 1 Sep. 1965–31 Aug. 1966

Paul C. Zamecnik and Joseph W. Gardella 22 Jun. 1966 51 p refs

(Contract AT(30-1)-2643)

(NYO-2643-22) CFSTI: HC $3.00/MF $0.30

Progress is reported in tracer studies of control mechanisms and regulators of nucleic acid and protein synthesis. Topics discussed include the structure of transfer RNA; activation reactions for protein synthesis; the chemical modification of enzyme systems controlling nucleic acid and protein synthesis; the fractionation of transfer RNA; the effects of uv radiation on the formation of transfer RNA in *E. coli;* the synthesis of RNA in regenerating rat liver; and effects of virus infection on the synthesis of RNA in cultured chick embryo cells. A list is included of 17 publications during the period covered by this report. NSA

N67-10883*# Pittsburgh Univ., Pa. Graduate School of Public Health.

[CONTRACT TO EXTEND THE USEFULNESS OF CYTOGENETIC METHODOLOGY AS A RESEARCH TECHNIQUE AND AS A BIOMEDICAL MONITORING PROCEDURE] Quarterly Progress Report, 1 Jan.–30 Jun. 1966

Niel Wald 3 Oct. 1966 10 p

(Contract NASr-169)

(NASA-CR-79746, QPR-10) CFSTI: HC $1.00/MF $0.50 CSCL 06C

Details are given on the automatic cytogenetic analysis system which consists of a digital computer, an ultra-precision flying spot scanner, and a mechanized microscope with either an incoherent or a coherent light source. The subsystems and their functions are described, along with the mode of system operation. The functions to be performed are listed as (1) detection of mitotic cells, (2) placement of mitotic cells under optical miscroscope; (3) focussing of microscope, (4) classification of mitotic cells as suitable for chromosome count only, or suitable for chromosome count and karyotype (matching of appropriate parts of chromosomes); and (5) analysis of the cell, and output of the results by means of photograph, printed page, or magnetic tape. M.G.J.

N67-10886*# California Univ., Los Angeles. Johns Hopkins Univ., Baltimore, Md.

SPECTRAL ANALYSIS TECHNIQUES AND PATTERN RECOGNITION METHODS FOR ELECTROENCEPHALOGRAPHIC DATA

W. R. Adey 1 Sep. 1966 42 p refs Presented at Conf. on Data Process. in Hosp., Elsinore, Denmark, Apr. 1966 Prepared Jointly with Johns Hopkins Univ. *Its* Inform. Exchange Group No. 3

(Contract NAS9-1970; Grants NsG-502; NsG-505; NsG-520; AF-AFOSR-256-63 et al)

(NASA-CR-79743, SM-47) CFSTI: HC $2.00/MF $0.50 CSCL 06B

A data acquisition, analysis, and display system for time-shared use by a group of neurophysiological investigators is described. Applications of spectral analysis to a normative library of EEG data in states of sleep and wakefulness are described, with establishment of baselines for adult males in the course of simple alerting, vigilance task performance, and in visual discriminations of increasing difficulty. Simple pattern recognition techniques were applied to such data from individual subjects, with good accuracy in automated recognition of EEG states accompanying different levels of focused attention. The use of computer analysis in analysis of intraneuronal wave records is described, and a physiological model of genesis of the EEG in a population of neuronal wave generators having independent and nonlinear characteristics is discussed. Possible future trends in electrophysiological data analysis are reviewed. Author

N67-10896*# Dartmouth Coll., Hanover, N. H. Dept. of Biological Sciences.

EFFECTS OF PLANT GROWTH HORMONES ON PLANT DEVELOPMENT IN THE ABSENCE OF GRAVITATIONAL EFFECTS. THE EFFECT OF WEIGHTLESSNESS ON THE GROWTH AND ORIENTATION OF ROOTS AND SHOOTS OF MONOCOTYLEDONOUS SEEDLINGS

Charles J. Lyon 6 Oct. 1966 48 p refs

(NASA-CR-79712) CFSTI: HC $2.00/MF $0.50 CSCL 06C

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1. EFFECTS OF PLANT GROWTH HORMONES ON PLANT DEVELOPMENT IN THE ABSENCE OF GRAVITATIONAL EFFECTS C. J. Lyon 11 p refs (See N67-10897 01-04)

2. THE EFFECT OF WEIGHTLESSNESS ON THE GROWTH AND ORIENTATION OF ROOTS AND SHOOTS OF MONOCOTYLEDONOUS SEEDLINGS C. J. Lyon 37 p (See N67-10898 01-04)

N67-10897*# Dartmouth Coll., Hanover, N. H. Dept. of Biological Sciences.

EFFECTS OF PLANT GROWTH HORMONES ON PLANT DEVELOPMENT IN THE ABSENCE OF GRAVITATIONAL EFFECTS Final Report, Sep. 1, 1964–Aug. 31, 1966

Charles J. Lyon *In its* Effects of Plant Growth Hormones on Plant Develop. in the Absence of Gravitational Effects 6 Oct. 1966 11 p refs (See N67-10896 01-04) CFSTI: HC $2.00/MF $0.50

(Grant NsG-231)

The use of radioactive auxin in studies to establish the basis for axial curvature in terrestrial plants is discussed, along with the effect of gravity on the slow transport of auxin through defoliated axes of tall Coleus plants. Retarded growth of internodes that develop on horizontal clinostats is reported for seedling tomatoes and Torenias. Tumbling motion is reported to be as effective as rotation in the horizontal position for preventing lateral transport of auxin by gravity. Refinemement of the wheat seedling experiment is reported, including techniques for growing uniform seedlings and thermal vacuum testing of the spacecraft. M.W.R.

N67-10898*# Dartmouth Coll., Hanover, N. H. Dept. of Biological Sciences.

THE EFFECT OF WEIGHTLESSNESS ON THE GROWTH AND ORIENTATION OF ROOTS AND SHOOTS OF MONOCOTYLEDONOUS SEEDLINGS Annual Status Report, 1 Jul. 1965–30 Jun. 1966

Charles J. Lyon *In its* Effects of Plant Growth Hormones on Plant Develop. in the Absence of Gravitational Effects 6 Oct. 1966 37 p (See N67-10896 01-04) CFSTI: HC $2.00/MF $0.50

(Contract NAS2-1558)

Culture techniques, plant organ orientation to gravity, and growth of uniform wheat seedlings within the flight hardware of a biosatellite are reported. Refinements in techniques are concerned with topics such as lateral curvatures of the primary root, soak and hold times, surplus water, and uniformity of vermiculite pack. Rubber caps for seed stalk arms, burning of slits in the rubber caps, and injection of stalks are also considered. Use of the stalk method for growth of oat seedlings, and a holder system for dicotyledonous seedlings are discussed. Aspects of the physiology of seedling organ orientation include: (1) apical dominance of primary root, (2) treatments with exogenous auxin, (3) maintaining angular orientation of roots, and (4) alternation of growth position. Biocompatibility tests of the flight package, conducted outside the spacecraft, established the adequacy of the hardware; and retardation of seed germination, which occurred when the package was used for a 3-day growth test within the spacecraft while the capsule was held within a thermal vacuum test chamber, was attributed to the heater blankets. M.W.R.

N67-10908# Tennessee Univ., Knoxville. Dept. of Zoology and Entomology.

A STUDY OF THE EFFECTS OF RADIATION ON HOST-PARASITE RELATIONSHIPS Progress Report, Jun. 1954–Jun. 1966

Arthur W. Jones 15 Jun. 1966 12 p refs

(Contract AT(40-1)-1749)

(TID-23114) CFSTI: HC $1.00/MF $0.50

Progress is reported in studies of the effects of X-radiation on host–parasite relationships. The effects of radiation on six species of cestode, seven species of final vertebrate hosts and a number of intermediate invertebrate hosts of these parasites were investigated. Data are summarized on the life cycle, cytology, histopathology in intermediate hosts, effects of whole-body radiation on final hosts, the survival of heavily irradiated larvae, and immune reactions of hosts to the dog tapeworm, cat tapeworm, rat tapeworm, salamander tapeworm, mouse tapeworm, and other related studies. NSA

N67-10925# Washington Univ., Seattle.
THE INFLUENCE OF BORDERS ON INCREMENT THRESHOLDS
Davida Y. Teller [1965] 16 p refs Presented at the Psychonomic Soc., Chicago, 14-16 Nov. 1965
(Contract DA-49-193-MD-2713)
(PLR-17A;AD-639353) CFSTI: HC $1.00/MF $0.50

Previous investigators have reported that increment thresholds are elevated in the regions of abrupt spatial changes of adapting field intensity, known as borders or edges. Such effects have often been attributed to lateral physiological interactions, particularly lateral inhibition, within the visual system. An attempt was made to determine empirically the actual cause or causes of the elevated thresholds on the high intensity side of a border. These elevated thresholds are tentatively attributed to the combined influence of two factors: involuntary eye movements, which produce frequent changes of retinal illuminance near the border; and transient elevations in the increment threshold which occur near the times of large, rapid changes in retinal illuminance. It is concluded that short-term lateral interactions have little if any influence on increment thresholds on the high intensity side of a border. The possibility remains, however, that such increment thresholds may be influenced by lateral interactions whose effects take an extended period of time to develop Author (TAB)

N67-10944# Chicago Univ., Ill. Toxicity Lab.
MODIFICATION OF THE RADIATION-INDUCED INCREASE IN ADENOSINE TRIPHOSPHATASE ACTIVITY OF THE SPLEEN BY VARIOUS CHEMICAL AGENTS, 1 DECEMBER 1965–31 MAY 1966
Robert O. Tardiff and Kenneth P. Du Bois Jun. 1966 29 p refs
(Contract AF 04(609)-2977)
(AD-637576) CFSTI: HC $2.00/MF $0.50

A study was conducted on the influence of various chemical agents and biological preparations on the radiation-induced increase in adenosine triphosphatase activity of the spleen of rats using cobalt gamma radiation exposures Exposure of rats to 21.2 r and 50 r per day over a 10-hour period caused dose-dependent increases in enzyme activity. Progressive increases occurred during the first few days followed by maintenace of the activity at a constant elevated level. Chemical agents were tested for protective activity by exposing rats to a total dose of 200 r at the rate of 50 r per day which resulted in an increase in enzyme activity of the spleen to 186% of normal. Cysteine, mercaptoethylamine, and 2-aminoethylisothiouronium (AET) were relatively ineffective in reducing the amount of change in enzyme activity in contrast to their protective effects against acute radiation injury. p-Aminopropiophenone, hydroxylamine, thyroxin, and thyroid stimulating hormones were effective antagonists of the radiation-induced injury. Progesterone and adrenal cortical extract exerted some protective action. A yeast extract and the water-soluble fractions of liver exerted marked protective effects when given parenterally but were ineffective when given orally Author (TAB)

N67-10968# New York Eye and Ear Infirmary, N. Y.
INVESTIGATION OF THE EFFECTS OF RUBY LASER RADIATION ON OCULAR TISSUE
Jerry H. Jacobson, Harold W. Najac, and Bossom Cooper Phila., Pa., Frankford Arsenal, Jun. 1966 34 p ref
(Contract DA-36-038-AMC-685(A))
(FA-R-1815; AD-638917) CFSTI: HC $2.00/MF $0.50

A series of laboratory and field experiments on rabbits were conducted by the New York Eye and Ear Infirmary in order to establish tentative safe operational distances and conditions for use of the Frankford Arsenal XM23 laser rangefinder. The measured far field corneal threshold dose for rabbits was tentatively determined to be 5X10 to the minus 7th power joule/sq. cm. From this a possible human corneal threshold was calculated as 0.00000145 joule/sq. cm. Based on this value, tentative safe operational distances were calculated as being 6460 meters for night (8 mm pupil), 1615 meters for twilight (4 mm pupil), and 914 meters for daylight (3 mm pupil). Author (TAB)

N67-10971# Naval Personnel Research Activity, San Diego, Calif.
AN EXPERIMENT IN BASIC AIRBORNE ELECTRONICS TRAINING. PART I: EFFECT OF REDUCTION IN TRAINING TIME UPON KNOWLEDGE OF ELECTRONICS FUNDAMENTALS
Alexander A. Longo and G. Douglas Mayo Aug. 1966 17 p ref
(STB-67-3; AD-638439) CFSTI: HC $1.00/MF $0.50

This is the first in a series of reports on a longitudinal study pertaining to the question on whether training time can be reduced in basic airborne electronics training through judicious revision of the course. This report compares the relative performance of two matched groups of 154 trainees each, on the basis of a comprehensive examination of knowledge of electronics fundamentals upon completion of the regular course (19 weeks of instruction) and the revised course (14 weeks of instruction). The results indicated that the course reduction of the size undertaken (26%) resulted in less knowledge on the part of the personnel receiving the shorter course, despite the best efforts of experienced training personnel who designed and implemented the shorter course. The difference between the two groups was statistically significant at the .01 level. Author (TAB)

N67-10987# Frankford Arsenal, Philadelphia, Pa.
DYNAMIC PHOTOELASTIC STRESS PATTERNS FROM A SIMPLIFIED MODEL OF A HEAD
Paul D. Flynn Feb. 1966 8 p refs Reprinted
(A66-9; AD-639596)

Photoelasticity is a method of experimental stress analysis employing polarized light and transparent models. Dynamic photoelasticity generally deals with the determination of transient stresses and strains in machine parts or structures subjected to impact or shock loading. The potential value of this technique in head injury research is illustrated by stress patterns of a simplified model of a skull and brain under dynamic loads that were photographed at a rate of 240,000 pictures per second. The results are compared with stress patterns obtained from the same model under static loads. Author (TAB)

N67-10989# Beckman Instruments, Inc., Fullerton, Calif.
ULTRAVIOLET OXYGEN DETECTOR Final Report, Mar.–Dec. 1965
Ronald G. Hughes Wright-Patterson AFB, Ohio, AMRL, Jun. 1966 68 p refs
(Contract AF 33(615)-2383)
(AM-2360-201; AMRL-TR-66-77; AD-639331) CFSTI: HC $3.00/MF $0.75

An ultraviolet oxygen sensor has been investigated, designed, fabricated and tested which is to photoelectrically measure the partial pressure of oxygen in the pressure range from 100 to 500 torr. A krypton source was used to illuminate the Fery prism which is the dispersing element of a dual beam single monochromator set to pass energy in the Schumann-Runge absorption continuum band of oxygen in the wave-length region of 1450 to 1510 A. Since the absorption coefficient of oxygen has an average value of 350/cm in this band, absorption spectroscopy is employed in the measurement of oxygen concentration by passing the selected band of radiation from the monochromator through a .014 cm path length of oxygen gas. By monitoring the change in luminous energy falling on the photocathode of a photomultiplier tube, one can determine the partial pressure of the gas for a specified temperature. Lamberts Law demonstrates the change in intensity

for a constant distance and due to the variation of k with a change in pressure. The partial pressure is read out directly on a 0-100 microamp meter which receives the signal from a ratioing, Darlington, current amplifier system. The amplifier obtains the primary signals from the current outputs of two RCA-type CF0129C phototubes positioned to detect light from an absorbing path and a reference path Author (TAB)

N67-10990# Naval Medical Research Inst., Bethesda, Md.
PHYSIOLOGIC MECHANISMS OF MAINTAINING THERMAL BALANCE IN HIGH PRESSURE ENVIRONMENTS
Lawrence W. Raymond Sep. 1966 30 p refs Presented at the 2d Conf. on Marine Systems and ASW, Los Angeles, 10 Aug. 1966, Sponsored by AIAA and Navy
(Rept.-10; AD-639608) CFSTI: HC $2.00/MF $0.50

The review of body temperature control aims to define the optimal environment for deep submergence habitats, at pressures of 15-20 atmospheres. Environmental factors demand major attention since they will largely dictate the physiologic adjustments which will be required. Inherent changes in gas composition and density indicate major increases in surface heat transfer, depending upon atmospheric temperature and movement. Habitat insulation and ocean temperature suggest that body surface heat transfer will also be increased by radiation, but this may be modified by heating techniques, special insulation methods or by treatment of cold habitat surfaces. Humidity may be an important determinant of comfort and skin hygiene. Psychrometric methods for hyperbaric atmospheres are discussed. Experimental data on body heat transfer in helium-rich environments are presented from simulation studies. The data confirm a major increase in convective heat transfer from the skin, in helium at increased pressures. The implications of these findings upon physiologic and environmental aspects of these findings upon physiologic and environmental aspects of deep submergence programs are discussed Author (TAB)

N67-10998# Ohio State Univ., Columbus.
MEASUREMENT OF COMPLIANCE AND RESISTANCE OF THE LUNGS AND THORAX BY THE USE OF EXPIRATORY FLOW-VOLUME CURVES Technical Report, Jul. 1963-Jun. 1965
William Raymond Carpentier (M.S. Thesis) Wright-Patterson AFB, Ohio, AMRL, Apr. 1966 39 p refs
(Contract AF 33(657)-11698)
(AMRL-TR-66-12; AD-638745) CFSTI: HC $2.00/MF $0.75

Compliance and resistance of the lungs and thorax system were measured in five healthy subjects by a method using relaxed expiratory flow-volume curves. Determinations were made during normal shirt-sleeve conditions and with the subjects suited in ventilated full pressure suits and in anti-G suits inflated to 3 psi. Vital capacity, inspiratory capacity and expiratory reserve volume were also measured under the three conditions. A significant correlation was found between the volume of air inspired above Functional Residual Capacity (FRC) expressed as percentage of normal vital capacity and peak flow reached under normal conditions. No significant correlation was found between the volume of air inspired above FRC and the slope of the V – V curve. Vital capacity and expiratory reserve volume were reduced when the subjects were in pressure suits and anti-G suits, but there was no significant change in inspiratory capacity. A reduction in FRC is implied Author (TAB)

N67-11008# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
TOXICOLOGICAL EVALUATION OF MATERIALS ASSOCIATED WITH SPACECRAFT
Kenneth C. Back Jun. 1966 13 p refs Presented at the AIAA/ASME 7th Struct. and Mater. Conf., Cocoa Beach, Fla., Apr. 1966
(AMRL-TR-66-69; AD-639060) CFSTI: HC $1.00/MF $0.50

The Air Force has pursued research in areas of ground support and space cabin toxicology for the past 5 years. Comprehensive treatment of toxicological problems in both areas has revealed the necessity to define human tolerance limits to propellants and other toxic materials for various durations of exposure. Hence, an integrated input of propellant and space cabin material toxicology provides the basis for selection of habitable cabin atmospheres and materials selection criteria. Since such selection procedures are based on both biological and engineering considerations, one cannot disregard the materials selection aspect or evaluate closed system toxicology without consideration of source. The toxic materials in space system atmospheres are determined primarily by the qualitative and quantitative composition of space cabin equipment and the contribution of contaminants by the crew. Materials selection and analytical studies on gas-off products are key considerations in controlling toxic contaminants in a space cabin. Methods are described to determine the composition of cabin materials gas-off products and to biologically test these compounds for their toxicological effects. An attempt is made to correlate the roles of the materials analytical chemist and the toxicologist as a working team to provide meaningful and useful materials selection criteria Author (TAB)

N67-11017# Naval School of Aviation Medicine, Pensacola, Fla. Naval Aerospace Medical Inst.
STUDIES ON THE RESPONSE TO ACUTE ALTITUDE EXPOSURE WITH SPECIAL REFERENCE TO THE POSSIBILITY OF EARLY DETECTION OF HIGH ALTITUDE PULMONARY EDEMA
Hugh S. Pratt, E. Peter Beck, Le Roy S. Wirthlin, and Ashton Graybiel May 1966 35 p refs
(NAMI-964; AD-639467) CFSTI: HC $2.00/MF $0.50

The pathogenesis of acute pulmonary edema of high altitude remains unknown. The present study was designed to evaluate the baseline and acute cardiorespiratory acclimation data of a group of young males selected to construct and maintain a scientific station on the Antarctic Plateau (pressure altitude 13,500 feet). Should serious altitude sickness or pulmonary edema develop in any of these subjects, it might be possible to determine which investigations, if any, could be used to screen potentially susceptible subjects and to identify avenues for more extensive studies. The baseline studies revealed the subjects to be in good health. The acute cardiorespiratory changes, both in the altitude chamber at 14,000 feet after 36 hours and following return to sea level, were similar to those described by other authors. No evidence of overt or insipient pulmonary edema was detected. However, there was an unexpectedly high incidence of protracted nausea and vomiting, necessitating the removal of two of the subjects from the chamber Author (TAB)

N67-11019# Marine Engineering Lab., Annapolis, Md.
FUNDAMENTALS OF AIR PURIFICATION
W. R. Calvert Aug. 1966 17 p refs Presented at the Symp. on Safety in Air Separation and Ammonia, Pt. 1, 60th Natl. Meeting, Atlantic City, 18-21 Sep. 1966
(MEL-364/66; AD-639582) CFSTI: HC $1.00/MF $0.50

The paper describes phenomena occurring during employment of adsorbents and oxidation catalysts in air purification. (Author) TAB

N67-11035# Naval Air Development Center, Johnsville, Pa.
EXPERIMENTAL RESULTS OF A SIMULATED FLIGHT TEST USING VARIOUS CONTACT ANALOG TEXTURE FORMATS Final Report
Vincent E. Lafranchi 2 Aug. 1966 35 p
(NADC-AM-6645; AD-638794) CFSTI: HC $2.00/MF $0.50

The experiment was performed to investigate whether synthetic ground and sky textures, displayed on a contact analog display, affect the ability of the pilot to follow command symbols presented to him during flight. Ninety-six laboratory simulated flights were flown and errors from prescribed path were recorded on magnetic tape. The data was reduced by a CDC 3200 computer and an analysis of variance was performed. The analysis indicated that no

significant changes in errors occurred for the four combinations of ground and sky textures displayed Author (TAB)

N67-11042# School of Aerospace Medicine, Brooks AFB, Tex.
AN EXPLORATORY STUDY OF FACTORS AFFECTING AIRCREW MORALE
Bryce O. Hartman, George K. Cantrell, and Lewis S. Sims Jul. 1966 13 p refs
(SAM-TR-66-62; AD-639141) CFSTI: HC $1.00/MF $0.50

Aircrew morale was studied in 176 MAC aircrewmen. In interviews and questionnaires, nine problem areas were identified. The primary problem reported by the aircrewmen was lack of planned free time. This factor had a negative effect both on duty and off duty. The remaining eight factors were more specific to the working environment. Several were a function of the mission of the command but some were accessible to local modification. In the face of these problems, aircrewmen maintained good motivation, probably because of the satisfactions obtained from flying and from other aspects of their Air Force careers Author (TAB)

N67-11059# Wisconsin Univ., Madison.
ISOLATION, NUTRITION AND METABOLISM OF PHOTOSYNTHESIZING PLANT TISSUE Final Technical Report
A. C. Hildebrandt Army Natick Labs., Mass., Aug. 1966 36 p refs (Contract DA-19-129-QM-1817(N))
(FD-52; TR-67-12-FD; AD-637848) CFSTI: HC $2.00/MF $0.50

There appears a great potential in tissue cultures of higher plants as a means of producing an abundant supply of fresh, edible, tasty, nutritious plant food for gas exchange in difficult situations and in space travel. Chlorophyllous and nonchlorophyllous strains of edible plant tissues have already been established from many plant species. The requirements for growth and chlorophyll production are influenced by the composition of the medium on which they are grown and by other environmental factors, including light, temperature and acidity of the medium. Nitrate is an excellent source of nitrogen. Tissues grown in liquid media on a shaker or in aerated media tend to fragment into single cells and small clumps of cells. Tissues on agar media may be grown as undifferentiated masses of cells or may be induced to differentiate roots, stems, leaves and plants by modifying the nutrient and other environments. Under space conditions the chlorophyllous tissues would have unlimited sunlight as energy for photosynthesis, would utilize carbon dioxide, and would produce oxygen in the process of synthesizing carbohydrate for food. Such abilities for growth and differentiation as a single cell or as tissue masses and even plants suggest this method has a great built-in potential to select for almost any type of food quality desired Author (TAB)

N67-11060# Bio-Dynamics, Inc., Cambridge, Mass.
DESIGN AND USE OF INFORMATION SYSTEMS FOR AUTOMATED ON-THE-JOB TRAINING. II: DESIGN OF SELF-INSTRUCTIONAL FEATURES
Thomas B. Sheridan, Benjamin C. Duggar, and Sylvia R. Mayer Jan. 1964 35 p refs
(Contract AF 19(628)-455)
(ESD-TDR-64-234; AD-602042) CFSTI: $1.00

The report is concerned with human engineering factors in the design of information systems. In particular it is addressed to the design of self-instructional features for these systems. It describes theories, methodology, and design principles for implementation of self-instructional features. The design principles were induced from the exploratory research on laboratory models of information systems which is reported in Volume I of this series (AD-602 041), from studies on current information systems, and from a literature review. The operational concepts underlying the study are stated, and an equipment design philosophy is proposed to complement this operational concept. Author (TAB)

N67-11074# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EFFECT OF ASCORBIC ACID ON THE ACTIVITY OF SALIVARY AND INTESTINAL GLANDS IN CONDITIONS OF ANOXIA
S. I. Filippovich 18 Apr. 1966 11 p refs Transl. into ENGLISH from Byull. Eksptl. Biol. i Med. (Moscow), no. 8, 1948 p 99–102
(FTD-TT-65-1646; TT-66-62238; AD-638899) CFSTI: HC $1.00/MF $0.50

Translation of Russian research: effect of ascorbic acid on the activity of salivary and intestinal glands in conditions of anoxia. TAB

N67-11096# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON THE ROLE OF DIATOMIC AND PERIDYN ALGAES IN SELF PURIFICATION OF SEA WATERS
N. N. Alfimov 17 Jun. 1966 14 p refs Transl. into ENGLISH from Botan. Zh. (Leningrad), v. 44, no. 6, 1959 p 868–872
(FTD-TT-65-1906; TT-66-62353; AD-639491) CFSTI: HC $1.00/MF $0.50

It was found that the Black Sea microscopic algae Prorocentrum micans, Gymnodinium najadeum and Thalassionema nitzschoides which are wide-spread in the plankton, considerably accelerated the destruction of Escherichia coli and Staphylococcus aureus in sea water, thus they promote auto-purification. At the same time, bethic forms of diatomic algae of the Black Sea–Actinocyclus ehrenbergi and Nitzschia closterium–do not produce an essential effect on the rate of necrosis of Escherichia coli and aurous Staphylococcus in sea water. Accumulations of substances, promoting the destruction of Escherichia coli, do not take place in the sea. These substances apparently, are continuously separated by algae in the process of their activity and are rapidly destroyed. Author (TAB)

N67-11097# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
COMPLEX METHOD OF STUDYING THE FUNCTIONS OF MAN'S TASTE ANALYZER
A. I. Vasil'yev 17 Jun. 1966 20 p refs Transl. into ENGLISH Tr. Inst. Fiziol. Akad. Nauk SSSR (Moscow), no. 6, 1957 p 172–182
(FTD-TT-65-1915; TT-66-62331; AD-639426) CFSTI: HC $1.00/MF $0.50

Translation of Russian research: complex method of studying the functions of man's taste analyzer. TAB

N67-11075# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EFFECT OF VITAMIN B_1 ON THE ACTIVITY OF SALIVARY AND INTESTINAL GLANDS IN ANOXIA CONDITIONS
S. I. Filippovich 25 Apr. 1966 p ref Transl. into ENGLISH from Byull. Eksptl. Biol. i Med. (Moscow), no. 11, 1948 p 387–389
(FTD-TT-65-1647; TT-66-62229; AD-638879) CFSTI: HC $1.00/MF $0.50

Translation of Russian research: effect of vitamin B_1 on the activity of salivary and intestinal glands in anoxia conditions. TAB

N67-11109*# Mississippi State Univ., State College. Dept. of Microbiology.
INFLUENCE OF METABOLIC ACCUMULATION OF PRODUCTS OF HYDROGENOMONAS CELLS ON THEIR CONTINUED GROWTH Progress Report, 1 May–31 Oct. 1966
Robert G. Tischer 31 Oct. 1966 11 p refs
(Grant NsG-650)
(NASA-CR-79832; PR-5) CFSTI: HC $1.00/MF $0.50 CSCL 06M

Fructose was found to be the only sugar that could be metabolized by *Hydrogenomonas eutropha*, although no fructose was detected in a spent medium. Other sugars, which were identified by paper chromatography could not be oxidized by either autotrophically or heterotrophically grown cells; nor could these sugars support the growth of the organism. Mutation studies have revealed auxotrophic mutants which produce polysaccharides; and the isolation of these polysaccharide-producing hydrogen-utilizing microorganisms is discussed. Large batch culture apparatus studies are reported. M.W.R.

N67-11111# Joint Publications Research Service, Washington, D. C.

NITROGEN METABOLISM IN THE BRAIN OF RATS SUBJECTED TO THE ACTION OF IMPULSE ACCELERATIONS

Z. S. Gershenovich, A. Z. Gershenovich, L. A. Odnokrylaya, E. Z. Emirbekov, and Ya. I. Veksler 28 Oct. 1966 7 p refs Transl. into ENGLISH from Vopr. Med. Khim. (Moscow), v. 22, no. 3, May-Jun. 1966 p 262-264

(JPRS-38380; TT-66-34806) CFSTI: $1.00

Impulse acceleration of between 4 and 10 g resulted in increased concentrations of ammonia in the brains of rats that were placed in a hermetically sealed chamber and subjected to explosion waves of 250 to 300 m/sec^2. There was a decrease in glutamine, while glutamic acid content remained at about the same level. There was even greater liberation of ammonia at impulse accelerations of between 10 and 24 g; labile amido groups showed a decrease of 35.7%. Other experiments at the higher acceleration were conducted on 10 rats; three of these perished and the rest remained in a grave state. Ammonia content increased markedly; glutamine decreased considerably; and labile amido groups decreased by 44.1%, while firmly bound groups decreased by 22.5% M.W.R.

N67-11125# Joint Publications Research Service, Washington, D. C.

DETERMINATION OF PHYSICAL PARAMETERS OF VIRAL AEROSOLS

A. I. Gromyko, A. I. Danilov, and G. Ya. Vlasenko 17 Oct. 1966 8 p refs Transl. into ENGLISH from Zh. Mikrobiol. Epidemiol. i Immunobiol. (Moscow), no. 7, 1966 p 94-97

(JPRS-38174; TT-66-34601) CFSTI: $1.00

An investigation of the condition of the aerosol cloud in an IVK-2 chamber and the significance of changes observed for the dosimetry of aerosol infection in animals is reported. Determinations were made of the concentration of dispersed substances in an aerosol state, along with correlations between the changes in this concentration and the time of animals' contact with the viral aerosol. Determinations were also made of the fractional composition of aerosols, and the quantity of aerosol passing through the lungs of animals. C.T.C.

N67-11126# Joint Publications Research Service, Washington, D. C.

DETERMINATION OF THE ANTICHOLINESTERASE ACTIVITY OF ORGANOPHOSPHORUS INHIBITORS

A. P. Brestkin, I. L. Brik, and A. A. Sagal 28 Oct. 1966 7 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 167, no. 4-6, 1966 p 1831-1834

(JPRS-38381; TT-66-34807) CFSTI: $1.00

Chemical kinetic equations regarding the inhibition of the enzymatic hydrolysis of acetylcholine by organophosphorus inhibitors, are derived. The effects of changes in the active concentration of the enzyme and enzyme inhibitor and of the incubation time on the hydrolysis rate, are considered, and data are given. Calculations indicate that the phosphorilation rate constant $k_6 = 0.241\ min^{-1}$ is of the same order of magnitude as the alkaline hydrolysis rate constant $k_h = 0.141$/mole min found experimentally. The rate constant k_5 in the calculations is more than twice as large as that of $k_{II,O}$; and thus the enzyme becomes almost completely tied up by the inhibitor in the form of an intermediate complex in a very short time. This assures a fast rate of enzyme phosphorilation. L.S.

N67-11154# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

TOXIC EFFECT OF HIGH OXYGEN PRESSURES ON THE ANIMAL ORGANISM

S. I. Prikladovitskiy 11 Aug. 1966 23 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 20, no. 3, 1936 p 507-517

(FTD-TT-65-1983; TT-66-61416; AD-639339) CFSTI: HC $1.00/MF $0.50

A high oxygen partial pressure has various effects on young white mice depending upon their age. The intraperitoneal, subcutaneous and intracapital introduction of wormtree essence in adult white mice causes the appearance of spasma analogous to the ones which are detected during intravenal injection of the preparatus into dogs. The 'threshold' dosage of wormtree amounts for adult white mice is 0.025 g per 100 g of animal weight. Young white mice react to intraperitobal injection of wormtree differently, depending upon age. An intraperitonael introduction of strychnine solution (1:2000) in white mice causes accidents of typical 'strychnine' pains. Three age brackets for the irritation of the cortex by electrical and chemical irritants can be established in white mice. In totality these results confirm the assumption that spasma, which appear in warm blooded animals under the effect of high partial oxygen pressures, are the result of an irritation in the cerebral cortex. Author (TAB)

N67-11167# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

FOODS FOR COSMONAUTS

15 Jun. 1966 4 p Transl. into ENGLISH from Sov. Estoniya (USSR), 14 Nov. 1964 p 4

(FTD-HT-66-225; TT-66-62355; AD-639494) CFSTI: HC $1.00/MF $0.50

Translation of Russian article: Foods for Cosmonauts. TAB

N67-11176# IIT Research Inst., Chicago, Ill.

DEVELOPMENT OF EDIBLE MOUTH COOLANTS Final Report

Richard W. Sroges Natick, Mass., Army Natick Labs., Jun. 1966 26 p

(Contract DA-19-129-AMC-96(N))

(FD-61; TR-66-53-FD; AD-638427) CFSTI: HC $2.00/MF $0.50

The report covers investigations relative to the selection and evaluation of edible substances that could alleviate the oral discomfort associated with thirst. A discussion is also made relative to the rationale of tests that utilize animals to screen substances for thirst-alleviating properties, screening tests that were evaluated, and description of the procedure used in experiments in which human taste panels were utilized to evaluate four substances that appeared to be effective in preliminary tests. Results of the taste panel experiments are also reported. (Author) TAB

N67-11183# Lockheed-Georgia Co., Marietta.

USE OF THE EXPERIMENTAL METHOD FOR EVALUATIONS OF PERFORMANCE IN MULTI-MAN SYSTEMS

George E. Passey, Earl A. Alluisi, and W. Dean Chiles (AMRL) Wright-Patterson AFB, Ohio, AMRL, Aug. 1966 28 p refs Presented at 7th Ann. Meeting of The Human Factors Soc., Palo Alto, Calif. 23-25 Oct. 1963. Prepared in cooperation with AMRL Previously published as AMRL Memo P-67

(Contract AF 33(657)-10506)

(AMRL-TR-66-121; P-67; AD-638183) CFSTI: HC $2.00/MF $0.50

The report discusses the use of the experimental method as a technique for arriving at solutions to human factors engineering problems encountered in the design of multi-man systems. Of specific concern are the methodological decisions that must be made in the design of the research. Factors that are likely to influence these decisions are considered as well as the implications of these decisions with respect to the validity and generality of the data thus obtained. These various decision points are illustrated through use of data on group performance during long-term confinement Author (TAB)

N67-11262# **Director of Engineering and Industrial Services, Edgewood Arsenal, Md. Biophysics Lab.**

MORPHOLOGICAL AND BIOCHEMICAL EFFECTS OF CLOSTRIDIUM PERFRINGENS ALPHA TOXIN ON INTACT AND ISOLATED SKELETAL-MUSCLE MITOCHONDRIA Technical Report, Aug. 1965–Apr. 1966

I. William Grossman, Dale H. Heitkamp, and Bertram Sacktor Sep. 1966 19 p refs

(EATR-4028; AD-638788) CFSTI: HC $1.00/MF $0.50

Electron-dense deposits were observed in skeletal-muscle mitochondria exposed in vivo and in vitro to a partially purified Clostridium perfringens alpha toxin. Depressed oxidative functions in the toxin-exposed, isolated mitochondria were concomitant with the electron-dense deposits. The mitochondria are suggested as the cellular site of action of the alpha toxin Author (TAB)

N67-11290# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

IMPORTANCE OF ORTHOSTATIC DISTURBANCES IN RABBITS SUBJECTED TO TOTAL X-RAY RADIATION

P. V. Sipovskiy and L. V. Funshteyn 28 Apr. 1965 6 p Transl. into ENGLISH from Med. Radiol. (Moscow), v. 4, no. 3, 1959 p 80–81

(FTD-TT-65-53; TT-65-62271; AD-615283) CFSTI: HC $1.00/MF $0.50

In a definite combination the effects of radiation and orthostatic disturbance of the blood circulation are capable of mutally reinforcing the biological effect of each of these factors and bringing about the early occurrence of death. The load on the cardiovascular system from the orthostatic position, in addition to the action of the radiation, leads to its functional incapacitance with untimely and even unexpected death of radiated rabbits for which sublethal doses of radiation take on the significance of fatal doses which act so lethally that death sets in after 3 and 1/2 hours post-radiation. Author

N67-11342*# General Dynamics Corp., San Diego, Calif.

LIFE SUPPORT SYSTEM FOR SPACE FLIGHTS OF EXTENDED TIME PERIODS

R. C. Armstrong Washington, NASA, Nov. 1966 587 p refs (Contract NAS1-2934)

(NASA-CR-614) CFSTI: HC $6.25/MF $2.50 CSCL 06K

The prototype physical-chemical life support system is described which provides reclamation and reuse of water and oxygen for a four-man crew and which maintains a safe, comfortable atmosphere in a simulated spacecraft cabin. Details are presented on the subsystems, the tradeoff techniques, the test procedures, and the analyses. The overall system, subsystem, and procurement specifications are given, and the subsystems are evaluated. It was concluded that the life support system was operationally demonstrated. N.E.N.

N67-11391*# National Aeronautics and Space Administration, Washington, D. C.

AEROSPACE MEDICINE AND BIOLOGY A Continuing Bibliography with Indexes

Oct. 1966 232 p refs

(NASA-SP-7011(29)) CFSTI: HC $1.00/MF $1.25 CSCL 06S

A continuing bibliography related to the physiological, psychological, and environmental effects of interplanetary space and the earth's atmosphere on man is presented. References describing similar effects on biological organisms of lower order are also included. The abstracted material contains such topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors. In general, emphasis is placed on applied research, however, fundamental studies and theoretical principles are included. S.P.

N67-11400*# California Univ., Berkeley.

MOLECULES AND EVOLUTION

Thomas H. Jukes N. Y., Columbia Univ. Press, 1966 293 p refs

(Grant NsG-479)

(NASA-CR-79389) CFSTI: HC $6.00/MF $1.50 CSCL 06A

Some of the research dealing with biochemical reactions that are responsible for the structure, function, and survival of living organisms and that have a bearing on evolution are reviewed. Emphasis is placed on the concept that the number and sequence of chemical bases in molecules of DNA are a cryptogrammic record of the evolutionary history of each species. It is felt that the solution to the cryptogram comes from the study of proteins and the genetic code. The chemical nature of mutations, base sequences in the genetic code, mechanism of protein synthesis, and gene duplication are discussed in detail. L.E.W.

N67-11401# Joint Publications Research Service, Washington, D. C.

PROBLEMS IN AEROSPACE MEDICINE

V. V. Parin, ed. 21 Oct. 1966 816 p Transl. into ENGLISH of the book "Problemy Kosmicheskoy Meditsiny: Materialy Konferentsii 24–27 Maya 1966" Moscow, 1966 p 3–414

(JPRS-38272; TT-66-34698) CFSTI: $8.40

Articles on experimental investigations of certain biological, physiological, and psychological problems related to aviation and space flight environments are presented. For individual titles see N67-11402–N67-11677

N67-11402# Joint Publications Research Service, Washington, D. C.

DATA ON THE FOOD VALUE OF CERTAIN BIOCOMPONENTS OF SYSTEMS OF LIFE SUPPORT

I. A. Abakumova, L. K. Vasilenko, A. N. Kozlova, Yu. I. Kondrat'yev, and A. S. Ushakov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 6 (See N67-11401 02-04) CFSTI: $8.40

Preliminary data were obtained on the food value of yeast, mycobacteria, and unicellular algae in dietary experiments with rats. Pathological-anatomical autopsies of the animals after about one month of supervised deficiency feeding showed that the animals perished due to substantial exhaustion and emaciation. The average length of life for animals fed only biological masses of unicellular algae as protein source averaged 5.5 months; in the case of feeding with pure biological mass the average length of life was about one month. G.G.

N67-11403# Joint Publications Research Service, Washington, D. C.

THE SENSITIVITY OF POTATO SEEDS TO PROTON AND GAMMA RADIATION

V. M. Abramova, D. F. Gertsuskiy, L. V. Alekseyenko, L. V. Nevzgodina, and S. A. Popkova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 7–8 (See N67-11401 02-04) CFSTI: $8.40

Biological action of protons and gamma rays on potato seeds at a dose strength of 84 rad-sec and a dose range of 500 to 50,000 rad, respectively, showed considerably more radiation resistance than tubers possessed. Ionizing radiation caused changes in growth and development of potato seedlings with the protons having a greater retarding effect than the gamma raysj The 100%

lethal dose for proton irradiated seeds was slightly more than 30,000 rads; for gamma rays this dosage exceeded 50,000 rads. G.G.

N67-11404# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF RAPIDLY INCREASING HYPOXIA ON THE HUMAN ORGANISM

N. A. Agadzhanyan, I. R. Kalinichenko, A. G. Kuznetsov, I. I. Lepikhova, G. A. Nikulina et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 9–10 (See N67-11401 02-04) CFSTI: $8.40

Resistance time of humans to rapidly increasing hypoxia was studied by spirographic measurements of return respiration. Results on 28 test subjects showed expressive changes of physiological functions terminating in a loss of consciousness upon failure to provide oxygen in time. Subjects displayed cyanosis of the skin surface and mucous membranes, dyspnea, somnolence, disturbance of handwriting, tremors, and sometimes muscle spasms of the hand. Several individuals also complained of breathing difficulty, dizziness, darkening of the eyes, fever, headache, etc. Conditioned motor reaction effects showed increased time prolongation in problem solving and movement coordination. EEG changes displayed some suppression of alpha rhythm in the first phase and slow waves in the third phase. Heart contractions increased in frequency and showed flattened R and T waves in ECG patterns. Peripheral blood contained increased erythrocytes and oxycorticosteriods. G.G.

N67-11405# Joint Publications Research Service, Washington, D. C.

THE EXPERIMENTAL INVESTIGATION OF THE POSSIBILITY OF CULTIVATING HIGHER PLANTS ON A CULTURE MEDIUM FROM A BIOLOGICAL MINERALIZER IN THE CASE OF CLOSED GAS EXCHANGE

A. L. Agre, N. T. Nilovskaya, S. I. Tsitovich, M. M. Bokovaya, V. F. Varlamov et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 11–12 (See N67-11401 02-04) CFSTI: $8.40

Syntheses of organic compounds from inorganic compounds by photosynthesis of higher plants and biochemical oxidation of an urinary-fecal mixture were studied in an assimilation chamber and aerotank system. Observed gas exchange between higher plants and biocynosis of microorganisms-mineralizers confirmed the possibility of utilizing a mineralized urinary-fecal liquid as nutrient medium for higher plants. G.G.

N67-11406# Joint Publications Research Service, Washington, D. C.

THE PROBLEM OF THE POSSIBILITY OF THE MINERALIZATION OF WATER-FECAL MIXTURES BY THE METHOD OF WET BURNING

A. L. Agre, V. M. Ivanov, and V. N. Trukhachev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 13–14 (See N67-11401 02-04) CFSTI: $8.40

Mineralization of urinary-fecal mixtures was studied under increased temperatures and pressures. Optimum conditions of a 275° temperature and a pressure of 120 to 130 atmospheres for two hours duration resulted in 90–93% mineralization of an urinary-fecal mixture. The gaseous phase that formed as a result of the mineralization of the mixture consisted mainly of carbon dioxide, residual oxygen, and nitrogen. G.G.

N67-11407# Joint Publications Research Service, Washington, D. C.

REDISTRIBUTION OF THE NUMBER OF ERYTHROCYTES UPON A LOWERING OF THE ATMOSPHERIC PRESSURE

A. M. Adler *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 15–16 (See N67-11401 02-04) CFSTI: $8.40

The influence of lowered atmospheric pressure on the blood erythrocyte content of white mice was studied at altitudes of 3500 to 7000 meters. It was found that the original reduction of erythrocyte numbers at a rarefaction corresponding to 3500–5000 meters increased after two days, and an original reduction of 5500 to 7000 meters increased after one day in all animals. G.G.

N67-11408# Joint Publications Research Service, Washington, D. C.

ANALYSIS OF THE RESULTS OF MEASUREMENTS OF DOSES OF COSMIC RADIATION IN NEAR-EARTH SPACE

Yu. A. Akatov, Ye. Ye. Kovalev, V. M. Petrov, S. J. Skvortsov, and L. N. Smirennyy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 17 (See N67-11401 02-04) CFSTI: $8.40

Cosmic radiation measurements at 200–400 km altitudes on different thicknesses of polyethylene were made by thermoluminescent dosimeters and photoemulsions. Results established a cosmic radiation dose of about 16 to 20 millirad per day; the dosage changed slightly with an increase in protective thickness. G.G.

N67-11409# Joint Publications Research Service, Washington, D. C.

INVESTIGATION OF ELECTROPHYSIOLOGICAL AND PSYCHOPHYSIOLOGICAL INDICES UNDER CONDITIONS OF PARTIAL ISOLATION AND HYPODYNAMIA

I. T. Akulinichev, A. Ye. Baykov, E. V. Bondarev, G. I. Gurvich, V. A. Yegorov et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 18–19 (See N67-11401 02-04) CFSTI: $8.40

Psychophysiological and electrophysiological studies on two human subjects during a seven day period of isolation and adynamia were reported. Observed were functions of attention and memory, reflex to time, throughput capacity of the visual analyzer, and the time of a simple motor reaction and a selection reaction from two alternatives; readings of ECG, EEG, and EMG, and other physiological functions were also taken. During the course of the entire experiment, no deviations from the physiological norms of electrophysiological indices were detected; some slight shifts primarily in the neuro-emotional and psychic spheres were observed but found of little consequence. G.G.

N67-11410# Joint Publications Research Service, Washington, D. C.

SOME DATA FROM THE ELECTROPHYSIOLOGICAL INVESTIGATIONS OF THE CREW OF THE VOSKHOD-2 SPACE SHIP DURING ITS SPACE FLIGHT

I. T. Akulinichev, A. Ye. Baykov, P. V. Vasil'yev, I. I. Kas'yan, D. G. Maksimov et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 20–21 (See N67-11401 02-04) CFSTI: $8.40

Electrocardiogram, pneumogram, seismocardiogram, electro-oculogram, and body temperature measurements on two cosmonauts during an 18 orbit space flight are reported. During the third orbit, the cosmonauts' initially increased heart beat and respiration rate returned to normal, but some slowing of the pulse and respiration rate was observed on the seventh orbit. Average values of the ECG Q-T and R-R intervals in both cosmonauts corresponded to the changes in heart beat. Dynamic electrooculogram recordings were in accordance with pulse and respiration rate changes; during the entire course of the flight the eye movements of both astronauts were found sufficiently symmetrical. G.G.

N67-11411# Joint Publications Research Service, Washington, D. C.

IONIZATION OF THE AIR AS ONE OF THE FACTORS OF SPACE FLIGHT

S. P. Aleksandryuk, B. V. Anisimov, N. N. Komarov, Yu. G. Nefedov, A. N. Potapov et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 22–23 (See N67-11401 02-04) CFSTI: $8.40

The biological effects of aeroionization in a space cabin were studied by luminescent analysis, mass spectrometry, and

paramagnetic resonance as well as by changes in blood pictures of experimental animals. Even single session aeroionization caused changes in the resistance of erythrocytes of the peripheral blood to osmotic hemolysis, a change of adsorption properties with respect to vital stains, shifts in the metabolism of a series of physiologically active substances, a change in the ionic penetrability of the skin, and an increase in the mytotic activity of tissue. It was concluded that the brief action of radiation induced aeroions in a space cabin atmosphere is important for the human organism. G.G.

N67-11412# Joint Publications Research Service, Washington, D. C.

NEW DATA ON THE PROBLEM OF SPECIAL FUNCTIONAL DIAGNOSIS

V. N. Alifanov, V. P. Yerokhin, V. M. Kozin, G. L. Komendantov, L. M. Lemesheva et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 24–25 (See N67-11401 02-04) CFSTI: $8.40

The functioning of the cardiovascular system, respiration, acoustical analyzer, and the equilibrium and spatial orientation apparatus were studied under special loads imitating conditions of flight activity as well as under actual flight conditions. Healthy human subjects showed a quickening of cardiac activity and increased systolic and pulse pressure at an altitude of 5000 meters; fliers with arteriosclerotic cardiosclerosis had a pathological displacement of the S-T interval with inversion of the T wave in the four ECG chest LEADS' Functional shifts in pilots reached considerable magnitudes under flight conditions of considerable strain. Special functional diagnostic models for investigations of latent vestibular disturbances in animals were used to obtain the compensation stability according to EMG indices and the appearance of the Flourens phenomena in chest-back and back–chest loads. G.G.

N67-11413# Joint Publications Research Service, Washington, D. C.

CHANGE OF PRECORDIAL VECTORELECTROCARDIOGRAMS UNDER CONDITIONS OF HYPOXIA IN FLIGHT PERSONNEL WITH INITIAL SYMPTOMS OF HYPERTENSION AND ATHEROSCLEROSIS

V. N. Alifanov and Ye. I. Kuznetsova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 26–27 (See N67-11401 02-04) CFSTI: $8.40

Discussed is the precordial vector electrocardiogram reaction of healthy and hypertonic flight personnel during 30 minute exposure to an hypoxic atmosphere of 5000 meters. All test subjects before "ascent" showed a predominance of the direction of the QRS vector to the left, up, and to the rear; this QRS orientation was generally preserved in all healthy persons under hypoxic conditions. Persons with beginning forms of hypertonic sickness produced a first plane displacement of the QRS vector to the right by about 5°, and in the second and fourth planes to the left by 10 and 5°, respectively. Persons with symptoms of hypertonic sickness in combination with arteriosclerosis showed slight displacements of the QRS vector to the right in the first, second, and fourth planes. The initial magnitude of the maximum QRS vector decreased in all persons exposed to hypoxia. G.G.

N67-11414# Joint Publications Research Service, Washington, D. C.

A QUANTITATIVE ESTIMATE OF CHANGES OF THE LATENT PERIOD OF CONDITIONED MOTOR REFLEXES DEPENDING ON THE NUMBER OF APPLIED STIMULI AND THE INTERVALS BETWEEN THEM

G. V. Altukhov, A. D. Yegorov, A. P. Polyakova, I. B. Svistunov, and S. A. Skuratova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 28–29 (See N67-11401 02-04) CFSTI: $8.40

An "emotion" unit was used to study the latent period duration in the conditioned reflex action of man under consecutive application of various light and sound stimuli, both with the same and with different probabilities after time intervals of 0.5, 2.5, 5.0, and 10.0 seconds. Results of 320 tests on 12 test subjects established that increased numbers of applied stimuli also increased the duration of the latent period in all probability combinations. A lesser duration of the latent period was found for shorter intervals between applied stimuli. G.G.

N67-11415# Joint Publications Research Service, Washington, D. C.

THE COLLISION OF CONCEPTS AND IMAGES OF PERCEPTION AS A CAUSE OF EMERGENCY SITUATIONS IN FLIGHT

B. S. Alyakrinskiy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 30 (See N67-11401 02-04) CFSTI: $8.40

The complex visual-motor-vestibular-tactile act connected with reading of piloting and navigational instruments was analyzed experimentally. It was shown that an artificially created collision of a concept and a perceived image can cause an abrupt disturbance of the coordinated activity with respect to spatial position control of the test object. The coordinated motor acts of the individual became jerky and chaotic and parts of them were not completed. G.G.

N67-11416# Joint Publications Research Service, Washington, D. C.

THE ABSORPTION OF GLUCOSE FROM THE SMALL INTESTINE IN VARIOUS GASEOUS MEDIA

N. Sh. Amirov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 31–33 (See N67-11401 02-04) CFSTI: $8.40

Sugar content and lactic acid in the blood and the wall of rat intestine during the process of glucose absorption from its lumen were studied under hypercapnic and hypoxic environmental conditions. To determine the sugar and lactic acid of the blood before and 30 minutes after glucose introduction into the lumen of the intestine, narcotized rats were placed in a chamber of a fixed gaseous environment after a small portion of their normal jejunum was removed. Comparison of data obtained under hypercapnic and hypoxic conditions showed that the stronger hyperventilation under hypercapnic conditions provided for the burning of absorbed glucose to the final products. Under hypoxic conditions, some partial glycolysis of the absorbed glucose in the organism and subsequent formation of lactic acid seemed likely. G.G.

N67-11417# Joint Publications Research Service, Washington, D. C.

THE CHANGE OF THE NEUROSECRETORY ACTIVITY OF THE HYPOTHALAMIC REGION UNDER THE ACTION OF SOME EXTREME FACTORS OF SPACE FLIGHT

L. A. Andrianova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 34–35 (See N67-11401 02-04) CFSTI: $8.40

Histochemical analyses on neurosecretory materials in the cells of the supraoptic and paraventricular hypothalamus nuclei of male rabbits, exposed to an acceleration of 10 g for four minutes or to a total gamma radiation dose of 400 roentgens, indicated a change of neurosecretory processes in the nuclei of the hypothalamic region. After acceleration for 10 to 15 minutes, and animals displayed antidiuretic activity of the blood plasma. Irradiated animals showed an accumulation of neurosecretion in the neurons of the supraoptical and paraventricular nuclei and intensified antidiuretic and oxytotic activity in hypothalumus extracts 3 hours after radiation exposure. Author

N67-11418# Joint Publications Research Service, Washington, D. C.

NEW DATA ON THE CHANGE OF THE REACTIVITY OF THE BODY UNDER THE INFLUENCE OF CERTAIN FACTORS OF SPACE FLIGHT

V. V. Antipov, V. A. Kozlov, B. I. Davydov, N. N. Dobrov, B. L. Razgovorov et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 36 (See N67-11401 02-04) CFSTI: $8.40

The effects of vibration, acceleration, and ionizing radiation factors on the function of animal organisms were studied by pharmacological and physical loads. The use of cystamine before exposure to vibration at 70 cycles for one hour, with a load of 10 grams, curtailed the duration of swimming by the animals. Sensitivity of the animals to the toxic action of cystamine and strychnine increased somewhat under the influence of vibration. Reactivity changes of centrifuged animals to physical loads correlated with ceruloplasmin shifts in their blood. 40 days after proton irradiation at 120 mev, from 700 to 1770 rad, the resistance of the animals to physical loads was reduced. Preliminary centrifuging before irradiation slightly increased the radioactive resistance of all animals. G.G.

N67-11419# Joint Publications Research Service, Washington, D. C.

THE THERMOREGULATING FUNCTION OF THE CENTRAL NERVOUS SYSTEM UPON THE ACTION OF HYPOXEMIA AND HYPEROXEMIA

I. I. Antonov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 37-38 (See N67-11401 02-04) CFSTI: $8.40

Decorticized and decerebrated animals were studied for their thermoregulatory functions at various partial oxygen pressures and external temperatures. Tests showed that decortication increased the resistance of an animal organism to a high partial oxygen pressure of 5 atmospheres and to the low partial pressure of an 8000 meter altitude by about four times in comparison with intact animals; also observed was a considerable effect on speed and magnitude of temperature reduction in the investigated organs and tissues. The same temperature drop was also noted in decerebrated animals; however, the change of partial oxygen pressure somewhat increased the speed of the drop in temperature and thus confirmed the complete disrupting disability of decerebrated animals to regulate their body temperature under changed partial oxygen pressure. It was concluded that decortication eliminated and distorted the adaptational changes of heat exchange in animals. G.G.

N67-11420# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF DYNAMIC FACTORS ON THE FUNCTIONAL STATE OF THE OTOLITHIC PART OF THE VESTIBULAR ANALYZER

Z. I. Apanasenko *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 39-40 (See N67-11401 02-04) CFSTI: $8.40

Changes of the electromyographic characteristics of a labyrinth tonic reflex for the muscles of the rear extremities of guinea pigs exposed to vibration and centrifuging were compared with corresponding effects of actual flights in an orbiting spaceship. Exposure to two-time vertical vibrations at 70 cycles or to 15 minute acceleration at 8 G changed the functional condition of the electroactivity of the muscles and of the vestibular analyzer and apparently established the predominance of excitation. This effect was most pronounced after space flight. G.G.

N67-11421# Joint Publications Research Service, Washington, D. C.

THE RESULTS OF CLINICAL-PHYSIOLOGICAL INVESTIGATIONS OF THE CREW OF THE FIRST VOSKHOD MULTI-PLACE SPACE SHIP

I. M. Arzhanov, A. V. Beregovkin, I. I. Bryanov, P. V. Buyanov, S. N. Zaloguyev et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 41-42 (See N67-11401 02-04) CFSTI: $8.40

Some of the postflight physical and physiological changes found in the astronauts of the first Voskhod spacecraft are reported. Medical examinations revealed a slight general fatigue, hyperemia of the mucosa of the upper respiratory tract and the conjunctiva, body weight loss, moderate loss of working ability, poor tolerance of load tests, and neutrophilic leucocytosis and eosinopenia. R.N.A.

N67-11422# Joint Publications Research Service, Washington, D. C.

SOME RESULTS OF THE POST-FLIGHT EXAMINATION OF P. I. BELYAYEV AND A. A. LEONOV WHO MADE THE FLIGHT ON THE VOSKHOD-2 SPACE SHIP

I. M. Arzhanov, I. I. Bryanov, V. A. Baturenko, A. V. Beregovkin, P. V. Buyanov et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 43-44 (See N67-11401 02-04) CFSTI: $8.40

Pre- and post-flight examinations were made of the Voskhod-2 cosmonauts and compared to determine the biological effects of space flight. The results of the examinations, which included measurements of the heart and brain biopotentials, arterial oscillograms and tachooscillograms, ballistocardiography, investigation of gaseous metabolism, physiological tests, and general clinical and biochemical examinations of the blood and urine, are briefly discussed. R.N.A.

N67-11423# Joint Publications Research Service, Washington, D. C.

THE ROLE OF THE VESTIBULAR ANALYZER IN THE RESPONSE REACTIONS OF AN ORGANISM TO RADIATION EFFECTS

N. I. Arlashchenko *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 45 (See N67-11401 02-04) CFSTI: $8.40

The vestibular apparatus under conditions of stress, such as those caused by weightlessness or the Coriolis effect, is shown to affect an organism's response reaction to radiation effects. R.N.A.

N67-11424# Joint Publications Research Service, Washington, D. C.

MATERIAL ON THE PHARMACOLOGICAL PROTECTION OF THE VESTIBULAR ANALYZER IN THE CASE OF RADIATION EFFECTS

N. I. Arlashchenko, L. N. Suslova, and L. N. Kvasnikova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 46 (See N67-11401 02-04) CFSTI: $8.40

The use of such pharmacological agents as vitamins, amino acids, and aminazine to protect the vestibular apparatus from the effects of ionizing radiation is discussed. R.N.A.

N67-11425# Joint Publications Research Service, Washington, D. C.

THE COMBINED EFFECT OF ACCELERATIONS, VIBRATIONS, AND RADIATION ON THE DIVISION OF THE CELLS OF THE BONE MARROW

M. A. Arsen'yeva, V. V. Antipov, L. A. Belyayeva, and A. V. Golovkina *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 47-48 (See N67-11401 02-04) CFSTI: $8.40

The effect of the combined action of acceleration, vibration, and radiation on the frequency of nuclear disorders in the bone marrow cells of mice was studied. The mice were subjected to accelerations of 8 and 10 g's for 15 and 30 minutes and vibration (700 cycles for 60 minutes) before and after ionizing radiation. The animals were irradiated with X-rays in doses of 100 or 350 roentgens. The intervals between effects were 1, 4, and 24 hrs. An acceleration of 8 g's for 15 minutes with irradiation of 100 roentgens after 1 and 4 hours slowed the restoration rate of the cell's mitotic activity in comparison with straight radiation. The combination of acceleration (10 g's for 30 minutes) or vibration with irradiation (350 roentgens) after 24 hours caused some reduction in the frequency of true chromosome reorganizations. Vibration and acceleration (10 g's for 30 minutes) after irradiation (350 roentgens) increased the mitotic activity of the cells and slightly reduced the effect of radiation. R.N.A.

N67-11426# Joint Publications Research Service, Washington, D. C.

THE PROBLEM OF CRITERIA OF THE TOLERANCE OF TRANSVERSE ACCELERATIONS

D. Yu. Arkhangel'skiy, V. I. Babushkin, and E. V. Marukhanyan *In its* Problj in Aerospace Med. 21 Oct. 1966 p 49 (See N67-11401 02-04) CFSTI: $8.40

The duration of the cardiac cycle was used as an objective criterion of an organism's tolerance of transverse accelerations. Fluctuations in the duration of the cardiac cycle make it possible to give a quantitative estimate of the magnitude of the physiological deviation and constitute an early sign of change in the functioning of the cardiovascular system. R.N.A.

N67-11427# Joint Publications Research Service, Washington, D. C.

INVESTIGATION OF THE INFLUENCE OF OPERATOR ACTIVITY ON THE DURATION OF THE CARDIAC CYCLE UNDER CONDITIONS OF INCREASED GRAVITATION

D. Yu. Arkhangel'skiy, A. N. Luk'yanov, and M. V. Frolov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 50 (See N67-11401 02-04) CFSTI: $8.40

The latent period of motor activity was determined in test subjects under the influence of prolonged transverse oriented acceleration within the range of 1 to 9 g's in performing operator activity, and a series of electrophysiological indices were registered. An analysis of the results established that the relative change of the average values of the cardiac cycle duration in the absence of operator activity in the first approximation increases in proportion to the magnitude of the acceleration. The relative change of the cardiac cycle duration based on the elementary operator activity in the first approximation does not depend on accelerations in the range from 1 to 6 g's. In this case the relative change of the average value of the latent period is slight. In accelerations higher than 6 g's the duration of the cardiac cycle decreases and the latent period increases. R.N.A.

N67-11428# Joint Publications Research Service, Washington, D. C.

HYPERVENTILATION AS A FUNCTIONAL TEST

N. M. Asyamolova, A. K. Kochetov, and V. B. Malkin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 51–52 (See N67-11401 02-04) CFSTI: $8.40

An investigation was conducted to analyze and establish the scientific basis for using hyperventilation as a functional test for selecting candidates for flight schools and for medical examination of flight personnel. An attempt was made to determine the significance of aspects of respiration itself with respect to the course of the hyperventilation syndrome. Dosed hyperventilation was performed with different frequency and depth of respiration for the same volume of lung ventilation. The decisive factor in the development of the hyperventilation syndrome, regardless of the structure of respiration, was found to be the volume of pulmonary ventilation. The development of hyperventilation occurred in three phases characterized by various shifts of carbon dioxide pressure in the alveolar air: 1) a rapid drop of carbon dioxide pressure which to some degree established an individual's sensitivity to hypocapnia, 2) a relative stationary level of carbon dioxide pressure in the alveolar air, and 3) the restoration phase. Also discussed are the results of undosed free hyperventilation, pathological reactions, and EKG shifts. R.N.A.

N67-11429# Joint Publications Research Service, Washington, D. C.

AGE LIMITATIONS ON FLIGHT PERSONNEL

A. N. Babiychuk *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 53–56 (See N67-11401 02-04) CFSTI: $8.40

Several medical studies on physiological, physical, and psychic changes due to aging are reviewed in an attempt to determine age limits for flight personnel. The studies show that in rendering a verdict as to the physical fitness of a given pilot for flight activity, it is necessary to consider his physical condition and actual physical working ability rather than his age. Most of the functional and physiological changes found in flight personnel over 40 years of age were neither pathological nor obstacles to their flying activities. R.N.A.

N67-11430# Joint Publications Research Service, Washington, D. C.

THE USE OF SEISMOCARDIOGRAPHY IN SPACE MEDICINE

R. M. Bayevskiy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 57–58 (See N67-11401 02-04) CFSTI: $8.40

The role of seismocardiography, which measures the contractive functioning of the heart, in space flight is discussed. Seismocardiography has been used to determine the effect of weightlessness on blood circulation and to study the homeostatic mechanisms of the cardiovascular system. The seismocardiographic instrument can be located on top of clothing or even in a vest pocket, and is very convenient for accomplishing a continuous medical check of the astronaut. A small size radio transmitter has been integrated with the seismocardiographic instrument which makes it possible to record a seismocardiogram under conditions of free movement. An algorithm has been developed for automatic analysis of the seismocardiogram, so that data can be obtained not only on the condition of the cardiovascular system, but also on respiration and motor activity, the condition of the vegetative system, and the emotional state. R.N.A.

N67-11431# Joint Publications Research Service, Washington, D. C.

THE SELECTION OF DIAGNOSTIC CRITERIA IN THE CONSTRUCTION OF AN ALGORITHM FOR AN ON-BOARD COMPUTER

R. M. Bayevskiy, G. A. Berezina, Yu. V. Bukharin, and S. A. Chernyayeva *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 59–60 (See N67-11401 02-04) CFSTI: $8.40

An experimental check was made of a medical diagnostic program to determine its effectiveness in detecting sudden or gradual deviations in healthy persons. The programmed examination, which uses a 3-channel amplifying system, 4 investigational methods, and lasts only 5 minutes, is briefly described. Results show that the programmed examination provides a large number of different indices and forms diagnostic criteria from which clear distinctions can be made between normal and pathological conditions. The diagnostic effectiveness of various programs have been validated in the clinic and they now appear useful for both space and earth medicine. The use of these programs in combination with automatic data processing by on-board computers is a feasible means of solving problems of medical research and diagnosis during prolonged and distant space flights. R.N.A.

N67-11432# Joint Publications Research Service, Washington, D.C.

A COMPLEX METHOD FOR DETERMINING THE COMPENSATORY-ADAPTIVE CAPABILITIES OF THE CARDIOVASCULAR SYSTEM IN THE CASE OF ORTHOSTATIC EFFECTS

V. P. Baranova, T. V. Benevolenskaya, N. P. Yermakova, Ye. N. Kochina, G. P. Mikhaylovskiy et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 61–62 (See N67-11401 02-04) CFSTI: $8.40

A complex study was made of the functional condition of the cardiovascular system in healthy individuals under conditions of normal vital activity and following experiments simulating certain effects of space flight. The investigation made use of mechanocardiography, rhinopneumometry in combination with a

change of body position, and an active orthostatic test. An electrocardiogram, an FKG, and sphygmogram of the carotid artery, a volumetric sphygmogram, and the arterial pressure were recorded, and the phases of cardiac activity were analyzed. A correlation was established between the data from the study of the hemodynamics, the rhinopneumometry, and the tolerance of orthostatic effects. In particular, poor tolerance of orthostatic effects occurred against a background of an increase in intranasal resistance of up to 35 to 50 mm of a water column, an increase in the minute volume of blood, a decrease in the peripheral resistance of the vascular canal, and an increase in the speed of cardiac ejection. R.N.A.

N67-11433# Joint Publications Research Service, Washington, D. C.

THE DIFFERENTIATED SENSITIVITY OF MAN TO THE CUMULATION OF VARIOUS VESTIBULAR STIMULI

U. P. Baranova and I. Ya. Yakovleva *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 63 (See N67-11401 02-04) CFSTI: $8.40

A number of studies are briefly reviewed which show the differential sensitivity of the vestibular apparatus in tolerating an accumulation of vestibular effects, particularly Coriolis accelerations. R.N.A.

N67-11434# Joint Publications Research Service, Washington, D. C.

ANALYSIS OF THE RELATION OF ORGAN-CHANGE AND TISSUE RESISTANCE

Z. I. Barbashova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 64–65 (See N67-11401 02-04) CFSTI: $8.40

Experiments were conducted on rats to compare the resistance of the whole organism to hypoxia with the resistance of its individual tissues. One group of rats had their resistance increased by a month of training in a barometric chamber at a simulated altitude of 7000 meters. Another group had their resistance lowered by an adrenalectomy. In rats of the first group, resistance was higher in the myocardium, skeletal muscles, brain tissue, and cells of the respiratory and vasculomotor centers. This is apparently connected with the higher activity of the cytochromoxidase and the higher oxygen capacity of the tissues themselves, as evidenced by the increase in myoglobin content. In rats that had adrenalectomies, resistance was reduced in the isolated myocardium. This was correlated with a decrease in the cardiac muscle's oxygen capacity due to a reduced myoglobin content. After a month of training for hypoxia, these same rats showed an increase in the resistance of the isolated myocardium which again was correlated with a rise in the myoglobin content in the cardiac muscle and an increase in the activity of the adenosinetriphosphatase. R.N.A.

N67-11435# Joint Publications Research Service, Washington, D. C.

THE INTERACTION OF THE ANALYZERS AND THE VEGETATIVE COMPONENTS OF MOTION SICKNESS

V. N. Barnatskiy and A. G. Kuznetsov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 66 (See N67-11401 02-04) CFSTI: $8.40

A study was conducted on vegetative phenomena occurring during motion sickness in dogs caused by rocking. The criterion for vegetative disorders consisted of indices of the motor functioning and electric activity of the muscle layer and nerve stems of the stomach and the occurrence of salivation and vomiting. On the average, vegetative phenomena occurred in the animals during vertical displacements with a frequency of 30 times/minute with accelerations of 0.3 g's every 10 to 15 minutes. These occurrences developed more rapidly in darkness. The most expressed reaction was attained when the animal was rocked in the absence of natural leg support. Evidently, visual signals and those from the proprioceptors of skeletal muscles have an inhibiting effect on the vestibular apparatus. Stimulation of the mechanoreceptors and chemoreceptors of the stomach increased the development of motion sickness. Motion sickness also increased more rapidly in dogs whose superior cervical sympathetic ganglia had been removed. Sodium bicarbonate injections sharply reduced the effects of rocking. R.N.A.

N67-11436# Joint Publications Research Service, Washington, D. C.

THE ADRENAL CORTEX AND THE REACTIONS OF THE NERVOUS SYSTEM TO STRESS EFFECTS

T. S. Barutkina, T. T. Zarubaylo, M. I. Mityushov, A. D. Nozdrachev, A. N. Panov et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 67–68 (See N67-11401 02-04) CFSTI: $8.40

Investigations were conducted on the reactions of the nervous system to various stresses and its dependence on the functioning of the adrenal cortex. Chronic tests on dogs with implanted electrodes showed that stress lowers the afferent and efferent impulsation in the sympathetic nerves. The administration of hydrocortisone prevents the suppression of electric activity, and desoxycorticosteronacetate either has no effect or suppresses it. The reaction of brain catecholamines to stress can depend on the corticosteroid level in the peripheral blood. The administration of large doses of hydrocortisone prevents the lowering of the catecholamine level of the brain in response to stress effects. The concentration of adenosine triphosphate, adenosinediphosphoric acid, adenosinemonophosphate, guanosinetriphosphoric acid, guanosinediphosphoric acid, lactic acid, citric acid, pyruvic acid, and ketoglutaric acid was measured in rat brain tissue after administering hydrocortisone in the state of rest and under the effect of an electrocutaneous stimulus. A prolonged stimulation did not change the indices of energy metabolism while a brief stimulation caused an increase in glycosis. R.N.A.

N67-11437# Joint Publications Research Service, Washington, D. C.

CHARACTERISTICS OF THE ACTIVITY OF THE ADRENAL CORTEX AND THE THYROID GLAND AND HIGHER NERVOUS ACTIVITY UNDER CONDITIONS OF THE PROLONGED ACTION OF SOUND

T. S. Barutkina, T. T. Zarubaylo, M. I. Mityushov, A. N. Panov, V. V. Rakitskaya et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 69–70 (See N67-11401 02-04) CFSTI: $8.40

White rats were subjected to the effects of sound, using a frequency of 650 hertz and an intensity of 70 decibels. The duration of the sound varied from one hour to 14 days and was applied for 17 seconds out of every half minute. The functional activity of the rat's adrenal cortex, as determined by the reduction in the concentration of ascorbic acid and cholesterol, increased depending on the time of the sound effect, reaching a maximum in 6 to 12 hours. After 8 days, the condition of the adrenal cortex was normal. The functional condition of the thyroid was judged from the content of protein-connected iodine in the blood plasma and from histological sections. An increase in the gland's activity was observed after one day of sound effects, after which no differences from the norm were observed. A study of rat nervous activity showed that sound caused an increase in the latent period, a tendency to prolong the time of running, and an increase in errors. R.N.A.

N67-11438# Joint Publications Research Service, Washington, D. C.

THE INCREASED RESISTANCE OF HYPOTHERMALLY CONDITIONED ANIMALS TO THE EFFECTS OF DECOMPRESSION

P. V. Beloshitskiy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 71–72 (See N67-11401 02-04) CFSTI: $8.40

Decompression tests were conducted on two groups of white rats. Rats of the first group were subjected to decompression at normal body temperature. The second group was first cooled to $22° \pm 1°C$ in a specially designed thermal chamber and then exposed to decompression. The results showed that in the hypothermally

conditioned rats, the lowering of PO_2 in the brain tissue is less than in nonconditioned rats. There were also less changes with respect to respiration and heart beat, i.e., the tissues are protected for a longer period of time against oxygen deficiency. It is possible that hypothermia also weakens the flow of impulses coming from the expanded chest cage and abdominal cavity, thereby reducing the probability of a reflex stoppage of respiration. The survival rate of the hypothermally conditioned rats was almost three times that of the unconditioned rats. R.N.A.

N67-11439# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF THE FACTORS OF SPACE FLIGHT ON THE EXCRETION OF 17-OXYCORTICOSTEROIDS WITH THE URINE

M. I. Belyakova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 73-74 (See N67-11401 02-04) CFSTI: $8.40

A laboratory study was made on the effect of accelerations on the functioning of the adrenal cortex. The study showed that the accelerations caused an increase in the excretion of free and connected 17-oxycorticosteroids in direct relation to the magnitude of the acceleration. Post-flight examinations were also made of 17-oxycorticosteroid excretions of astronauts. A comparison of the data from the two studies shows that space flight causes no greater changes in the functioning of the adrenal cortex than the laboratory acceleration tests. The normalization of the excretion of 17-oxycorticosteroids during a short period of time following a considerable increase or reduction, indicates that these effects do not exceed the physiological capabilities of the adrenal cortex. R.N.A.

N67-11440# Joint Publications Research Service, Washington, D. C.

A DOSED PHYSICAL LOAD IN THE DIAGNOSIS OF CHANGES OF THE FUNCTIONAL STATE OF THE CARDIOVASCULAR SYSTEM

T. V. Benevolenskaya, O. I. Boykova, M. M. Korotayev, G. P. Mikhaylovskiy, and A. A. Savilov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 75-76 (See N67-11401 02-04) CFSTI: $8.40

A method is described for diagnosing the functional state of the cardiovascular system. The method determines a subject's adaptability to a variable physical work load by recording a series of electrophysical parameters and detecting pathological changes in the cardiovascular system during the load with a veloergometer. R.N.A.

N67-11441# Joint Publications Research Service, Washington, D. C.

THE EFFECT OF GAMMA RADIATION AND PROTONS WITH ENERGIES OF 127–660 MeV ON THE RADIATION INJURY OF YEAST CELLS

V. N. Benevolinskiy, Yu. P. Druzhinin, A. S. Klimenko, T. S. Malyutina, and I. A. Sychkov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 77-78 (See N67-11401 02-04) CFSTI: $8.40

Diploid cells of Saccharomyces vini strain Megri 139-13, and haploid cells of Saccharomyces cerevisiae strain 40-2587 were investigated. It was established that the action of protons does not differ significantly from the action of gamma radiation. The coefficient of relative biological effectiveness of protons was close to 1 in all cases. On the basis of data obtained, a preliminary evaluation was made concerning the effects of radiation on quiescent yeast cells under space flight conditions when yeast is used as emergency material if the system for the continuous growing of heterotrophs were to fail. L.S.

N67-11442# Joint Publications Research Service, Washington, D. C.

THE BASIS OF THE CREATION OF A STORAGE PLACE FOR OXYGEN UPON THE OXYGENATION OF TISSUE UNDER INCREASED PRESSURE

I. P. Berezin, G. I. Seregin, and B. N. Rostovtsev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 79–80 (See N67-11401 02-04) CFSTI: $8.40

The preservation time of the electroencephalographic activity of the brain of a rabbit after the cessation of external respiration was experimentally investigated in series tests on 70 rabbits. Measurements of brain bioelectric activity were made after cessations for varying time periods, and under different atmospheric (pressure) conditions. Analysis of the data showed that the bioelectric activity under conditions of breathing oxygen under increased atmospheric pressure was always preserved considerably longer than in the case of normal pressure. The data indicate that the use of increased partial pressures of oxygen for the purpose of oxygenation, creates considerable supplies of oxygen in the tissues which under certain conditions can be used for therapeutic purposes. L.S.

N67-11443# Joint Publications Research Service, Washington, D. C.

THE CHANGE OF SOME PHYSIOLOGICAL INDICES OF THE BODY UNDER THE INFLUENCE OF A GASEOUS ENVIRONMENT FORMED AS A CONSEQUENCE OF THE DESTRUCTION OF POLYMERS

Yu. P. Bizin, G. M. Gorban, V. M. Zinov'yev, Z. I. Pilipyuk, K. K. Sidorov et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 81–82 (See N67-11401 02-04) CFSTI: $8.40

The physiological changes occurring in laboratory animals situated in a sealed chamber (simulated space ship cabin) in which vapors from various organic polymers placed in the system were formed when temperatures became greater than 40°C were investigated. Changes in the quantity of erythrocytes, leucocytes, reticulocytes, and hemoglobin were determined. The functional condition of the liver was judged from the ability of the organism to synthesize hippuric acid from benzoic acid. In addition, integral methods of investigation such as the behavior and general condition of the animals, the dynamics of weight change, tolerance of physical load, and oxygen consumption, were used. Functional changes to the central nervous system were unstable and non-specific. The use of the investigated polymers in outfitting sealed cabins is possible if the harmful gaseous vapors of the listed materials are eliminated from the air, or are in allowable concentration for closed spaces of small volume. L.S.

N67-11444# Joint Publications Research Service, Washington, D. C.

PSYCHOPHYSIOLOGICAL CHARACTERISTICS OF THE SEQUENCE OF MOVEMENTS IN MAN

I. D. Bogina, I. M. Gorbunova, Ye. S. Rogovenko, and N. A. Rokotova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 83–84 (See N67-11401 02-04) CFSTI: $8.40

The process by which human subjects learned a sequence of manipulations of keys on a panel was investigated. A concept was developed explaining the sequence of actions as the creation of internal criteria, and the performance of a learned sequence as the following of selected internal criteria. The results of the tests with respect to selection of the order of motor actions, the determination of the time for fulfillment, and the maintenance of regular speed of movement, are presented. The data indicate that the process of learning is a process of selecting and constructing internal criteria such as the direction of the movement of the hand (or the panel as used in the tests). The nature of the fluctuation in time intervals during a motor cycle is also discussed. L.S.

N67-11445# Joint Publications Research Service, Washington, D. C.

THE PROBLEM OF THE FUNCTIONAL INTERACTION OF ANALYZER (VISUAL, ACOUSTIC, AND TACTILE) IN FLIGHT PERSONNEL DURING THE PROCESS OF PROLONGED FLIGHTS

E. V. Bondarev, G. I. Gurvich, T. T. Dzhamgarov, V. A. Yegorov, V. L. Marishchuk et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 85–86 (See N67-11401 02-04) CFSTI: $8.40

The throughput capability of analyzers used for judging the activity of flight personnel during prolonged flight was evaluated. The test subjects in random order were subjected to visual, acoustic, and tactile stimuli to which they were supposed to react as quickly and correctly as possible by pressing the appropriate button. The time of a simple motor reaction and of the reaction of selection, the number of errors, the amount of processed information, the throughput capability, and the time for processing a unit of information were calculated. Results indicate that for light stimuli during the first 9 hrs of flight, the throughput capacity gradually increased with a subsequent reduction at the 15th hr of flight, and drops regularly as the duration of flight increased. The relation of fatigue to responses to stimuli are discussed. L.S.

N67-11446# Joint Publications Research Service, Washington, D. C.

CHANGES OF THE VISUAL AFTER-IMAGE WITH DIFFERENT METHODS OF STIMULATING THE VESTIBULAR APPARATUS

B. B. Bokhov and I. V. Komissarova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 87–88 (See N67-11401 02-04) CFSTI: $8.40

Human subjects were turned at varying speeds to examine the relationship between the direction of the displacement of a visual after-image and angular and Coriolis acceleration. In addition, the relation between the degree of deviation of the after-image and the angular accelerations of different magnitude was studied. Tests involving irritation of the vestibular apparatus by stimuli confirmed previously obtained data on the displacement of the visual after-image in the direction of rotation upon stopping, and also revealed certain new aspects of this phenomenon. Results suggest that there is a possibility of quantitatively evaluating the spatial and time indices of the visual after-image from tests such as those described. L.S.

N67-11447# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF A TEST OF VERTICAL WRITING ON POST-ROTARY NYSTAGMUS

B. B. Bokhov and M. M. Frolova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 89 (See N67-11401 02-04) CFSTI: $8.40

The performance of human subjects in vertical writing tasks after being rotated at various speeds was tested to study the effects of various indices on vestibular nystagmus. The writing test was used as an index of the tonic labyrinth reflex to the musculature of the upper extremities. The recording of post-rotary nystagmus was accomplished at the same moment. Results indicate that the duration and number of occurrences of post-rotary nystagmus increase, while the amplitude decreases under the influence of a simultaneous writing test. This effect is particularly distinct upon stopping rotation at low speeds (15, 30°/sec.). A less noticeable decrease of duration of nystagmus is observed at a speed of 60°/sec. L.S.

N67-11448# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF A GEL CULTURE MEDIUM ON THE REACTIONS OF AN ORGANISM UNDER CONDITIONS OF A DEFICIENCY OF OXYGEN AND AN EXCESS OF CARBON DIOXIDE

I. S. Breslav and Ye. N. Salatsinskaya *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 90 (See N67-11401 02-04) CFSTI: $8.40

It was found that in gel media with both normal and reduced oxygen content, human respiration becomes faster and less flexible; while the saturation of the blood with oxygen differs little from that observed in nitrogen–oxygen mixtures. Under conditions of moderate hypoxia (12% O_2), the increase of pulmonary ventilation in a helium environment was more weakly expressed than in a nitrogen environment. The ability of the test subjects to distinguish such a mixture from an environment with a normal content of oxygen in helium was considerably less than in nitrogen. The reaction of man to inspiration of a mixture of 9% oxygen with helium was the same for all the studied indices as in the case of a similar nitrogen mixture. Author

N67-11449# Joint Publications Research Service, Washington, D. C.

ELECTROPHYSIOLOGICAL INVESTIGATIONS OF THE CENTRAL MECHANISMS OF GRAVITATIONAL COLLAPSE

Ya. M. Britvan, V. G. Lychko, and Yu. S. Belkaniya *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 92–93 (See N67-11401 02-04) CFSTI: $8.40

Electroencephalographic measurements of bioelectric activity in cat brains under conditions of orthostatic (gravitational) collapse were analyzed. The potentials were determined from the sensomotor and occipital areas of the cerebral cortex, specific nuclei of the thalamus and anterior hypothalamus, the reticular formation of the middle brain, and the pons varolii. The data indicate that in a series of tests in which the cats were placed in a vertical position, gravitational collapse occurred after 6 to 10 hrs with complete extinction of bioelectric activity, a reduction of arterial pressure to 20–30 mm Hg, and terminal disturbances of respiration. The changes of bioelectric activity went through the following stages: initial desynchronization, a stage of mixed waves, dominance of slow activity, zones of silence, and finally complete suppression. Other observations of the bioelectric activity are also discussed. L.S.

N67-11450# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF TRANSVERSE ACCELERATIONS ON PANCREATIC SECRETION

S. A. Bugrov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 94 (See N67-11401 02-04) CFSTI: $8.40

Changes occurring in the external pancreatic secretion of animals from the action of transverse radial acceleration were investigated in a series of tests. Two types of reactions were noted: inhibition and excitation of pancreatic secretion. In one group of tested animals a clearly expressed undulation in the secretion of juice with sharp fluctuations in the periods of the rise and fall in the amount of juice was observed. In the second group, a certain plateau in the direction of an increase in the amount of juice with a slight amplitude for the periods of rise and fall was observed. Similar changes were observed with respect to the enzyme secreting function of the pancreas. L.S.

N67-11451# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF PENETRATING RADIATION ON FOOD PRODUCTS AND THE PHYSIOLOGICAL VALUE OF FOOD

I. M. Buznik *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 95–96 (See N67-11401 02-04) CFSTI: $8.40

It was shown that irradiation of food with large doses of gamma rays (about 2 million roentgens at a quantum energy of 1.25 MeV) leads to a worsening of the organoleptic (odor, color, taste) qualities and a reduction of the physiological value of food products. Changes occurring in fats, proteins, and vitamins are discussed. The data are useful when considered with other

literature studies conducted at different radiation levels and types to determine if irradiated food for space astronauts is feasible. L.S.

N67-11452# Joint Publications Research Service, Washington, D. C.

PROLONGED HYPOKINESIA AS A FACTOR CHANGING THE FUNCTIONAL CONDITION OF THE CARDIOVASCULAR SYSTEM OF A WELL MAN

P. V. Buyanov, A. V. Beregovkin, N. V. Pisarenko, and V. I. Slesarev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 97–98 (See N67-11401 02-04) CFSTI: $8.40

Tachooscillograms, arterial oscillograms, and electrocardiograms of cardiac activity were recorded in human subjects being tested for the effect of prolonged restriction of mobility on the blood circulation. Subjects were tested under bed regime conditions and under water immersion. The duration of hypokinesia was 10 to 15 days. The significance of physical exercises and periodic kneading of the lower extremities to reduce the negative effect of hypodynamia was evaluated. The data will be of value in estimating the load tolerance that an astronaut can tolerate under weightlessness in space flight before serious disturbances occur to his cardiovascular system. L.S.

N67-11453# Joint Publications Research Service, Washington, D. C.

SOME PROBLEMS OF THE SELECTION OF CANDIDATES FOR A SPECIAL CONTINGENT

P. V. Buyanov, A. V. Galkin, V. G. Terent'yev, Ye. Ye. Sheludyakov, N. V. Pisarenko et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 99–100 (See N67-11401 02-04) CFSTI: $8.40

A methodical approach to selecting flier and astronaut candidates is discussed, based on evaluations of actual procedures used. The selection method used is conducted in three stages: 1) an initial ambulatory selection, 2) stationary examination at special medical facilities, and 3) elimination during the first months of professional activity. The main reasons for rejection at each stage are outlined. These included ailments of the otorhinolaryngological organs, internal diseases, vestibular-vegetative weakness, anomalies of development, and degenerative changes of the spine. During recent years rejection during the second stage (which was 50% of the candidates who had passed the first stage) was reduced as a result of a stricter approach toward the candidates during the initial examination. About 10% were found unsuitable during the third stage due to functional changes caused by professional activity. The data obtained are used to predict the capabilities of an individual under his work load and environmental conditions. L.S.

N67-11454# Joint Publications Research Service, Washington, D. C.

THE EXPERIMENTAL STUDY OF THE DYNAMICS OF CONFLICT

A. F. Bystritskaya and M. A. Novikov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 101–102 (See N67-11401 02-04) CFSTI: $8.40

The nature and causes of conflict situations in performing group activity were experimentally investigated through the use of a homeostatic scheme of connections (called Blind-Apodal) which models group activity conflict. An external signal from a control panel was introduced to discoordinate all instruments to create mathematically incompatible conditions of solution. In the first stage of the experiment the group was irradiated and skill was tested; in the second stage, discoordinating interference was introduced during the solution of the problems. The sum of the modules of the activity parameters of the operators and the vegetative reactions of the test subjects during the solution of the problems were recorded. The results obtained demonstrate that the introduction of discoordinating interference upon the approach of the system to a stable condition causes conflict tension accompanied by neurotic reactions which are expressed by disturbance of the developed dynamic stereotype to include the loss of a skill and inability to decide, change of behavioral reactions, and change of the emotional-vegetative background. Other comments on the behavior of the human test subjects are also discussed. L.S.

N67-11455# Joint Publications Research Service, Washington, D. C.

MOISTURE LOSSES OF THE HUMAN ORGANISM AT HIGH ALTITUDES

M. I. Vakar, N. I. Chernyakov, I. V. Maksimov, V. A. Glazkova, and P. Ya. Azhevskiy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 103–104 (See N67-11401 02-04) CFSTI: $8.40

The rate of moisture loss of humans subjected to prolonged stays at high altitudes (30,000 meters and higher) was studied with the aid of complex oxygen equipment for breathing under excess pressure. The subjects were dressed in compensating clothing which provided external mechanical counterpressure on the body but did not preclude contact by the skin surface with the deep vacuum and did not hamper the evaporation of moisture from the surface of the skin and from the underclothing. The water loss was determined by weighing the test subjects fully dressed before and after the experiment. Thermocouples were used to measure the skin and underclothing temperatures. It was established that prolonged stay in a state of physical rest leads to an increase in moisture loss exceeding that under ground conditions by 1.5–2 times (70–120 gms/hr vs 40–50 gms/hr). Performance of physical loads led to increases in water loss where similar loads under ground conditions caused less moisture loss. L.S.

N67-11456# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF AMINAZINE, METAMIZIL, AND PENTAPHENE ON CERTAIN VESTIBULAR REACTIONS

A. V. Val'dman, M. A. Buryak, and Ye. A. Spalva *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 105–106 (See N67-11401 02-04) CFSTI: $8.40

The effect of the central cholinolytes metamizil and pentaphene, and the adrenalyte aminazine on vestibular reactions of central origin: cardiac arhythemia, disturbance of coronary blood circulation, vascular reactions, nystagmus, and salivation were studied. Electrocardiographic data of the functioning of the heart and the state of coronary blood circulation were obtained on tested cats in which vestibular nuclei located at the bottom of the fourth ventricle were electrically stimulated. Results indicate that cholinolytic compounds are very useful for preventing the symptomatic complex of motion sickness. Metamizil is the most effective of the compounds studied. There are some doubts as to the prospects for using adrenalytic compounds (aminazine), but further research with this compound is necessary. L.S.

N67-11457# Joint Publications Research Service, Washington, D. C.

THE CHANGE OF CERTAIN INDICES OF THE FUNCTIONAL CONDITION OF THE ORGANISM UPON PROLONGED STAY BY MAN IN THE POSE OF "AVERAGE PHYSIOLOGICAL REST"

Yu. V. Vanyushina, M. A. Gerd, and N. Ye. Panferova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 107–108 (See N67-11401 02-04) CFSTI: $8.40

The pulse and respiratory rates, blood pressure magnitudes, and body temperatures of human subjects immersed in water (or in chairs of special design) were measured at 2 hr intervals during waking hours to determine the changes occurring in physiological indices that occur during a prolonged stay in the pose of average

physiological rest characteristic under weightlessness conditions. The basal metabolisms of the tested individuals were determined by the Douglas–Holden method each morning immediately after sleep. Periodic measurements of the maximum strength and endurance of the right and left hand muscles were made. It was found that the pulse and respiratory rates remained practically unchanged throughout the course of the tests, and that the level of maximum and minimum arterial pressure dropped progressively. The biological activity of the blood changed in the direction of a decrease in the chronotropic effect and increase of the inotropic effect. The basal metabolism was reduced during the course of testing, and the respiratory coefficient rose. Other comments on the fundamental transformation of functional systems under the conditions of physiological rests, are also made. L.S.

N67-11458# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF HIGH AIR TEMPERATURE ON THE ADAPTABILITY OF MAN TO AN ORTHOSTATIC TEST

Yu. V. Vanyushina, N. Ye. Panferova, and V. A. Tishler *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 109–110 (See N67-11401 02-04) CFSTI: $8.40

The body temperatures, moisture losses, cholinesterase activity, arterial pressure, and electrocardiogramic, seismocardiogramic, and neumogramic behavior of human subjects before and after 1–4 hr stays in a warm chamber (36–40°C) having relative humidity of 60–70% were measured to determine the mechanism of change in the adaptibility of man to orthostatics after such exposure. After being in the warm condition, the adaptibility of the test subjects to an orthostatic test was poorer; the frequency of cardiac contractions increased sharply; blood pressure fell; and in one case there was a precollaptoid conditon. In the vertical position the test subjects showed a shortening of the R R and PQ intervals on their electrocardiograms, and an increase in the difference between the actual and necessary systolic indices. Other effects on the physiological functions are also described. L.S.

N67-11459# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF STRESS ON THE CONVERSION OF LIPIDS IN THE LIVER WITH QUALITATIVELY DIFFERENT FEEDING

E. N. Vasil'yeva *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 111–112 (See N67-11401 02-04) CFSTI: $8.40

The reaction of rat livers, in which fat content was increased due to a deficiency of protein in the diet, to the administration of formalin stress agents was studied. The irritants caused a reaction of the organism characteristic of stress (decrease of the relative weight of the liver, increase of the weight of the adrenal glands, and a lowering of the ascorbic acid content in the adrenal glands). In the control animals all the stress agents caused an increase in the contents of lipids in the liver. The same stress agents in the case of rats with increased initial fat content in the liver not only caused no increase in the level of lipids but sometimes led to a lowering of lipid content in the liver tissue. Similar data with non-esterified fatty acids in blood serum showed that the mobilization of fat from the depot occurs just as intensively in control animals as in rats which had received an insufficient amount of protein in their diets. The data indicate that the different reaction of liver with different initial fat content is connected with the nature of the processes of the conversion of lipids in the liver tissue itself. Other comments on the studies are also made. L.S.

N67-11460# Joint Publications Research Service, Washington, D. C.

CHANGE OF THE VASCULAR TONUS UNDER THE INFLUENCE OF HYPODYNAMIA

V. Ye. Vasil'yeva, O. N. Belina, and T. D. Vasil'yeva *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 113–114 (See N67-11401 02-04) CFSTI: $8.40

Electrocardiographic recordings and sphygmograms from a radial artery and the end of a middle finger were made on athletic test subjects before and during a position of rest in a horizontal position without moving for 10 days to determine the effect of hypodynamia on the tonus of the vascular vessels. The data indicate that the speed of propagation of a pulse wave along vessels of the elastic type does not undergo noticeable changes during the 10 day period. However, vessels of the purely muscular type (arteries of the hand e.g.) considerably change their elastic-cohesive state. This is expressed in an abrupt change of the speed of propagation of the pulse wave. Under the influence of hypodynamia, the propagation speed along the muscular type vessels decreased. L.S.

N67-11461# Joint Publications Research Service, Washington, D. C.

INVESTIGATION OF THE POSSIBILITY OF CREATING A CONFLICT SITUATION IN THE CASE OF THE INTERDEPENDENT GROUP ACTIVITY OF OPERATORS BY THE METHOD OF MATHEMATICAL MODELING

V. K. Vasil'yev, F. D. Gorbov, M. A. Novikov, A. B. Sauvin, and Ye. Z. Tambiyev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 115–116 (See N67-11401 02-04) CFSTI: $8.40

Man–machine problems are discussed, and reports on the properties of one operator interacting with a technical system are listed. A homeostat is also mentioned; this device makes it possible to conduct experimental investigations of the behavior of an operator in a group, and to obtain quantitative data required for constructing a mathematical model of the interdependent work of the operators. Two approaches to studying the tactics of the operators on a homeostat are identified as the work of the operators in a nonconflict situation when the problem in principle can be solved, and in a conflict situation when the task in principle cannot be solved. M.G.J.

N67-11462# Joint Publications Research Service, Washington, D. C.

THE MATHEMATICAL MODELLING OF THE CONSUMPTION OF OXYGEN BY THE BODY WHEN PERFORMING PHYSICAL WORK

V. K. Vasil'yev, B. S. Katkovskiy, and A. B. Savvin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 117–118 (See N67-11401 02-04) CFSTI: $8.40

In the proposed mathematical model, an analysis is made of the oxygen regime of the organism under standard physical loads of average intensity. The nature of the transitory process of oxygen consumption during activation (input into the regime) and restoration (removal of the load) is studied in response to gradual excitement (physical work), using an automatic gas analyzer. A second order differential equation is used to describe the process of oxygen consumption during physical work. Another differential equation is derived to describe the restoration process after completion of the work. An attempt is made to connect the coefficients of the equations for each process. It is reported that the model provides solutions which are in good agreement with experimental analyses. M.G.J.

N67-11463# Joint Publications Research Service, Washington, D. C.

INCREASING THE RESISTANCE OF ANIMALS TO TRANSVERSE-DIRECTED LOADS BY MEANS OF ACTIVE AND PASSIVE ACCLIMATIZATION UNDER CONDITIONS OF A HIGH MOUNTAINOUS AREA

P. V. Vasil'yev, G. V. Lysukhina, and N. N. Uglova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 119 (See N67-11401 02-04) CFSTI: $8.40

White mice, white rats, and guinea pigs were used in acclimatization studies undertaken as a method of nonspecific training for increasing the adaptive capabilities of an organism to extreme

flight conditions. Test conditions are outlined. The results show: (1) The survival rate of acclimatized animals following the action of large magnitude loads was 1.5 to 2 times greater than that for control animals. The positive effect of acclimatization lasted for 3 to 4 weeks. (2) Cardiac disturbances occurred later in the test animals and were less severe. (3) Active adaptation to high altitude conditions, including systematic physical training, was more effective than passive stay at the altitude. M.G.J.

N67-11464# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF PROTON AND GAMMA RADIATION ON THE MITOTIC ACTIVITY OF AN INOCULATED CULTURE OF HUMAN CELLS

I. S. Vasil'yev, N. I. Ryzhov, N. N. Derbeneva, A. I. Portman, N. Zh. Dorofeyeva et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 120-121 (See N67-11401 02-04) CFSTI: $8.40

A two-week culture of amniotic cells in a single layer and in suspension was subjected to the action of 630 MeV protons and gamma rays of Co^{60}. The proton dose strength was 35 rad/sec; for the gamma rays it was 3 rad/sec. Activation and luminescence methods were used for the proton dosimetry; ionization chambers were used for beam monitoring. For gamma radiation, mitotic activity was determined directly after irradiation and after 12, 24, 36, and 48 hours; for proton radiation, after 10, 20, 40, and 60 hours. The experiments showed that irradiation causes a distinct change in the mitotic activity of the cells; the relationship between the suppression of mitotic activity and the dose was also noted. M.G.J.

N67-11465# Joint Publications Research Service, Washington, D. C.

MEASUREMENT OF ABSORBED DOSES OF INTERMEDIATE NEUTRONS

L. N. Veselovskiy, B. S. Gribov, V. G. Kuznetsov, and V. A. Sakovich *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 122 (See N67-11401 02-04) CFSTI: $8.40

Summary data are given on the use of detectors with isotropic sensitivity for investigating the effectiveness of biological shielding of a nuclear reactor. It is also reported that a directed detector with variable thickness for the moderating layer was created behind the biological shielding to study the angular characteristics of the neutron flow. M.G.J.

N67-11466# Joint Publications Research Service, Washington, D. C.

EVALUATION OF THE RADIATION DANGER IN A FLIGHT TO THE MOON

A. I. Vikhrov, V. Ye. Dudkin, Ye. Ye. Kovalev, V. G. Kuznetsov, and L. N. Smirennyy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 123 (See N67-11401 02-04) CFSTI: $8.40

Solar flare radiation is identified as the greatest hazard that astronauts will encounter during lunar flights and landings. It is reported that behind shielding of about 1 gram/cm^2 the surface dose can reach about 10^4 rem from a high intensity flare; if the astronaut is in a radiation shelter, the doses can be reduced to 50 rem or less. It is also noted that the probability of a solar flare during maximum solar activity is about 10% for a 30-day period. M.G.J.

N67-11467# Joint Publications Research Service, Washington, D. C.

THE PRINCIPLES OF CALCULATING PROTECTION FROM SPACE RADIATION

A. I. Vikhrov, V. Ye. Dudkin, Ye. Ye. Kovalev, V. G. Kuznetsov, A. V. Kolomenskiy et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 124 (See N67-11401 02-04) CFSTI: $8.40

Abstracted data are presented on the problems associated with calculating protection against high energy corpuscular radiation. A general formulation of the problem is proposed whereby for the given initial conditions (trajectory, flight duration, etc.), the basic requirements are determined for astronaut protection against radiation doses greater than the allowable limits while achieving a minimum weight increase. M.G.J.

N67-11468# Joint Publications Research Service, Washington, D. C.

SOME ADAPTIVE REACTIONS OF THE BLOOD SYSTEM OF MAN AND ANIMALS UNDER CONDITIONS OF PROLONGED OXYGEN STARVATION

V. I. Voytkevich *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 125-126 (See N67-11401 02-04) CFSTI: $8.40

Changes in the composition of the peripheral red blood were studied, along with the humoral stimulators of hemopoiesis in the blood serum, the change in the quantity of blood in the brain, and the oxygen-linking properties of hemoglobin. Investigations were conducted on alpinists before their ascent, during one month in the mountains at altitudes of 2000 to 4000 meters, and for a month after their descent. Under conditions of oxygen deficiency, observations showed a parallel increase of both the amount of hemoglobin and the number of erythrocytes in the peripheral blood, and the preservation of hemopoietic activity of the serum for up to two weeks after cessation of the hypoxic factor. Also studied were 13 generations of white rats which lived for 12 hours a day in a hypoxic chamber into which was fed a mixture of 10.5% oxygen and 89.5% nitrogen at normal atmospheric pressure. Test results are summarized, and it was concluded that under conditions of prolonged oxygen deficiency a series of adaptive shifts appear in the blood system. M.G.J.

N67-11469# Joint Publications Research Service, Washington, D. C.

APPLICATION OF THE METHODS OF SPACE CARDIOLOGY IN THE CLINIC AND SOME PROBLEMS OF THE CLINICO-PHYSIOLOGICAL EVALUATION OF THE RESULTS OF FLIGHT EXPERIMENTS IN SPACE

Yu. N. Volkov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 127-128 (See N67-11401 02-04) CFSTI: $8.40

Clinical data are reported on the compensatory mechanisms observed in patients with atherosclerogenic cardiosclerosis, and on the effects of hypodynamia in patients subjected to a bed regime. The interrelationships of the methods and systems developed for medical control and physiological reaseach in space with those of clinical practice are pointed out. Based on the observations a series of recommendations is proposed with respect to diagnostic criteria as applied to operational medical control during space flight. M.G.J.

N67-11470# Joint Publications Research Service, Washington, D. C.

CHANGE OF THE MOTOR-EVACUATORY ACTIVITY OF THE GASTROINTESTINAL TRACT IN DOGS AFTER THE ACTION OF RADIAL ACCELERATIONS

T. V. Volkova, A. P. Mukhina, and V. Ye. Potkin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 129-130 (See N67-11401 02-04) CFSTI: $8.40

Balloon-graphic and roentgenological methods were used in experiments conducted on dogs with stomach fistules to study hungry periodic motor activity. Indices were the time of work and rest periods, along with the time of the full cycle of stomach and duodenum activity. The animals were subjected for three minutes to the effects of overloads on a centrifuge, and a magnitude of 8 g, with the forces acting in a transverse direction. Test details and results are outlined. Findings show that increased gravitation causes changes in both the hungry periodic motor activity and the evacuatory functioning of the digestive tract; the period of restoration is from 3 to 9 weeks. M.G.J.

N67-11471# Joint Publications Research Service, Washington, D. C.

MOTOR ACTIVITY AS ONE OF THE CRITERIA FOR EVALUATING THE READINESS OF A FLIER FOR FLIGHT

A. A. Vorona, N. M. Pavlenko, and A. I. Serikov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 131–132 (See N67-11401 02-04) CFSTI: $8.40

Findings from a study on the individual differences in the motor activity of fliers are outlined. The concept of a motor working dynamic stereotype was considered in relation to pilot actions in a preflight check of the controls. It was established that these actions consist of individual movements performed in strict sequence, and that multiple repetition leads to their combination in a definite set of motor operations. It was concluded that motor activity is a sensitive indicator of change in the functional condition of a pilot during flying, and that motor working dynamic stereotypes are a suitable criteria for evaluating the flight readiness of a pilot. M.G.J.

N67-11472# Joint Publications Research Service, Washington, D. C.

THE EXPERIENCE OF EMPLOYING A FUNCTIONAL TEST OF RESPIRATION UNDER EXCESS PRESSURE UPON HAVING MEDICAL EXAMINATION AND EXPERTISE FOR FLIGHT PERSONNEL

P. F. Vokhmyanin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 133–134 (See N67-11401 02-04) CFSTI: $8.40

Summary data are presented to show that by using a certain physiological load as a functional test, the functional condition and working ability of flight personnel can be determined based on the changes in the cardiovascular activity indices when breathing under excess pressure. Findings indicate that good tolerance of the load is found in persons preserving or increasing the minute volume of the heart during a load for 5 minutes at 10% or more than the initial figure, and in cases where the minute volume of the heart is equal to the required value or within $\pm 10\%$ of it. Persons showing a decrease of the minute volume of the heart by more than 30% in relation to the required values are considered to have tolerated the load satisfactorily; persons with more than a 30% decrease are classified as having tolerated the functional test poorly. M.G.J.

N67-11473# Joint Publications Research Service, Washington, D. C.

ALGORITHMS AND DIAGRAMS OF THE ACTIVITY OF THE OPERATOR OF A SYSTEM OF AUTOMATIC CONTROL AND MANAGEMENT

A. I. Galaktinnov, I. M. Panasenko, and L. V. Fatkin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 136–137 (See N67-11401 02-04) CFSTI: $8.40

A method of constructing and analyzing an algorithm is proposed as a solution to the problem of the correct distribution of the functional duties between the operator and the automatic apparatus of a control and management system. Optimum coordination of the operator with the automatic apparatus and technical components of the system is also considered. A brief outline of the approach used is presented. M.G.J.

N67-11474# Joint Publications Research Service, Washington, D. C.

THE BIOELECTRIC REACTIONS AND OXYGEN TENSION OF CERTAIN PARTS OF THE BRAIN IN THE CASE OF HYPOXIC HYPOXIA

L. S. Gezalyan, Ye. A. Il'in, and A. N. Razumeyev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 137–138 (See N67-11401 02-04) CFSTI: $8.40

Experiments were conducted to observe the sequence of the appearance of changes in the EEG in various parts of the brain, their agreement with the functional condition of the brain, and the physiological mechanisms on which they are based. In the rabbits used for the tests, electrodes were implanted in the sensory area of the cortex, the hippocampus, the rear hypothalamus, and the reticular formation of the middle brain; polarographic methods were used for recording oxygen tension in the cortex and reticular formation. Hypoxia was induced by breathing nitrogen through a mask equipped with a valve for exhaling. Test results are summarized. It was found that three characteristic phases of changes on the EEG occurred during the development of hypoxia: (1) the reaction of arousal; (2) the domination of slow waves; and (3) the fading of electrical activity. M.G.J.

N67-11475# Joint Publications Research Service, Washington, D. C.

THE MECHANISM OF HUMAN ADAPTATION TO AN ANTIORTHOSTATIC POSE

K. L. Geykhman and M. R. Mogendovich *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 139–140 (See N67-11401 02-04) CFSTI: $8.40

Arterial oscillography, pulsotachometry, cutaneous thermometry, and oxyhemography methods were used to study hemodynamic shifts in 128 athletes. Muscle tonus was measured with an electromyotonometer. It was found that the handstand used for the antiorthostatic pose is characterized by (1) less frequent cardiac activity; (2) an increase of the maximum and a lowering of the minimum pressure with a small change of the average pressure and an increase in the oscillatory index; (3) a considerable increase in the skin temperature of the forehead, along with insignificant changes of the skin temperature of the hip; (4) decreased blood oxygenation; and (5) a sharp increase in muscle tonus of the hands, and a slight increase in muscle tonus of the legs. M.G.J.

N67-11476# Joint Publications Research Service, Washington, D. C.

WAYS FOR EXPERIMENTAL STUDY OF THE REACTIONS OF ANTICIPATION

S. G. Gellershteyn *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 141–142 (See N67-11401 02-04) CFSTI: $8.40

Several experiments are listed, in which the stimulus used was a situation with a latent tendency; the test subject upon detecting this tendency guessed the logic of the course of events, thereby preparing himself for reactions to the developing future. These tests included guessing the time of the onset of coming events, anticipation of several possible changes, false anticipation modeling conflicting situations, and guessing the hidden logical connection involved in a sequential series of occurrences. M.G.J.

N67-11477# Joint Publications Research Service, Washington, D. C.

THE PROBLEM OF CHANGE OF THE HEART IN PILOTS WITH A DISTURBED ELECTROLYTE BALANCE

B. L. Gel'man, G. L. Strongin, L. I. Kuznetsova, and Ye. I. Kuznetsova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 143–145 (See N67-11401 02-04) CFSTI: $8.40

As a functional test for characterizing coronary insufficiency in persons suffering from stenocardia, flight personnel were given 150 grams of glucose. Based on complex clinical and clinical-physiological examinations, the subjects were grouped according to persons having (1) atherosclerosis, (2) hypertonic sickness of the first stage, (3) hypertonic sickness complicated by atherosclerosis, and (4) myocardial cardiosclerosis; the fifth group was basically healthy. Test details and results are summarized. Among the findings reported are: A considerable lowering of the T wave was observed in the test subjects of all groups. However, whereas such a lowering was noted in only 10% of the healthy persons, personnel with hypertonic sickness in combination with atherosclerosis showed an incidence of 31%. The most significant

changes in the glucose test and shifts of electrolyte exchange and carbohydrate exchange were observed in persons with identified coronary insufficiency. M.G.J.

N67-11478# Joint Publications Research Service, Washington, D. C.

ESTIMATION OF THE RADIATION DANGER TO PLANTS OF A SPACE HOTHOUSE

D. F. Gertsuskiy, L. V. Nevzgodina, L. V. Alekseyenko, V. M. Abramova, and L. N. Smirennyy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 146–147 (See N67-11401 02-04) CFSTI: $8.40

In a test to study the effects of gamma rays and protons on potatoes, it was found that with a dose of about 4000 rad only individual tubers produce sprouts. A stimulating effect is obtained from a gamma ray dose of 500 to 1000 rad, and from a proton dose of not more than 250 rad. In the irradiation of potato seeds, the plants were ruined in the case of a proton dose of about 40,000 rad and a gamma ray dose of more than 50,000 rad. Beets, beans, and lettuce showed greater radiation resistance than do potatoes, while cabbage, carrots, radishes, and tomatoes were observed to have relatively high radiation resistance. In work performed to determine the relative genetic and biological effectiveness of 660 MeV protons in comparison with gamma rays of Co^{60}, it was found that as the dose increases the coefficients of the relative genetic effectiveness of protons increases. M.G.J.

N67-11479# Joint Publications Research Service, Washington, D. C.

THE EFFECT OF PROTONS OF 660 MEV AND GAMMA RAYS ON POTATOES UPON PRE-PLANTING IRRADIATION OF THE TUBERS

G. F. Gertsuskiy, V. M. Abramova, L. V. Alekseyenko, M. A. Sychkov, S. A. Popkova et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 148–149 (See N67-11401 02-04) CFSTI: $8.40

Germination, development rate, and number and yield of tubers were used as the basic criteria in evaluating the effects of irradiation. Summarized data on the results are presented. It was noted: (1) A dose of protons on the order of 250 rad had a stimulating effect on the speed of appearance of shoots and on the beginning of the budding phase. For gamma rays the required dose was 500 to 1000 rad. A noticeably inhibiting effect was observed beginning with a dose of 500 rad and over 1000 rad respectively. (2) Visual observations of the vegetating plants showed that the stimulating effect of small doses is most apparent in the first phases of development and disappears gradually with time. (3) Protons have a greater effect on the growth, development, and yield of potatoes than do gamma rays. M.G.J.

N67-11480# Joint Publications Research Service, Washington, D. C.

RECEPTION AND PROCESSING OF COMPLETE AND CONDENSED REPORTS

Ye. L. Ginzburg, V. A. Pestova, V. G. Stepanov, and V. N. Shcherbakova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 150–151 (See N67-11401 02-04) CFSTI: $8.40

Efforts to find and formulate rules for condensing command-informational textual communications are outlined. The development of two condensation algorithms is reported, and summary data are given on experiments conducted to check the effectiveness of perception of the condensed proposals. M.G.J.

N67-11481# Joint Publications Research Service, Washington, D. C.

THE DYNAMICS OF THE SATURATION OF THE BLOOD WITH OXYGEN IN MAN WHEN BREATHING UNDER EXCESS PRESSURE AT HIGH ALTITUDE

V. A. Glazkova, I. V. Maksimov, and I. N. Chernyakov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 152–153 (See N67 11401 02-04) CFSTI: $8.40

Experiments conducted at altitudes above 12,000 meters indicated that oxygen saturation in the blood rose 3 to 5% during active and long conversation or when counting aloud. The saturation fell rather sharply, at least 20%, when subjects performed physical tests; and the size of the drop was dependent upon the exertion encountered by the subject. At altitudes of more than 12,000 meters, oxygenation of the blood changed according to the absolute intrapulmonary pressure, which in turn determined the level of alveolar pO_2. M.W.R.

N67-11482# Joint Publications Research Service, Washington, D. C.

STUDY OF THE EFFECT OF PROTONS OF 126 MeV AND GAMMA RAYS OF COBALT-60 ON THE PROCESSES OF CELL DIVISION IN THE BONE MARROW OF WHITE RATS

R. D. Govorun and S. V. Vorozhtsova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 154–155 (See N67-11401 02-04) CFSTI: $8.40

Mitotic activity, destructive processes in brain cell nuclei, and disturbances in the cell division processes were investigated in white rats that were subjected to various doses of whole-body irradiation with 126 MeV protons and gamma rays from Cobalt 60. A distinct change in mitotic index of the bone marrow was found with increasing doses; and there was an increase in the number of metaphases for 6 to 48 hours following irradiation, as well as a decrease in number of prophases and anaphases during the first day. A considerable increase in the number of degenerated nuclei is observed during the first day; and there was less damaging action from the protons than the gamma rays. Magnitude of relative effectiveness of the two types of irradiation varied according to when the tests were performed, and chromosome aberrations were related to dosage. To carry on these studies, the rats were decapitated at 1, 3, 6, 12, and 24 hours; as well as 2, 4, 7, 20, and 30 days after exposure. M.W.R.

N67-11483# Joint Publications Research Service, Washington, D. C.

THE PROBLEM OF EVALUATING THE MUSCULAR WORKING CAPACITY OF MAN AFTER THE ACTION OF SHOCK LOADS

S. A. Gozulov and N. I. Frolov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 156–157 (See N67-11401 02-04) CFSTI: HC $8.40

Muscular working ability in man, following the effects of repeated and stronger shock loads, is considered to pass through three stages. First, there is a predominant improvement of working ability; next, a discoordination stage; and last, a stage of lowered ability. It is noted, however, that because of a redistribution of functions and mutual compensation, there is a relatively small decrease in working ability. Further, there is great variation among individuals. Details of the study are not included. M.W.R.

N67-11484# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF CONSIDERABLE MUSCLE LOADS AND OF CERTAIN PHARMACOLOGICAL PREPARATIONS ON THE SUBSEQUENT RESISTANCE OF WHITE RATS TO RADIATION

D. A. Golovacheva *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 158–159 (See N67-11401 02-04) CFSTI: $8.40

Testing of trained white rats indicates resistance to radiation is directly related to the level of muscular working ability developed during the training period. Optimum physical loads, which are not defined, increase radiation resistance; whereas an exhausting working regime or slight loads do not produce beneficial results.

There was a 31% survival rate in rats who were trained for 2 to 3 months and then subjected to radiation doses of 1100 roentgens; for the untrained control group, a 100% mortality rate was noted. Other studies, which combine training with pharmacological intervention produced radiation resistance against a high level of muscular working ability. M.W.R.

N67-11485# Joint Publications Research Service, Washington, D. C.

TRACE REACTIONS IN AN EEG OF A MAN AND THEIR MEANING IN EVALUATING THE FUNCTIONAL STATE OF THE BODY

F. D. Gorbov and V. I. Myasnikov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 160–161 refs (See N67-11401 02-04) CFSTI: $8.40

Electroencephalographic studies in man indicate that the occurrence of drowsiness during periods of brisk activity under conditions of isolation is a highly developed ability to relax, as well as a favorable protective-adaptive mechanism of the organism to monotonous conditions. Considerable similarity is noted between drowsy states and fatigue itself; and the dynamics of EEG trace reactions, especially the exalted flashes of alpha rhythm in response to stopping a light stimulus, were investigated. M.W.R.

N67-11486# Joint Publications Research Service, Washington, D. C.

THE HOMEOSTATIC PRINCIPLE OF MODELLING GROUP ACTIVITY

F. D. Gorbov, M. A. Novikov, A. F. Bystritskaya, A. A. Gerasimovich, and M. A. Kareva *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 162–163 refs (See N67-11401 02-04) CFSTI: $8.40

Three human operators were studied in terms of their individual and intergroup activities via the use of a homeostatic model. The strength of mutual ties is found to influence the strategy of the group situation in both visual and motor activities; and conflicts are found to be dependent upon the psychological characteristics of the individuals, as well as the situation which arises at any given moment. M.W.R.

N67-11487# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF THE PROLONGED ACTION OF VESTIBULAR AND ORTHOKINETIC STIMULI ON THE FREQUENCY SPECTRA AND THE REACTION OF THE ASSIMILATION OF THE RHYTHMS OF LIGHT FLICKERINGS IN ELECTROCORTICOGRAMS OF VARIOUS PARTS OF THE BRAIN OF RABBITS

N. P. Gordeyeva and V. A. Il'yanok *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 164–165 (See N67-11401 02-04) CFSTI: $8.40

Electrodes were implanted in the visual, parietal, motor, and frontal areas of the cerebral cortexes in rabbits to study both the separate and combined action of vestibular and optokinetic stimuli. In the case of low intensity light flashes, there is an even decrease in the magnitude of the assimilated rhythm as well as the high and low frequencies at all the leads. Vestibular stimuli are found to reduce the frequency spectra of EKG's at all areas of the brain and at all frequencies except the lower ones of from 4 to 7 hertz, which display increased spectra. Under the combined action of vestibular and optokinetic stimuli, there is a continuous drop at all frequencies beginning at 6 or 7 hertz; at 4 hertz, there is a sharp increase. M.W.R.

N67-11488# Joint Publications Research Service, Washington, D. C.

THE REACTION OF THE BLOOD SYSTEM OF A DEVELOPING ORGANISM TO THE BRIEF AND REPEATED ACTION OF LOW PARTIAL PRESSURE OF OXYGEN

L. S. Gorozhanin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 166–167 ref (See N67-11401 02-04) CFSTI: $8.40

Reaction of the blood system to sharp and repeated action of a partial oxygen pressure of 56 mm Hg was studied in 23 dogs of various ages. Both the redistributive and erythropoietic reactions to hypoxia are absent in dogs during the first two months of their lives; and during the first month, dogs subjected to hypoxia often display an acute reaction in the bone marrow. During the third month of life, an acute erythrocyte reaction appears that is preserved during subsequent stages of post-natal ontogenesis; and acute reticulocytosis is also observed at this time. Thus, it is concluded, that the protective erythrocyte reactions to the effects of hypoxia are not evidenced from birth, but are linked to the age-related formulation of the neuro-humoral mechanisms that regulate the blood system. M.W.R.

N67-11489# Joint Publications Research Service, Washington, D. C.

ASPECTS OF THE PHYSICAL TRAINING OF A SPECIAL CONTINGENT WITH RESPECT TO CERTAIN EXTREME EFFECTS

F. M. Gorskiy and V. K. Khukhlayev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 168–169 (See N67-11401 02-04) CFSTI: $8.40

Five persons involved in mental work were studied to improve their general physical training and the functional capabilities of their systems in order to develop special physical qualities and skills that would facilitate human tolerance to various extreme conditions. Special exercises were developed and used in morning exercise periods over approximately a month. Results noted from these exercises, which were intended to increase the resistance of the vestibular analyzer and to develop equilibrium ability, include: (1) lowering of the pulse rate by 10 to 15 beats/min during activity, and by 6 to 8 beats/min during rest; (2) increasing vestibular resistance by 1%; and (3) increasing ability to walk on a 6-cm in diameter bar. Other improvements noted include improvement in respiration control and in muscle tolerance. M.W.R.

N67-11490# Joint Publications Research Service, Washington, D. C.

THE COMPENSATORY REACTIONS OF AN ORGANISM UPON THE DEVELOPMENT OF DECOMPRESSION DISTURBANCES

P. M. Gramenitskiy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 170–171 (See N67-11401 02-04) CFSTI: $8.40

Tests were made on dogs, cats, and rabbits to study their defensive compensatory reactions, such as formation of free gas bubbles within the blood, following exposure to decompression conditions. The main link in the pathogenesis of decompression disturbances is considered to be the aero-embolism formation in the overall venous system as well as in the pulmonary vessels. The formation of gas bubbles as a result of rapid decompression offers protection to the animal. Although details are not given, it is stated that it is possible to train the organism to accept decompression effects and to form artificial embolisms. M.W.R.

N67-11491# Joint Publications Research Service, Washington, D. C.

EVALUATING THE DANGER AND ESTABLISHING THE ALLOWABLE DOSES OF IONIZING RADIATION FOR ASTRONAUTS ON A FLIGHT TO THE MOON

Yu. G. Grigor'yev, M. P. Domshlak, N. G. Darenskaya, and S. A. Rayevskaya *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 172 (See N67-11401 02-04) CFSTI: $8.40

Mention is made of the development of a classification and magnitude of radiation doses that would be encountered during short space flights and lunar exploration. It is noted that large laboratory animals were used to evaluate the effects of ionizing radiation, but none of the details are included. M.W.R.

N67-11492# Joint Publications Research Service, Washington, D. C.

RADIATION SAFETY FOR SPACE FLIGHTS

Yu. G. Grigor'yev and Ye. Ye. Kovalev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 173-174 (See N67-11401 02-04) CFSTI: $8.40

A suggested system to provide protection from radiation hazards during space flight includes: (1) safety measures for the compartments and a radiation shelter; (2) radiation dosimetry including on-board equipment, individual dosimetric control, and signal and warning devices; (3) means to provide pharmacochemical prophylaxis and therapy for radiation injury; and (4) a ground radiation safety service. Mention is made of the complexity of problems associated with radiation hazards, as well as the interaction of these problems with other aspects of space flight. M.W.R.

N67-11493# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF NITROGEN-OXYGEN AND HELIUM-OXYGEN HYPEROXIA ON THE MORPHOLOGICAL COMPOSITION OF THE BLOOD OF MICE

P. A. Gul'tyayev and N. M. Pogodina *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 175-176 (See N67-11401 02-04) CFSTI: $8.40

Leukopenic reactions are stronger in mice exposed to helium-oxygen atmospheres than those placed in nitrogen-oxygen environments, with oxygen content about 80% in both instances. In the N-O environment, lymphopenia was frequently combined with nitrophilosis after exposures of from 4 to 11 days; while in He-O atmosphere, lymphopenia was combined with neutropenia at various time intervals after exposure. Leukocyte count was generally reduced in both environments, and shifts in morphological composition of the blood are about the same in either case. M.W.R.

N67-11494# Joint Publications Research Service, Washington, D. C.

THE FUNCTIONAL STATE OF THE ANALYZERS AND THE REACTIVITY OF AN ORGANISM

G. I. Gurvich *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 177 (See N67-11401 02-04) CFSTI: $8.40

Mention is made of the ability of animals to acclimate themselves to rarefied atmospheres. The general readjustment of an organism is caused by the sensitivity of the chemoreceptors during hypoxia; and specifically the cardiovascular receptors provide the link for changes in the functioning of the central nervous system and the reactivity of the organism as a whole. M.W.R.

N67-11495# Joint Publications Research Service, Washington, D. C.

THE ROLE OF CHANGES OF THE PARTIAL PRESSURE OF OXYGEN OF THE TISSUES IN REGULATING REGIONAL BLOOD CIRCULATION THE CASE OF ACUTE HYPOXIA

M. I. Gurevich and S. A. Bershteyn *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 178-179 (See N67-11401 02-04) CFSTI: $8.40

Acute hypoxia in cats under the influence of chloralose-nembutal narcosis was investigated in various gaseous mixtures with reduced oxygen contents. It was found that not all tissues received the same amount of oxygen; the cerebral cortex, for instance, received oxygen at the expense of the skeletal muscles and the skin. There is a redistribution of blood in the organism which is related to tonus changes in peripheral blood vessesl. Conclusions are based on changes in oxygen tension and tissue blood flow in a hip muscle, skin of the stomach, and the parietal area of the cerebral cortex. Arterial pressure was measured at the femoral artery, and oxygen requirements were met at this point. M.W.R.

N67-11496# Joint Publications Research Service, Washington, D. C.

STUDY OF REGIMES OF VITAL ACTIVITY OF A GROUP OF TEST SUBJECTS IN AN ISOLATION CHAMBER

N. N. Gurovskiy, B. A. Dushkov, and F. P. Kosmolinskiy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 180-181 (See N67-11401 02-04) CFSTI: $8.40

Results of two 15-day isolation chamber experiments, with three persons participating in each, indicate that the more difficulty a person has in tolerating a regime, the more he will depart from his customary reactions. In one experiment, one test subject slept, the second rested, and the third was on watch when observations were made; with each individual alternating between eight hours of sleep and four hours of work. The second experiment employed a six-hour period of sleep, a three-hour period of duty, another six-hour sleep, and a three-hour period of relaxation. M.W.R.

N67-11497# Joint Publications Research Service, Washington, D. C.

FUNCTIONING OF EXTERNAL RESPIRATION IN THE PROCESS OF HIGH ALTITUDE ACCLIMATIZATION AND UNDER CONDITIONS OF EXTREME DEGRESS OF RAREFACTION OF THE ATMOSPHERE IN A BAROMETRIC CHAMBER

G. A. Davydov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 182-183 (See N67-11401 02-04) CFSTI: $8.40

External respiration in man was studied following exposure to high altitude conditions, and gaseous metabolism at extreme levels of atmospheric rarefaction was investigated in a barometric chamber. Following 40 days stay at 4200 meters, the lung capacity did not change; but there is evidence of initial rise in respiratory rate. Respiratory volume increases throughout the stay in the mountains, the breath can be held for shorter periods of time in the rarefied atmosphere, and basal metabolism and respiratory values go back to their original values upon return to the lower altitudes. Studies in the simulated rarefied atmosphere indicate that respiratory rate changes only slightly on ascent, the lung capacity does not display regular changes, the time holding capacity at a simulated altitude of 7500 meters is half that on the ground, and alveolar ventilation upon ascent drops more slowly in persons acclimatized to high altitudes than those who are not. M.W.R.

N67-11498# Joint Publications Research Service, Washington, D. C.

EXPERIMENTAL INVESTIGATIONS OF THE LINK OF HIGHER PLANTS FOR A SYSTEM OF A CLOSED CYCLE OF MATTER

V. P. Dadykin, Ye. V. Lebedeva, N. T. Nikovskaya, and I. V. Tsvetkova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 184 (See N67-11401 02-04) CFSTI: $8.40

A model was calculated for use in the study of higher plants in a closed ecological system, and it was shown that increased yields can be obtained for certain plants than result under normal cultivation conditions. While the details are not presented for either the type of plant or the model, mention is made of the determination of optimum light regimes, characteristics of plant metabolism, and the use of nutrients to replenish mineral supplies expended by the plants. M.W.R.

N67-11499# Joint Publications Research Service, Washington, D. C.

INVESTIGATION OF THE TOLERANCE OF A FLOW OF HEAT AGAINST THE SURFACE OF THE SKIN OF A PERSON

I. I. Dedenko *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 185-185 (See N67-11401 02-04) CFSTI: $8.40

Absorption of heat by a unit of skin surface was studied by blackening the skin of 172 test subjects, and mirrored-type drying lamps were used for the irradiation source. Intensities ranged

from and increased from 2 to 16 cal/cm^2 min, and tolerance time was found to decrease with increasing intensity. With an increase in the heat flow intensity and, to a lesser degree, the area subjected to radiation, the temperature level of the pain threshold decreases. M.W.R.

N67-11500# Joint Publications Research Service, Washington, D. C.

CHANGES IN THE PERFORMANCE OF AUTOMATIC AND NON-AUTOMATIC MOVEMENTS IN SIMULTANEOUS PROCESSING OF SENSORY INFORMATION

Yu. K. Dem'yanenko *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 187–188 (See N67-11401 02-04) CFSTI: $8.40

When additional sensory information is introduced during the performance of tasks which require complex coordinated movements, there is an increase in rate of work above that which is considered optimum. Simultaneously, there is a decrease in the qualitative indices of work. This capacity for so-called differentiated inhibition is interrupted less in persons who have been given more physical training. Particularly, in work involving a high degree of automatic movement, individuals with considerable physical training can perceive additional information. M.W.R.

N67-11501# Joint Publications Research Service, Washington, D. C.

NEW DATA ON THE MECHANISMS OF THE ACTION OF IONIZING RADIATION ON THE FUNCTIONAL PROPERTIES OF THE RETINA

G. G. Demirchoglyan *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 189–190 (See N67-11401 02-04) CFSTI: $8.40

Definite morphological and histochemical changes in the retinas of rabbits are observed following exposure to ionizing radiation, and electroretinograms note shifts in functional properties. Despite these changes, the irradiated optical system continues to perceive and process visual information. Preservation of impulsation in the optical nerve of frogs is noted under intensive radiation, and a lessening in the content of free sulfhydril groups in solutions of rhodopsin, extracted from the retinas of frogs by amperometric titration, is evidenced even though there is not a change in the liberation process for these groups. M.W.R.

N67-11502# Joint Publications Research Service, Washington, D. C.

INVESTIGATION OF THE DYNAMICS OF TRAINING THE CARDIOVASCULAR SYSTEM IN FLIGHT PERSONNEL

T. T. Dzhamgarov, Yu. K. Demiyanenko, L. A. Kustov, and V. L. Marishchuk *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 191–192 (See N67-11401 02-04) CFSTI: $8.40

Examination of EKG's and MKG's of flight personnel showed that a poor reaction to a work load was related to low scores on a modified Harvard step test in almost two-thirds of the subjects; high indices were exhibited by only 9% of the subjects exhibiting poor reactions. The high percentage of failures evidenced by flight personnel in training who had below average scores on the step test is reported as statistically significant. Throughout the testing, unique individual reactions to work loads were reported; thus, emphasizing the importance of the need for highly standardized testing procedures. M.W.R.

N67-11503# Joint Publications Research Service, Washington, D. C.

THE EFFECT ON THE ORGANISM OF ANIMALS OF REPLACING THE NITROGEN OF THE AIR WITH HELIUM UNDER CONDITONS OF A DEFICIENCY OF OXYGEN AND INCREASED CONCENTRATIONS OF CARBON DIOXIDE GAS

A. G. Dianov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 193–194 (See N67-11401 02-04) CFSTI: $8.40

Experiments conducted on rats who were placed in chambers without regenerative oxygen supplies indicate that when helium is replaced for the nitrogen in the atmosphere at 22°C, there is a 42% increase in length of life of the animals. As the chamber temperature increases, this life-prolonging effect decreases; and at 36°C, there are no statistically significant results between the effects of helium-oxygen environment and the air atmosphere. These findings are attributed to the fact that at the higher temperature, there is no difference between body heat and that of surroundings; whereas at the lowered temperature, a cooling effect is provided. M.W.R.

N67-11504# Joint Publications Research Service, Washington, D. C.

ELECTROPHYSIOLOGICAL ANALYSIS OF THE ROLE OF THE DIAPHRAGM NERVES IN THE MECHANISM OF THE VESTIBULAR REACTION OF THE ILEUM

A. S. Dmitriyev and Ye. V. Burko *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 195–196 refs (See N67-11401 02-04) CFSTI: $8.40

A rotational load on narcotized dogs is reported to produce changes in the frequency characteristics of the bioelectric activity in an intact neck nerve; with increases in pulse amplitude accompanying pulse frequency increases. This strengthened reaction is accompanied by suppression of motor functioning in the ileum, and, in 76% of the cases, disappears completely following two-sided cutting of the diaphragm nerves in the neck. In labyrinthless animals, there are no significant changes in bioelectrical activity of the central and peripheral ends of the diaphragm nerve; but in animals with intact labyrinths, there is intensification of pulsation in the center and no change in the peripheral ends. M.W.R.

N67-11505# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF THE NEURO-HUMORAL MECHANISM OF VESTIBULAR INFLUENCE ON THE MOTOR FUNCTIONING OF THE ILEUM

A. S. Dmitriyev and A. A. Pushkarchuk *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 197–198 refs (See N67-11401 02-04) CFSTI: $8.40

Rotation of animals with intact nervous systems and labyrinths causes a significant increase in adrenaline as well as simultaneous suppression of the motor activity of the ileum; and these changes become more marked as the rotational load increases. With intact labyrinths and sectioned splanchnic nerves, the inhibiting actions of the ileum are decreased by 30% under 0.16 g and 6% under 0.6 g loads. The extralabyrinthal systems play a significant role in the case of larger rotational loads, whereas the vestibular nature of the humoral shifts in the blood and the reaction of the ileum are implicated in the case of the smaller loads. M.W.R.

N67-11506# Joint Publications Research Service, Washington, D. C.

THE SIGNIFICANCE OF THE ADRENAL AND THYROID GLANDS IN ADAPTATION TO HYPOXIA AS A METHOD OF INCREASING THE RESISTANCE OF THE ORGANISM

V. P. Dudarev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 199–200 refs (See N67-11401 02-04) CFSTI: $8.40

The role of the adrenal and thyroid glands in gradual acclimatization to high altitudes was investigated, along with the effect of the thyroids on resistance to acceleration action. An adrenalectomy in rats is accompanied by a reduction in erythrocyte content and hemoglobin in the circulating blood; and high level acceleration decreased survival rate, whereas administration of ACTH, cortisone, and desoxycorticosterone acetate resulted in a return to the original or higher life expectancy. Rats without thyroid glands were found to be capable of adapting to the higher altitudes; and although their consumption of oxygen was reduced, these rats exhibited almost the same increase in hemoglobin and erythrocyte

content as the intact animals. It is noted that in all of the animals these increases were greater when the initial level was lower and the degree of oxygen insufficiency was reduced. M.W.R.

N67-11508# Joint Publications Research Service, Washington, D. C.

INVESTIGATION OF THE ACCURACY AND STABILITY OF TIME-FORCE REACTIONS IN VARIOUS POSITIONS OF THE HUMAN BODY

B. A. Dushkov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 203-204 (See N67-11401 02-04) CFSTI: $8.40

Functional tests of muscular strength, endurance, feeling of time, and muscle-joint sensitivity, as well as determinations of mental and physical working ability, were used to study the accuracy and stability of time-force reactions in various body positions that might be encountered by an astronaut for a prolonged period of time. There is a gradual adaptation to a forced position that is related to the time spent in it; and working capacity decreases with the complexity of the position. The prolonged stay in an inconvenient position disturbs coordination of force reactions and calculating time; and this is apparently related to the cyclic course of stimulation and inhibition in central nervous system neurons. M.W.R.

N67-11509# Joint Publications Research Service, Washington, D. C.

SOME PROBLEMS OF THE PLANNING AND ANALYSIS OF PHYSIOLOGICAL FLIGHT EXPERIMENTS

B. B. Yegorov, A. D. Yegorov, A. A. Kiselev, and I. S. Shadrintsev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 205-206 (See N67-11401 02-04) CFSTI: $8.40

Mention is made of the critical analysis of physiological information obtained on man and animals during space flights, as well as of the planning of flight experiments. The selection of parameters and interpretation of data are listed as tasks of primary importance, and mathematical models are considered necessary to the solution of these physiological problems. M.W.R.

N67-11510# Joint Publications Research Service, Washington, D. C.

THE FUNCTIONAL CONDITION OF CERTAIN INTERNAL ORGANS UPON THE ACTION OF RADIAL FORCES AND CORIOLIS FORCES DURING MULTI-DAY EXPERIMENTS IN A SLOWLY ROTATING ROOM

P. I. Yegorov, T. V. Benevolenskaya, M. M. Korotayev, M. B. Reutova, L. M. Filatova et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 207 (See N67-11401 02-04) CFSTI: $8.40

Various functional changes in internal organs are observed on six healthy subjects who were confined for three and six days in a rotating room. At a rotational speed of 40°/sec for three days, changes included: (1) hypoglycemia and inadequate reaction of pancreatic beta cells to insulin secretion, (2) acute hyperkaliemia and moderate reduction in kidney functioning, (3) decreased liver secretions, and (4) a tendency for certain blood changes, such as increase activity of the cholinesterase and a sharp drop in properdin. At a speed of 10°/sec for a 7-day stay, reactions included: (1) lowered T-wave and electrocardiograms at all leads, (2) less adaptability of the cardiovascular system to physical loads, (3) stronger ocularcardiac refleces, and (4) lowering of cholinesterase activity and increase in properdin in the blood. M.W.R.

N67-11511# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF HYPOKINESIA AND A FOOD RATION OF HOMOGENIZED PRODUCTS ON THE FUNCTIONAL STATE OF THE HUMAN ORGANISM

P. I. Yegorov, V. S. Dupik, N. P. Yermakova, M. M. Korotayev, Ye. N. Kochina et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 208-209 (See N67-11401 02-04) CFSTI: $8.40

When four young men were confined in a horizontal position under conditions of limited isolation, all of them displayed a decreased respiratory volume and lung capacity. The two who received a special diet, but with the same 2200 calories as those who received ordinary food, displayed a greater increase in oxygen consumption. Changes in EKG's, noted for all the subjects for more than 12 days after the experiment, were lowering of the R and T voltage waves, bradicardia, and a turning of the axis to the right. M.W.R.

N67-11512# Joint Publications Research Service, Washington, D. C.

RESULTS AND WAYS OF STUDYING THE FUNCTIONING OF CERTAIN ANALYZERS AS APPLIED TO THE CONDITIONS OF SPACE FLIGHT

M. D. Yemel'yanov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 210-211 (See N67-11401 02-04) CFSTI: $8.40

Analysis is made of data related to vestibular functioning and motor activity under space flight conditions. Among the observations made are: (1) transitory changes in gastrointestinal functioning and liver secretions, (2) loss of weight, (3) decrease of diuresis, (4) increase of Ca and K content of blood, (5) neurodynamic disturbances, and (6) and some increase to light sensitivity. M.W.R.

N67-11513# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF THE INFLUENCE OF OXYGEN ON THE LEVEL OF ACTIVITY OF ACETYLCHOLINESTERASE OF THE BRAIN OF ANIMALS

N. S. Yeremeyev and G. V. Troshikhin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 212-213 (See N67-11401 02-04) CFSTI: $8.40

Prolonged effects of hyperoxic environments with varying amounts of oxygen are investigated in terms of activity of the acetylcholinesterase in the brain of white mice. This activity is found to increase with increasing oxygen content in the atmosphere, and is considered primarily due to an increase in the functioning of the vegetative nervous system. M.W.R.

N67-11514# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF HIGH TEMPERATURES ON THE FUNCTIONAL CAPACITIES OF MAN

A. V. Yeremin, V. I. Kopanev, A. N. Azhayev, N. A. Lysakov, and S. V. Zhadovskaya *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 214-215 refs (See N67-11401 02-04) CFSTI: $8.40

Working ability in man in air temperatures of 40° 60° and 80°C is evaluated, and a lowering of ability is reported after a 60-minute stay at 40°C. Note is made of changes in the visual analyzer, thresholds of electrical excitability of the eyes, and weight of the tests subjects. An increase in body temperature of 0.3°C is noted, along with increased frequency of cardiac contractions. M.W.R.

N67-11515# Joint Publications Research Service, Washington, D. C.

THE STUDY OF THE SUPPLYING OF FLIGHT CREWS OF CIVIL AVIATION WITH CERTAIN FOODSTUFFS DEPENDING ON THE NEW CONDITIONS OF THEIR WORK

V. V. Yefremov, L. M. Solov'yeva, G. M. Makhkamov, V. Ya. Gilinskiy, A. G. Kozlova et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 216-217 (See N67-11401 02-04) CFSTI: $8.40

Food requirements and vitamin deficiencies among civilian flight personnel are discussed. In order to compensate for these deficiencies, which continue to exist after the crews return to land, it is recommended that diets include increased animal proteins, fruits, and vegetables; as well as reduced caloric content and administration of multiple vitamins. M.W.R.

N67-11516# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF INVESTIGATING THE WORKING CAPACITY OF AN OPERATOR UNDER CONDITIONS OF A PROLONGED STAY IN A DUMMY SPACE SHIP

S. G. Zharov, A. P. Kuz'minov, I. I. Kas'yan, D. G. Maksimov, V. F. Onishchenko et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 219-220 (See N67-11401 02-04) CFSTI: $8.40

Human reaction to prolonged isolated conditions was investigated in a simulated spacecraft. Following a 3-day stay, the general condition of test personnel does not change very much; working capacity decreases on the first day, but returns to normal for the second and third days. More pronounced lowering of work capacity is found during a 12-day simulated trip; with lowered capacities noted on the first, fifth, seventh, and eleventh days. M.W.R.

N67-11517# Joint Publications Research Service, Washington, D. C.

THE SPEED OF THE FORMATION OF CONDITIONED REFLEXES AND THE LEVEL OF THE ABSORPTION OF THE OXYGEN IN ANIMALS LOCATED FOR A PROLONGED PERIOD IN A HELIUM ATMOSPHERE ENRICHED WITH OXYGEN

A. G. Zhironkin and G. V. Troshikhin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 221 (See N67-11401 02-04) CFSTI: $8.40

A decrease in the speed of conditioned reflexes and motor reactions and an increase in the level of gaseous metabolism in mice exposed to a prolonged stay in a helium environment enrichment with oxygen is attributed to the thermal conductivity role of helium which facilitates the cooling of the animals and shifts their heat comfort zone. By the end of the 12-day stay, the EEG showed congestive exaltation of the alpha rhythm; and the EMG was reduced from 300 to 200 microvolts upon the appearance of sudden signals and from 650 to 480 microvolts for cutaneous signals. M.W.R.

N67-11518# Joint Publications Research Service, Washington, D. C.

SOME RESULTS AND PROSPECTS OF STUDYING THE BIOLOGICAL ACTION OF SPACE RADIATION AND DYNAMIC FLIGHT FACTORS WITH THE HELP OF MICROBIOLOGICAL AND CYTOLOGICAL MODELS

N. N. Zhukov-Verezhnikov, I. N. Mayskiy, G. P. Tribulev, N. I. Rybakov, I. I. Podoplelov et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 222-223 (See N67-11401 02-04) CFSTI: $8.40

Results of biological effects on Vostok and Voshkod spacecraft are reviewed in terms of cosmic radiation hazards. It is noted that there is an increased sensitivity of lysogenic bacteria to gamma radiation if the system is first subjected to the effects of vibration. Mention is made of the use of cytological models and the restoration of cells during spaceflight. M.W.R.

N67-11519# Joint Publications Research Service, Washington, D. C.

PSYCHOPHYSIOLOGICAL ASPECTS OF THE ACTIVITY OF MAN IN AUTOMATED CONTROL SYSTEMS

N. D. Zavalova and V. A. Ponomarenko *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 224-225 refs (See N67-11401 02-04) CFSTI: $8.40

Pilot performance under stress conditions is considered in terms of adapting to conditions of increased activity, and the role of man in an automated control system is mentioned. Time characteristics, the level of physiological reserve, and quality of the activity are the criteria of working ability. M.W.R.

N67-11520# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF A CHANGED GASEOUS ENVIRONMENT ON THE OCCURRENCE AND COURSE OF DECOMPRESSION DISORDERS

V. P. Zagryadskiy, O. Yu. Sidorov, and Z. K. Sulimo-Samuyllo *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 226 (See N67-11401 02-04) CFSTI: $8.40

The influence of excess carbon dioxide and the resulting decompression disorders are investigated in dogs and rats, some of whom had been previously acclimated to a gaseous environment. More rapid and profuse formation of gas emboli is facilitated by a preliminary stay in an atmosphere with increased carbon dioxide content, and decompression sickness results more frequently under these adverse conditions than in a normal air environment. M.W.R.

N67-11521# Joint Publications Research Service, Washington, D. C.

THE FUNCTIONAL CONDITION OF THE CENTERS OF THE NERVOUS SYSTEMS OF MAN AND ANIMALS UPON THE FORMATION OF A SPASMATIC REACTION UNDER CONDITIONS OF HYPEROXIA

G. L. Zal'tsman, I. D. Zinov'yeva, A. A. Savich, and A. I. Selivra *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 227-228 (See N67-11401 02-04) CFSTI: $8.40

The results of an investigation of higher nervous activity during conditions of hyperoxia are briefly discussed. It is reported that there are shifts in the functional state of individual brain structures during the initial phase of increased oxygen pressures. However, these shifts are still compensated for and are not manifested in behavioral and vegetative reactions, a change of which would have an adaptive character. A.G.O.

N67-11522# Joint Publications Research Service, Washington, D. C.

TRANSAMINASES OF THE BLOOD AS AN INDEX OF THE TOLERANCE BY MAN OF THE SHOCK LOADS OF LANDING

I. P. Zinov'yeva, L. A. Rubashkina, and V. K. Kostin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 229-230 (See N67-11401 02-04) CFSTI: $8.40

The feasibility of using transaminases of the blood as criteria to determine human tolerance characteristics during landing load conditions is considered. It is reported that investigations which were conducted showed that under the action of shock loads the activity of transaminases is a sufficiently sensitive test which makes it possible to a certain degree to judge the reaction of an organism to an applied effect. A.G.O.

N67-11523# Joint Publications Research Service, Washington, D. C.

THE BIOLOGICAL EFFECT OF A 12-TIME REPEATED GAMMA RADIATION TREATMENT OF WHITE MICE

T. M. Zukhbaya, M. P. Kalandarova, B. A. Markelov, N. A. Popova, Ye. P. Sizan et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 231-232 (See N67-11401 02-04) CFSTI: $8.40

Results are presented from an investigation in which white mice were subjected to repeated once-a-month gamma radiation with a dose of 12.5 roentgens to a total dose of 150 roentgens/year. Consideration is given briefly to the hemopoietic system, mitotic activity in cornea epithelium, chain motor conditioned reflexes, and radiation injury compensation in the central nervous system A.G.O.

N67-11524# Joint Publications Research Service, Washington, D. C.

THE DYNAMICS OF CHANGES OF RESPIRATION, BLOOD CIRCULATION, AND BLOOD UNDER THE CONDITIONS OF THE COMPLEX ACTION OF A CHANGED GASEOUS ENVIRONMENT AND FUNCTIONAL DEAFFERENTATION OF THE CENTRAL NERVOUS SYSTEM

Yu. N. Ivanov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 233-234 (See N67-11401 02-04) CFSTI: $8.40

Consideration is given to the effect of gaseous environment changes on central nervous system functions. It is reported that deafferentation of the central nervous system and the subsequent change of the cerebral cortex functional state inevitably lead to a drop in the sensitivity of the reactions of respiration, blood pressure, satruation of the blood with oxygen, and the blood to the action of a changed gaseous environment. A.G.O.

N67-11525# Joint Publications Research Service, Washington, D. C.

THE DYNAMICS OF THE PARTIAL PRESSURE OF OXYGEN IN VARIOUS FORMATIONS OF THE BRAIN WHEN BREATHING OXYGEN UNDER NORMAL CONDITIONS, AFTER UNDERGOING ANOXIA, AND IN THE CASE OF DISTURBANCES OF BLOOD CIRCULATION IN THE BRAIN

Ye. A. Il'in *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 235-236 (See N67-11401 02-04) CFSTI: $8.40

Oxygen partial pressure measurements in the cortex, hippocampus, hypothalamus, and the reticular formation of the brain stem indicated that rhythmic changes occur in the initial pressure level at a frequency of 2-6 fluctuations per second. In three experiments the increase of pO_2 in the cerebral cortex upon breathing oxygen was preceded by a slight decrease, apparently indicating the vasoconstrictive influence of the oxygen. After anoxia the breathing of oxygen led to a considerable increase of the pO_2 in the cerebral cortex and in the subcortical formations of the brain. In the case of brain circulation disturbance due to an increase of intracranial pressure the oxygen regime did not change. A.G.O.

N67-11526# Joint Publications Research Service, Washington, D. C.

THE DYNAMICS OF THE FUNCTIONAL STATE OF THE BLOOD CIRCULATION APPARATUS IN A ATHLETES UNDER THE INFLUENCE OF RESTRICTION OF MOTOR ACTIVITY

L. A. Ioffe, Yu. M. Stoyda, and T. D. Vasil'yeva *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 237-238 (See N67-11401 02-04) CFSTI: $8.40

The prevention of unfavorable effects from limited motor activity on the functioning of the cardiovascular system is considered. Results are presented from studies on the effects of a 10-day bed regime on the electrical activity of the heart and on the readings of cardiodynamics and arterial pressure in highly qualified weightlifters and distance runners. A.G.O.

N67-11527# Joint Publications Research Service, Washington, D. C.

THE SPEED OF THE PERCEPTION AND PROCESSING OF INFORMATION BY A PILOT UNDER ORDINARY AND EMERGENCY CONDITIONS

L. S. Isaakyan *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 239-241 (See N67-11401 02-04) CFSTI: $8.40

Methods for calculating the throughput capacity of pilots are developed for normal and emergency flight conditions. It is also shown that from the information theory viewpoint, the throughput capacity of a flier necessary for the perception and comprehension of an emergency situation in the form of an engine failure can be calculated as the product of the objective probability of the given failure for the magnitude, return time, and comprehension of the situation. A.G.O.

N67-11528# Joint Publications Research Service, Washington, D. C.

THE PROBLEM OF DECALCINATION IN THE CASE OF HYPODYNAMIA OF MAN AS APPLIED TO THE CONDITIONS OF PROLONGED SPACE FLIGHT

L. I. Kakurin and Ye. N. Biryukov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 242-243 (See N67-11401 02-04) CFSTI: $8.40

An outline is given of the problem of decalcination that is experienced as a result of a restriction in muscular activity. The physiological reactions based on a disturbance of the calcium metabolism are cited, and it is concluded that preventative problems can be solved in experiments conducted on earth. C.T.C.

N67-11529# Joint Publications Research Service, Washington, D. C.

VISUAL RECOGNITION OF IMAGES AND DETERMINATION OF THE DEGREE OF THEIR RESEMBLANCE

A. N. Kalinina, V. G. Stepanov, and Ye. I. Shugam *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 244-245 (See N67-11401 02-04) CFSTI: $8.40

A determination was made of the connection between recognition and the similarity of given images in the process of receiving and processing information by visual observation. Also investigated was the hypothesis that under certain conditions the last reception will receive the advantage with respect to rapidity of recognition without significant loss of accuracy. The investigations were conducted by giving a test subject a series of images with an etalon. A series with increasing similarity was then compiled, with each image given a number in the series. Distributions of the numbers given to a certain image by various test subjects were then constructed, and the mathematical expectations and dispersions of these distributions were calculated. C.T.C.

N67-11530# Joint Publications Research Service, Washington, D. C.

THE ROLE OF THE CERVICAL AND ABDOMINAL REGIONS OF THE SYMPATHETIC NERVOUS SYSTEM IN CHANGES OF THE BLOOD AND BLOOD CIRCULATION UPON THE ACTION OF CHRONIC HYPOXIA AND IONIZING RADIATION

T. V. Kalinina *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 246-247 (See N67-11401 02-04) CFSTI: $8.40

Experiments were conducted with 227 male rats, with different series of rats subjected to chronic hypoxia in the form of a month of training. This training consisted of four hours each day in a barometric chamber with gradual ascent to an altitude of 7500 meters and subsequent irradiation with various doses of X-rays. The effects of removing the cervical and abdominal parts of the sympathetic nervous system were then investigated by following the indices of the peripheral blood, blood pressure, and the tonus of the peripheral vessels. Various other procedures, observations, preliminary results, and conclusions are presented. C.T.C.

N67-11531# Joint Publications Research Service, Washington, D. C.

SOME PROBLEMS OF THE AUTOMATION OF THE PROCESSING OF PHYSIOLOGICAL INFORMATION OBTAINED ON SPACE FLIGHTS AND ACCOMPANYING INVESTIGATIONS

A. P. Kalinovskiy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 248-249 (See N67-11401 02-04) CFSTI: $8.40

A brief discussion is presented of the decoding and scientific analysis of physiological information obtained from space flights. Emphasis is placed on relatively narrow problems in which information to be processed is presented in the form of electric signals coming to the input of an analyzing apparatus without recording at an intermediate carrier. C.T.C.

N67-11532# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF MEXAMINE ON THE GASEOUS METABOLISM OF ANIMALS UNDER CONDITIONS OF A CHANGED GASEOUS ENVIRONMENT

Ye. Ya. Kaplan and V. V. Ogleznev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 250 (See N67-11401 02-04) CFSTI: $8.40

The effect of mexamine (5-methoxytryptomine) on the gaseous metabolism of white rats under conditions of increased and reduced oxygen content was investigated. Results indicated that there was a reduction in the consumption of oxygen and release of carbon dioxide (by 10 35%). Based on these results it was concluded that antioxidants such as mexamine can be used to increase the resistance of organisms to oxygen starvation. A.G.O.

N67-11533# Joint Publications Research Service, Washington, D. C.

INCREASING THE RESISTANCE OF AN ORGANISM TO HYPOXIA WITH THE HELP OF ANTIOXIDANTS

Ye. Ya. Kaplan *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 251-252 (See N67-11401 02-04) CFSTI: $8.40

An investigation was conducted to determine the effects of the pharmacological agents, mexamine, BYe-57, and ambunol, on the resistance of an organism to oxygen deficiency under conditions of aviation and space flight. It was established that respiration stoppage occurred later in animals which had received the antioxidants. Based on these experimental results it was concluded that the use of agents from the antioxidant group is fully justified. A.G.O.

N67-11534# Joint Publications Research Service, Washington, D. C.

ASPECTS OF SPEECH ASSOCIATIVE ACTIVITY UNDER CONDITIONS OF A LACK OF TIME AND THE PRESENCE OF INTERFERENCE CLOSE IN CONTENT TO A USEFUL SIGNAL

M. A. Kareva and M. A. Novikov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 253-254 (See N67-11401 02-04) CFSTI: $8.40

The activities of test subjects under conditions of interference and time shortage are compared. The most typical kinds of oral associative disruptions are mentioned, and the reasons for their occurrence are examined. Experimental data are also presented from dynamic stereotype research. A.G.O.

N67-11535# Joint Publications Research Service, Washington, D. C.

PROBLEMS OF DESIGNING THE LOCAL PROTECTION OF AN ASTRONAUT

O. N. Karpov, Ye. Ye. Kovalev, G. F. Nevskaya, and L. N. Smirennyy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 255 (See N67-11401 02-04) CFSTI: HC $8.40

A method for calculating local shielding is described which is based on the determination of shielding effectiveness of a given critical organ by the design elements of the ship, taking into account the screening of this organ by other parts of the human body. For the calculations use was made of the dose relation to the depth of the tissue for given thickness of the shielding. It is reported that results of the calculations show the possibility of saving weight when using local shielding. A.G.O.

N67-11536# Joint Publications Research Service, Washington, D. C.

ANALYSIS AT THE NEURON LEVEL OF THE READJUSTMENT OF THE RESPIRATORY CENTER UNDER CONDITIONS OF BREATHING WITH EXCESS INTRAPULMONARY OXYGEN PRESSURE

M. V. Kirzon and G. G. Chernova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 256-258 (See N67-11401 02-04) CFSTI: $8.40

A study was made of the bulbar respiratory neurons in cats which had been narcoticized with nembutal and in cats which had been decerebrated by means of an intracellular microelectrode lead, under conditions of excess intrapulmonary oxygen pressure. The significant results are a confirmation of the existence of a readjustment in the activity of the respiratory center, and an indication of its nature at the neuron level. C.T.C.

N67-11537# Joint Publications Research Service, Washington, D. C.

INVESTIGATION OF THE FREQUENCY-AMPLITUDE CHARACTERISTICS OF HEAT TONES USING MODERN ACOUSTICAL TECHNIQUES

A. M. Kirsanov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 259-260 (See N67-11401 02-04) CFSTI: $8.40

Emphasis is placed on a description of the identifying features of a system for studying cardiac tones and noises in man. This system is based on a variation of the spectral phonocardiographic method, in which the test subjects are located in a special acoustical chamber. The recording of sound phenomena connected with cardiac activity is then accomplished with the aid of a condenser microphone and a microphone amplifier. C.T.C.

N67-11538# Joint Publications Research Service, Washington, D. C.

THE POSSIBILITY OF USING A POLYCARDIOGRAPHIC METHOD FOR CHECKING THE CONDITION OF ASTRONAUTS IN FLIGHT

A. A. Kiselev, S. O. Nikolayev, and G. K. Chizhov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 261-262 (See N67-11401 02-04) CFSTI: $8.40

Consideration is given to the possibility of using a polycardiographic method for evaluating the condition of blood circulation in a space flight environment. This method is based on an analysis of the phase structure of the cardiac cycle with the aid of polycardiographic curves. It is reported that this method can be used to give a quantitative characterization of the contractive ability of the myocardium, determine the time relation between the electrical and mechanical manifestations of heart activity, and evaluate the condition of the apparatus for the regulation of blood circulation. C.T.C.

N67-11539# Joint Publications Research Service, Washington, D. C.

A THERMOGRAM OF THE BRAIN OF ANIMALS SUBJECTED TO THE INFLUENCE OF ACCELERATIONS

V. Ya. Klimovitskiy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 263-264 (See N67-11401 02-04) CFSTI: $8.40

An experiment is reported in which the temperature of the carotid artery and the parietal and frontal surfaces of the brain was recorded during transverse and longitudinal accelerations. Results of the experiment indicate a probable suppression of functional heat production in the tissues of the brain after accelerations. C.T.C.

N67-11540# Joint Publications Research Service, Washington, D. C.

REACTION OF THE CEREBELLUM TO AFFERENT STIMULATION UNDER THE INFLUENCE OF LOADS

L. D. Klimovskaya, N. P. Smirnova, and A. T. Poleshchuk *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 265-266 (See N67-11401 02-04) CFSTI: $8.40

The reaction of the cerebellum to afferent effects which might be experienced during space flight was investigated in white rats. The method of evoked potentials was used on rats subjected to

the action of transverse directed overloads of 10 g for 4 minutes. It was found that the acceleration causes considerable changes in the functional state of the afferent systems of the cerebellum. The significant conclusion is that the transition to a state of weightlessness occurs upon disruption of the adequate perception of afferent impulsation by the cortex of the cerebellum. C.T.C.

N67-11541# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF THE FOOD VALVE OF THE PROTEIN OF UNICELLULAR ALGAE

N. S. Klyushkina, I. T. Troitskaya, A. S. Ushakov, and V. I. Fofanov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 267 (See N67-11401 02-04) CFSTI: $8.40

The procedure used to determine the food value of the protein of unicellular algae for application to life support systems is briefly discussed. Two groups of rats, one with unicellular algae as the only protein source and the other with casein and soy protein sources, were examined. Results indicated that the protein of the unicellular algae (chlorella and scenedesmus) had high biological value, but it was also noted that the rats on this diet showed some lagging in weight. L.E.W.

N67-11542# Joint Publications Research Service, Washington, D. C.

BASIC PROBLEMS OF MODELING THE EFFECTS OF SPACE RADIATION ON BIOLOGICAL OBJECTS

Ye. Ye. Kovalev, V. I. Popov, and M. A. Sychkov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 268 (See N67-11401 02-04) CFSTI: $8.40

Methods used to model the effects of various types of space radiation on biological subjects are briefly considered, and some of the problems involved are mentioned. It is pointed out that the time parameters and magnitude of the effect of space radiation are modeled with the help of gamma radiation. For the modeling of solar flares, the physical conditions for the radiobiological experiments were created using a synchrocyclotron in a range of energies up to 50 MeV. A device was made for the irradiation of cultures by multicharged ions to simulate the ends of the path of heavy charged particles. It was also felt that the radiation effect of heavy ions on large biological specimens might be modeled by using microcollimated beams of high energy electrons. L.E.W.

N67-11543# Joint Publications Research Service, Washington, D. C.

THE DYNAMIC OXYGENOTOPOGRAPHY OF AN ORGANISM

Ye. A. Kovalenko *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 269 (See N67-11401 02-04) CFSTI: $8.40

Various topics related to the dynamics of oxygen in an organism are briefly summarized. These include basic levels of oxygen tension in various organs and tissues, the use of oxygenotopography, and movement of oxygen into the tissues based on diffusion theory. L.E.W.

N67-11545# Joint Publications Research Service, Washington, D. C.

THE DYNAMICS OF PHYSIOLOGICAL INDICES IN A TEST OF PROLONGED STANDING IN EVALUATING THE FUNCTIONAL CONDITION OF AN ORGANISM IN THE AFTERMATH OF PROLONGED STAND EXPERIMENTS

O. P. Kozerenko *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 272-273 (See N67-11401 02-04) CFSTI: $8.40

An experiment involving prolonged standing (20 min) for the purpose of investigating aspects of the interaction of the motor and vascular systems in accomplishing locomotor and pose establishing activity is briefly summarized. An uneven lowering of the vascular and muscular tonus was noted and a condition of asthenia occurred. It was pointed out that shifts in the recorded physiological indices provided evidence of a change in the mechanisms for regulation of the physiological functions which provide the optimum reaction in each case outside of the experimental influence. L.E.W.

N67-11544# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF CONDENSING PHYSIOLOGICAL INFORMATION

V. I. Kozharinov, V. S. Magedov, and I. S. Shadrintsev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 270-271 (See N67-11401 02-04) CFSTI: $8.40

The problems connected with data storage and reduction posed by prolonged physiological experiments are pointed out. Two solutions are suggested: preliminary processing of information by isolating certain measured parameters from the processes under study; and distinguishing the most important results of the experiment. It is noted that although a considerable reduction in the volume of recorded information will be attained, the diagnostic values of the experiment will not be reduced. L.E.W.

N67-11546# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF A STRONG SOUND STIMULUS ON ACOUSTICAL PERCEPTION OF THE TONES AND SPEECH OF CIVIL AVIATION FLIGHT PERSONNEL

V. M. Kozin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 274 (See N67-11401 02-04) CFSTI: $8.40

An investigation conducted to determine the adaptation of an auditory analyzer to the acoustic environment is reported. The experiment was based on working experience under given conditions related to the tones and speech of civil aviation flight personnel. Preliminary data on the abilities of the analyzer are briefly presented. L.E.W.

N67-11547# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF PRESERVING DRINKING WATER USING IONIC SILVER

G. I. Kozyrevskaya, Yu. S. Koloskova, N. N. Sitnikova, S. V. Chizhov, and Z. P. Pak *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 275-276 (See N67-11401 02-04) CFSTI: $8.40

The problems involved in preserving the taste and sanitary hygienic qualities of drinking water for the crews of spacecraft are briefly outlined. Experimental data on the properties of ionic silver used as a preserving agent are mentioned. It was pointed out that the minimum dose of silver that provides a persistent bactericidal effect for 6 months is 0.1 mg/liter; ionic silver in doses 10 times or more in excess of the minimum bactericidal dose does not have a toxic effect on the organism of test animals; and man's use of water preserved by ionic silver in a dose of 0.1 mg/liter for 15 days does not cause any pathological changes in the functional conditions of the organs or systems. L.E.W.

N67-11548# Joint Publications Research Service, Washington, D. C.

A ROTARY TEST AS A METHOD OF DETERMINING LATENT FORMS OF MOTION SICKNESS UNDER CONDITIONS OF WEIGHTLESSNESS

I. A. Kolosov, I. F. Chekirda, V. I. Lebedev, G. F. Khlebnikov, and I. I. Kas'yan *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 277-279 (See N67-11401 02-04) CFSTI: $8.40

Several astronauts, who had previously demonstrated high resistance of the vestibular analyzer to motion sickness, were subjected to a modified version of Barany's rotary test (10 revolutions in 10 sec) under conditions of horizontal flight in a jet airplane and under conditions of brief weightlessness (25 sec). The vestibular

analyzer was studied with respect to three basic components: somatic (duration of postnystagmus), vegetative (pulse rate, sweatiness, skin coloring), and sensory (subjective sensations, illusion of counterrotation). It was found that under these conditions 18.2% of the test subjects had a latent form of motion sickness. In the second stage of the test, in which subjects experienced transition from overloads to weightlessness, an additional 22.2% of the subjects demonstrated symptoms of motion sickness. Causes for motion sickness under both test conditions are proposed. L.E.W.

N67-11549# Joint Publications Research Service, Washington, D. C.

FURTHER DEVELOPMENT OF THE OTOLITHIC THEORY OF MOTION SICKNESS

G. L. Komendantov, V. S. Kompanets, V. I. Kompanev, S. I. Poleshchuk, N. A. Razsolov et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 280-281 refs (See N67-11401 02-04) CFSTI: $8.40

The main points of the otolithic theory of motion sickness are briefly delineated, and recent developments in this theory are summarized. From an investigation of these papers the following data were established: (1) the presence of phases in the development of motion sickness, (2) fluctuation of functions, whose amplitude depends on the phase of development, (3) disturbance of the functional systemic state as an additional mechanism of motion sickness, (4) occurrence of the illusion of rocking and corresponding compensatory motor reactions, (5) specific nature of the course of motion sickness at altitudes of 2000, 3000, 4000, and 5000 m, (6) change of the excitability and lability of the visual analyzer in the latent form of motion sickness, (7) changes of atrioventricular conductivity during the various phases, (8) influence of dibazol on latent motion sickness, and (9) inhibition of lift reflexes in the case of prolonged standard rocking of animals and the restoration of these reflexes on change of the rocking regime, and the possibility of using motion sickness to detect latent functional deficiencies. L.E.W.

N67-11550# Joint Publications Research Service, Washington, D. C.

THE COMBINED ACTION OF ACCELERATION AND IONIZING RADIATION ON THE ORGANISM OF ANIMALS

N. I. Konnova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 282 (See N67-11401 02-04) CFSTI: $8.40

The combined influence of acceleration and ionizing radiation on mice, rats, and dogs was evaluated on the basis of mortality, length of life of the test animals, body weight, and peripheral blood. In the tests on mice, it was found that contrifuging both before and after a 600 R gamma ray dose increases the survivability of the animals by 8% to 12%. In the experiments on rats there were no statistically reliable differences in tests of survival and average length of life between the test and control groups. Testing of the dogs established that in the animals subjected to the combined action of acceleration and irradiation, leucopenia was more pronounced. L.E.W.

N67-11551# Joint Publications Research Service, Washington, D. C.

THE RADIATION SENSITIVITY OF WHITE RATS UNDER CONDITIONS OF HYPOTHERMIA

L. G. Kon'kova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 283-284 (See N67-11401 02-04) CFSTI: $8.40

A comparison of the radiation sensitivity of white rats irradiated in a state of hypothermia and at normal body temperature was made on the basis of genital system and fertility, peripheral blood, and change of weight. The following results were indicated: (1) The sexual cycle of rats irradiated in a state of hypothermia occurred without significant deviation from the norm; however, rats irradiated at normal body temperature exhibited serious disturbances during the course of the extra cycle appearing as a prolongation of the stage of diestrus and decrease in the number of normal cycles. (2) In respect to fertility, it was found that females subjected to irradiation in the state of hypothermia and mated with nonirradiated males produced vital progeny, which did not occur in females irradiated at normal body temperatures. (3) Changes in peripheral blood were more weakly expressed in animals irradiated in the state of hypothermia. L.E.W.

N67-11552# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF VIBRATION ON THE HUMAN ORGANISM

A. A. Koreshkov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 285 (See N67-11401 02-04) CFSTI: $8.40

Data from an experimental study of the influence of general vertical vibrations with a frequency of 50 cycles and an amplitude of oscillation of 0.5 mm during the course of 1 hr on the organism of a healthy human being are mentioned. L.E.W.

N67-11553# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF BRIEF INTENSIVE LIGHT FLASHES ON ADAPTATION TO DARKNESS AND ON VISUAL ACUITY

P. A. Korzun *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 286-287 refs (See N67-11401 02-04) CFSTI: $8.40

The effect of the color nature of brief intensive flashes on light sensitivity and visual acuity of the human eye was examined. The flashes were produced with an impulse lamp, and red, blue, and green flashes were obtained with the use of filters. The following patterns were established: (1) After brief intensive illumination of the periphery of the retina with blue and green flashes, light sensitivity was reduced by 5 to 30 times, and the duration of this reduction varied from 15 to 30 min. (2) After illumination of the retina with red flashes, the light sensitivity was the same as after readaptation. (3) In the case of illumination of the macular area of the retina the light sensitivity is restored just as quickly as after readaptation to the sphere. (4) Visual acuity is reduced the least and returns most quickly to the initial level after illumination with flashes of blue light. L.E.W.

N67-11554# Joint Publications Research Service, Washington, D. C.

THE DYNAMICS OF THE ADAPTATION OF THE HUMAN ORGANISM UNDER CONDITIONS OF PROLONGED SPACE FLIGHT

A. V. Korobkov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 288-289 (See N67-11401 02-04) CFSTI: $8.40

Various aspects of simulating the conditions of prolonged space flight and its effects on the human body are summarized. It is noted that adaptation to hypodynamia and hyperdynamia is characterized by a series of general shifts in the endocrine system, the resistance of capillaries, and other reactions. Four stages of adaptation to prolonged space flight are delineated, and characteristics of adaptation during the first stage are briefly reported. Investigation of changes of the functional condition of persons with varying degrees of physical training showed an adjustment of the control of movements in persons with a high level of physical training. It is pointed out that the most important condition for the expansion of human possibilities for active actions under these conditions is a properly organized regime of motor and psychic activity with the use of food, pharmacology, and other factors in preliminary training, during the space flight, and during the restorational period. L.E.W.

N67-11555# Joint Publications Research Service, Washington, D. C.

CHANGE OF THE MOTOR FUNCTIONING OF ATHLETES UNDER THE INFLUENCE OF THE CONDITIONS OF RESTRICTED MOBILITY

A. A. Korobova and G. G. Ratishvili *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 290-291 (See N67-11401 02-04) CFSTI: $8.40

The effect of multiday hypokinesis on the accuracy of performing a movement by weight lifters and distance runners was studied. A detailed description of the accuracy of the movement was provided by determining its dynamics under the influence of maximum loads (running on a treadmill for speed and endurance). It was concluded that many days of the effects of hypokinesis in athletes does not cause considerable changes in the degree of precision of the performance of movements, and that the regime of muscular activity and systematic training of the motor apparatus facilitates better tolerence of extreme factors. L.E.W.

N67-11556# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF THE INFLUENCE OF CHANGES OF SENSORY LOADS UNDER FLIGHT CONDITIONS

F. P. Kosmolinskiy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 292 (See N67-11401 02-04) CFSTI: $8.40

Various aspects of simulating prolonged space flight conditions and the effect of changes of psychophysiological sensory loads on the human organism are briefly considered. It is pointed out that among the factors affecting the human body would be the situational ones, e.g., social isolation, monotony, and sensory deprivation. A method of investigating the alternating effect of reduced and increased afference under conditions of complex aviation flights is also mentioned. L.E.W.

N67-11557# Joint Publications Research Service, Washington, D. C.

CAMPIMETRIC INVESTIGATIONS OF MAN UNDER PROLONGED ACCELERATIONS

E. S. Kotova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 293 refs (See N66-11401 02-04) CFSTI: $8.40

The effects of subjection to repeated action of transverse accelerations of various magnitudes on the dimensions of the human blind spot are reported. Measurements of the dimensions of the blind spot indicated that the blind spot expands at 38 to 50 min after stopping the centrifuge. The restoration of normal boundaries of the blind spot occurred at 28 to 36 hr after the experiment; the restoration of the angioscotomas corresponded to the times of restoration of the normal size of the vessels at 5 to 8 to 11 days. It was concluded that increase of the scotoma of a blind spot and of angioscotomas could be a result of local hemocirculatory disturbances of the retinal vessels and of hemodynamic shifts in the vascular system of the brain. L.E.W.

N67-11558# Joint Publications Research Service, Washington, D. C.

CHANGE OF THE FUNCTIONAL CONDITION OF THE TEMPERATURE AND AUDITORY ANALYZERS UNDER CONDITIONS OF HIGH AIR TEMPERATURE

N. A. Kokhanova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 294-295 refs (See N67-11401 02-04) CFSTI: $8.40

The latent time of human sensory-motor reaction to heat and sound stimuli under conditions of high air temperature was investigated. Test details are briefly outlined. The data indicated that a decrease of the latent reaction to heat stimulation indicated an increase of the functional mobility of the temperature analyzer, which is combined with a simultaneous lowering of the functional mobility of the auditory analyzer. This was manifested by an increase of the latent time of the auditory reaction. L.E.W.

N67-11559# Joint Publications Research Service, Washington, D. C.

THE NEGATIVE INFLUENCE OF RADIATION-PROTECTIVE PREPARATIONS ON THE MOTOR-EVACUATORY FUNCTIONING OF THE GASTROINTESTINAL TRACT

I. G. Krasnykh and A. R. Mansurova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 296-297 (See N67-11401 02-04) CFSTI: $8.40

The effects of cystamine, S_1, β-aminoethylisothiuronium, cystaphos, and mexamine on the motor-evacuatory functioning of the gastrointestinal tract of nonirradiated rats were assessed. The radiation-protective preparations were administered intraperitoneally, orally, and rectally. Observations conducted using X-ray methods and a contrasting substance, barium sulfate, indicated the following: (1) These preparations retard the evacuation of the contrasting mass from the stomach by 4 to 8, 3 to 6, and 2 to 3 times depending on administration by mouth, intraperitoneally, and rectally. (2) The protective agents cause a prolonged spasm of the pylorus and the prepyloric part of the stomach and also a phase disturbance of the tonus and peristalsis. (3) The preparations cause spasm and strengthening of the tonus of the cranial loops of the small intestine during the first hours and symptoms of dystonia of the entire intestine during later hours. (4) The lowering of the preparations' effect in the case of oral administration is connected with disruption of evacuation from the stomach and consequently with retardation of their absorption. L.E.W.

N67-11560# Joint Publications Research Service, Washington, D. C.

THE ELIMINATION OF CERTAIN CONSEQUENCES OF EXTREME EFFECTS OF STEP-BY-STEP ACCLIMATIZATION TO A HIGH ALTITUDE CLIMATE

A. N. Krasyuk, N. V. Kol'chenko, and S. I. Moldavskaya *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 298-299 (See N67-11401 02-04) CFSTI: $8.40

The effect of step-by-step acclimatization to a high altitude climate on the organism of persons with symptoms of the effects of small doses of ionizing radiation was assessed. The testing was conducted at altitudes of 2100, 3000, 3400, and 3700 m above sea level. The main tests conducted concerned the idices of the peripheral blood, oxyhemography, mobility of the nervous processes, and working ability of the cortical cells of the brain. It was concluded that step-by-step acclimatization has a favorable effect on hemopoiesis, the vascular system, the mobility of the nervous processes, and the working ability of the cortical cells of the brain of test subjects. L.E.W.

N67-11561# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF INCREASED AND REDUCED TEMPERATURES IN A CHAMBER ON THE MENTAL WORKING ABILITY AND PHYSICAL FUNCTIONING OF TEST SUBJECTS

Ye. M. Krutova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 300-301 (See N66-11401 02-04) CFSTI: $8.40

The influence of chamber temperatures on the mental ability and psychic functioning is considered. Attempts were made to discern the effect of increased temperature (40°C) and humidity (70-78%) and reduced temperature (0°, -10°C) and humidity (40-60%) on test subjects' memory, thinking, and attention. It was concluded that under conditions of increased temperature and humidity there is a worsening of mental ability. Under conditions of reduced temperature and normal humidity, there is a fluctuation of mental working ability in accordance with the cooling of the body. S.P.

N67-11562# Joint Publications Research Service, Washington, D. C.

THE STATE OF THE FUNCTIONING OF THE AUDITORY ANALYZER UPON THE PROLONGED ACTION ON THE HUMAN ORGANISM OF SMALL MAGNITUDES OF CORIOLIS ACCELERATIONS

Yu. V. Krylov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 302–303 (See N67-11401 02-04) CFSTI: $8.40

Human auditory functioning under prolonged action of Coriolis accelerations is examined. A 24-hr exposure resulted in fluctuations of auditory sensitivity on the order of 10.0–12.5 decibels. In the case of 24-hr continuous rotation at an angular velocity of 10.6°/sec and 21.2°/sec, there was a fluctuation of auditory sensitivity that reached 15–25 decibels. S.P.

N67-11563# Joint Publications Research Service, Washington, D. C.

A METHOD OF IRRADIATING BIOLOGICAL OBJECTS WITH A MULTIPLY CHARGED ION ACCELERATOR

Ye. I. Kudryashov, A. M. Marennyy, V. I. Popov, A. I. Portman, B. I. Solyanov et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 304–305 (See N67-11401 02-04) CFSTI: $8.40

Irradiation experiments were conducted on tissue and plant cultures using multichared ion accelerators to aid in calculating the total dose received by astronauts and a biocomplex during prolonged space flight. When the thickness of the biological objects did not exceed 5 to 10 microns, the dose absorbed by the biological object was calculated according to the ionization losses in polyethylene, which is close in its inhibiting ability to moist tissue. S.P.

N67-11564# Joint Publications Research Service, Washington, D. C.

EXPERIMENTAL INVESTIGATION OF THE EFFECTIVENESS OF LOCAL PROTECTION

R. A. Kuzin, G. F. Nevskaya, V. I. Popov, M. A. Sychkov, A. V. Shafirkin et al *In its* Prob. in Aerospace Med. 21 Oct. 1966 p 306–307 (See N67-11401 02-04) CFSTI: $8.40

A method is described for arranging radiobiological experiments to study the effectiveness of local protection. The desired conditions for the experiments are listed. Paraffin was selected as the shielding material. By describing the results of an experiment, it is shown that the method proposed is adequate. H.S.W.

N67-11565# Joint Publications Research Service, Washington, D. C.

THE USE OF SYNTHETIC PREPARATIONS FOR INCREASING THE HEAT RESISTANCE OF AN ANIMAL ORGANISM

Ye. I. Kuznets *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 308–309 (See N67-11401 02-04) CFSTI: $8.40

The process which increases the amount of heat that an animal's body may tolerate is explained. The process involves the use of synthetic antioxidizing agents which retard heat production. From tests on white mice, it was learned that the possibility exists of using biogenic amine–indolilalkylamines as thermal protectors for increasing the heat resistance of an organism. H.S.W.

N67-11566# Joint Publications Research Service, Washington, D. C.

SOME ASPECTS OF THE REACTION OF AN ORGANISM TO THE EFFECTS OF THE SOUND IMPULSES OF PRESSURE

V. S. Kuznetsov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 310–311 (See N67-11566 02-04) CFSTI: $8.40

The boom of a supersonic aircraft was imitated by sound shocks to determine the degree of discomfort as indicated by the response reaction of an organism. Changes in the electrical activity of the cerebral cortex according to the data of an electroencephalogram were investigated. Vegetative reactions including pulse rate, respiratory rate, and the cutaneous galvanic reflex were studied. In addition to recording physiological functions the psychophysiological sensations of the test subjects were considered in determining the discomfort from shock impulses of pressure. S.P.

N67-11567# Joint Publications Research Service, Washington, D. C.

SOUND CHAMBER TESTS AS A METHOD OF STUDYING THE INDIVIDUAL-PSYCHOLOGICAL ASPECTS OF PERSONALITY

O. N. Kuznetsov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 312–313 (See N67-11401 02-04) CFSTI: $8.40

Sound chamber studies of man's personality during solitary confinement are described. The advantages of this method are enumerated and termed useful in solving problems of engineering psychology and astronautics. S.P.

N67-11568# Joint Publications Research Service Washington, D. C.

ENERGY CAPACITY OF PHYSICO-CHEMICAL METHODS OF MINERALIZATION OF THE PRODUCTS OF THE VITAL ACTIVITY OF MAN

S. O. Kuznetsov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 314–315 (See N67-11401 02-04) CFSTI: $8.40

Physico-chemical methods of mineralization such as thermal combustion, wet combustion, and catalytic oxidation are evaluated. The energy requirements of all three methods are compared for cases of treating feces and less concentrated waste products. In the case of energy requirements conclusions were that it is best to process solid waste using the thermal method and use the catalytic method or wet combustion for less concentrated waste products. S.P.

N67-11569# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF THE METHOD OF "APPLICATION" OF STRICT SENSORY DEPRIVATION DURING PROLONGED SOUND CHAMBER TESTS

O. N. Kuznetsov, V. I. Leoedev, and A. N. Litsov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 316–317 refs (See N67-11401 02-04) CFSTI: $8.40

The events leading to the selection of a method for the study of sensory deprivation are discussed. It was found that during a period of nine hours of regulated sleep, the test subjects slept for only seven hours, and spent the remainder of the time lying in a horizontal position in darkness with sharp restriction of movement. The hours of sleeplessness during the prolonged sound chamber tests are considered good simulation conditions for investigating strict sensory deprivation against a background of relative deprivation. The use of this technique in astronaut training is mentioned. H.S.W.

N67-11570# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF A CATALYTIC METHOD OF MINERALIZATION OF THE PRODUCTS OF THE VITAL ACTIVITY OF MAN

S. O. Kuznetsov, Yu. Ye. Sinyak, and I. L. Shul'gina *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 318–319 (See N67-11401 02-04) CFSTI: $8.40

The oxidation of waste directly on a catalyst, and pyrolysis of waste with subsequent oxidation of the products on a catalyst were the two methods investigated. It was found that the second

method has the advantage that it eliminates the problem of removing the inorganic residue from the surface of the catalyst. The conclusions drawn from the investigations are listed. H.S.W.

N67-11571# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF THE COMPLEX ACTION OF MULTIPLE VIBRATION AND FRACTIONATED IRRADIATION ON THE STATE OF THE ARCH OF THE SPINE-BRAIN REACTION

M. A. Kuznetsova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 320 (See N67-11401 02-04) CFSTI: $8.40

The results from the tests are given. It was found that the vertical vibration caused the development of parabiotic inhibition in the reflex arch. The radiation caused an increase in the latent periods of reaction to weak irritants, and a decrease in the reaction period for strong irritants. Animals subjected to both vibration and radiation reacted either in a manner similar to the vibrated animals, or in the same manner as the irradiated animals. H.S.W.

N67-11572# Joint Publications Research Service, Washington, D. C.

QUESTIONS OF THE WORK AND REST REGIME OF CIVIL AVIATION FLIGHT PERSONNEL

D. S. Kuleshov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 321 (See N67-11401 02-04) CFSTI: $8.40

The improvements made in the operating conditions for the pilots of modern, high performance aircraft are noted. It is further noted that a scientific regime of work and relaxation for crew members is necessary because of longer missions and longer flying hours. An analysis of this problem is recommended; however, it is inferred that this analysis is beyond the framework of the capabilities of medical personnel. H.S.W.

N67-11573# Joint Publications Research Service, Washington, D. C.

THE STUDY OF THE NATURE OF CHANGES OF THE FUNCTIONAL STATE OF THE SKIN UNDER CONDITIONS OF ITS NATURAL CONTAMINATION

L. M. Kurilova and S. I. Sidorkina *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 323-324 (See N67-11401 02-04) CFSTI: $8.40

Observations of the facial skin changes were made on subjects in an enclosed chamber. Physiological indexes used were skin temperature, heat radiation of the skin, and changes in functional adjustment of the thermal receptors on the cheeks under reflective temperature influence. S.P.

N67-11574# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF THE INFLUENCE ON AN ORGANISM OF PROLONGED RESTRICTION OF MOBILITY AND WAYS TO COMPENSATE FOR IT BY PHYSICAL EXERCISES

B. A. Lampusov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 325-326 (See N67-11401 02-04) CFSTI: $8.40

The effect of hypokinesis on the motor sphere during conditions of restricted mobility is considered, and compensation through physical exercise is examined. Of the subjects tested, the magnitude and character of the negative physiological shifts depended on the amount of motor activity and magnitude of physical loads in their professional work. The strength and tonus of the muscles, cardiac activity, and respiratory functioning were affected. S.P.

N67-11575# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF IMMUNIZATION ON THE RESISTANCE OF AN ORGANISM TO THE RADIATION FACTOR OF SPACE FLIGHT

K. A. Lebedev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 326-328 (See N67-11401 02-04) CFSTI: $8.40

The lymphoid tissue of irradiated rabbits which were immunized before irradiation, were studied to investigate the mechanisms involved in the protective action of various antigenic agents. After irradiation, it was shown that there was destruction in the multiplication centers of the secondary follicles in the lymph nodes. In studying the antibody-containing cells, it was found that after irradiation the number of these cells increased in the same manner as in nonirradiated immunized rabits. The radiation resistance of the actively multiplying hemocytoblasts is thought to be the reason for the accelerated regeneration of lymphoid tissue. H.S.W.

N67-11576# Joint Publications Research Service, Washington, D. C.

THE CONVEYER SYSTEM IN THE LINK OF HIGHER PLANTS

Ye. V. Lebedeva, L. V. Dmitriyeva, and A. V. Malinovskiy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 329 (See N67-11401 02-04) CFSTI: $8.40

The growth of plants in a closed ecological system is discussed briefly. Two methods of growing plants are mentioned: aeroponics and hydroponics. Experiments in plant growth using hydroponics showed that it is possible to obtain fresh vegetables in quantities to provide a calculated daily ration; the vitamin content in the plants is normal; and the productivity of plants in a conveyer may be increased by regulating the parameters of the ecological complex. H.S.W.

N67-11577# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF THE PSYCHOLOGICAL BASES OF THE INDIVIDUALIZATION OF PHYSICAL TRAINING

B. V. Legon'kov, Yu. A. Surinov, O. N. Kuznetsov, and V. I. Lebedev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 330-331 (See N67-11401 02-04) CFSTI: $8.40

A method for studying the psychological aspects of individual physical training is described. Astronauts are subject to various training exercises; and such processes as thought, attention, and memory are determined. Physical training is divided into two stages; first, conversation and passive observation and second, individual training and experimentation. S.P.

N67-11578# Joint Publications Research Service, Washington, D. C.

THE ROLE OF THE CENTRAL CHOLINOREACTIVE AND ADRENOREACTIVE SYSTEMS IN THE REGULATION OF VESTIBULAR REACTIONS

I. I. Leshchinyuk *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 332-333 (See N67-11401 02-04) CFSTI: $8.40

The roles of cholinoreactive, and adrenoreactive systems in regulating vestibular reactions are examined. A study was made of such parameters of rotary nystagmus as duration, number of strokes, frequency, amplitude, and energy. Results showed that blockage of the central M- and N-cholinoreactive systems caused a sharp reduction of all these parameters except frequency, which did not change significantly. In contrast to the central cholinolytic agents, aminazine increased the duration, number of strokes and frequency, while reducing the amplitude and not changing the energy of nystagmus. Data showed that cholinoreactive and adrenoreactive systems do not play the same role in regulating vestibular-motor reactions. S.P.

N67-11579# Joint Publications Research Service, Washington, D. C.

THE COMBINED ACTION OF VIBRATION AND IONIZING RADIATION ON THE METABOLISM AND FUNCTIONING OF THE CENTRAL NERVOUS SYSTEM

N. N. Livshits, Z. I. Apanasenko, M. A. Kuznetsova, L. D. Luk'yanova, and Ye. S. Meyzerov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 334-335 (See N67-11401 02-04) CFSTI: $8.40

The complex action of vibration before and after irradiation in lethal doses is considered with respect to oxidative processes, vestibular reflexes, and bioelectric activity of the skeletal muscles. Mechanisms contributing to this action are the oxygen effect, change in the central nervous system, nerve center interaction, and the course of repair and compensatory processes. S.P.

N67-11580# Joint Publications Research Service, Washington, D. C.

THE COMPLEX ACTION OF VIBRATION AND IONIZING RADIATION ON THE CONDITIONED REFLEX ACTIVITY OF RATS

N. N. Livshits and Ye. S. Meyzerov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 336-337 (See N67-11401 02-04) CFSTI: $8.40

Investigations of the complex action of vibration and radiation on the nervous system are reported. It was demonstrated that under the influence of vibration, significant changes occur in effects of radiation on the oxidative metabolism of the brain and on the conditioned reflex activity of animals. S.P.

N67-11581# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF THE USE OF THE METHODS OF THE THEORY OF INFORMATION FOR ESTIMATING THE ADAPTABILITY OF A HUMAN OPERATOR TO CHANGED DAILY REGIMES

A. N. Litsov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 338-339 (See N67-11401 02-04) CFSTI: $8.40

The relationship between the daily dynamics of physiological functions and man's ability to adapt to external environmental changes which affect the speed of reception and processing of information was studied using methods of the theory of information. On the basis of experimental data it was found that: (1) A pause by a human operator under artificial conditions involving distortion of the customary rhythm of life placed into action adaptive mechanisms which produced the dynamic stereotype applicable to the changed conditions; (2) On the basis of comparative data on the dynamics of the working ability with the daily periodicity of the physiological functions, it is possible to distinguish qualitative differences in the effect of different daily routines on the human organism; (3) Based on the degree of expression of the daily dynamics of working ability and the daily periodicity of the physiological functions it is possible to determine the time required for the adjustment of the human organism to a changed daily routine; (4) The directed and active nature of the adaptation of man to changed daily routines puts the process of adaptation in a state of dependence on the qualities of will of the personality; and (5) The dynamics of the output capacity of an operator which artificially characterize the success of human activity under conditions of changed routines are a valuable indicator of working ability. S.C.W.

N67-11582# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF THE BIOLOGICAL EFFECT OF COMBINED X-RAY AND SUPERHIGH- FREQUENCY RADIATION

A. Ya. Loshak *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 340-341 (See N67-11401 02-04) CFSTI: $8.40

The effect of decimetric radio waves of low intensity and the effect of total and local ionizing radiation on the survivability of rats after x-ray irradiation with a lethal dose of 100/30 was studied. The purpose of the study was to examine the degree of sensitivity of rats to the subsequent action of lethal doses of ionizing radiation, and to determine the possibility of increasing the radiation resistance of the organism. Results of the experiment did not show the presence of a protective effect of preliminary microwave irradiation, and it was not possible to establish differences in the survival of rats subjected to general or local (head) effects of superhigh frequency energy. Data indicated a considerable reduction in the resistance of rats to the combined effect of decimetric radio waves of low intensity and of ionizing radiation. This phenomenon is attributed to the single direction of the morphological and functional changes in the organs and tissues, particularly in the hemopoietic system, occurring under the influence of the electromagnetic fields of the decimetric range and of X-rays. The less expressed biological effect of the superhigh frequency irradiation of the head of the rats was connected with the absence of the direct effect of microwaves on the hemopoietic organs, especially on the bone marrow. S.C.W.

N67-11583# Joint Publications Research Service, Washington, D. C.

COMPARATIVE HYGIENIC CHARACTERISTICS OF CIVIL AVIATION AIRPLANES AND HELICOPTERS

A. Ya. Loshak, V. Ya. Gilinskiy, and A. G. Kozlova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 342 (See N67-11401 02-04) CFSTI: $8.40

Presented are results of a comparative study on the effects of air environment (microclimate, products of oil pyrolysis, etc.) and physical factors (noise, vibration, ionizing and radio frequency radiation) on the hygienic characteristics of aviation equipment used with helicopters and passenger airplanes. S.C.W.

N67-11584# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF HISTAMINE AND ANTIHISTAMINE AGENTS ON THE RESISTANCE OF ANIMALS TO THE EFFECTS OF A RAREFIED ATMOSPHERE AND FACTORS OF A CLOSED SPACE

P. I. Lukiyenko *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 343-344 (See N67-11401 02-04) CFSTI: $8.40

The effectiveness of histamine and antihistamine preparations in preventing hypoxia was studied using white mice and rats as test animals. Experiments were conducted in a barometric chamber and a closed vessel. In the barometric chamber, the activity of the preparations was determined at altitudes at which all the test animals perished. The preparations were administered one time under the skin in various doses 60 minutes before ascent. The effectiveness of these preparations was evaluated using a protective index which was calculated by dividing the 50% lethal dose by the 50% protective dose. The duration of life served as the protective index in a closed container. Preparations were administered 60 minutes before the test in doses which were most effective under barometric chamber conditions. It was established that histamine and antihistamine compounds in certain doses increased the resistance of animals to hypoxia. S.C.W.

N67-11585# Joint Publications Research Service, Washington, D. C.

INVESTIGATION OF THE INTERRELATION BETWEEN THE FUNCTION ACTIVITY OF THE BRAIN AND ITS OXIDIZING METABOLISM UPON THE ACTION OF A VIBRATION STIMULUS

L. D. Luk'yanova, Ye. P. Kazanskaya, A. V. Kol'tsova, and Ye. S. Meyzerov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 345-346 (See N67-11401 02-04) CFSTI: $8.40

The influence of vibrational stimuli on functional interrelationships between the brain and central nervous system, and the consumption of oxygen in sensory-motor and visual areas of the cerebral cortex, was studied. Reported are results of observations of EEG's of laboratory animals after subjection to short period (interrupted) and multiple (uninterrupted) vibrational stimuli. S.C.W.

N67-11586# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF VIBRATION ON THE COURSE AND OUTCOME OF RADIATION INJURY IN ANIMALS

T S L'vova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 347 348 (See N67-11401 02-04) CFSTI: $8.40

Tests were conducted on mice and dogs to determine the relationship between the frequency of vibration, radiation dose, and time between exposures on the occurrence and degree of radiation injury. In tests on mice it was established that the preliminary action of vibration with a frequency of 700 hertz at four hours and one day before irradiation reduced mortality rates by 10 to 20% and increased the average life span of the animals which subsequently died by 10 to 40%. The preliminary action of vibration five days before irradiation increased mortality rates and reduced the average life span of these animals. The application of vibration every four hours for one day and five days after irradiation reduced mortality rates by 15 to 38% and increased the average life span of the animals which eventually died. The preliminary action of vibration after one hour did not influence the course or outcome of radiation injury. Radiation sickness was intensified when a vibrational frequency of 700 hertz was applied after irradiation. Studies of hematological indices of dogs irradiated at two hours or one day after vibration showed that the quantity of leucocytes and erythrocytes was higher than that of control animals. No persistent and expressed shifts were observed with respect to leucocytic number. S.C.W.

N67-11587# Joint Publications Research Service, Washington, D. C.

TISSUE RESPIRATION DURING THE ACTION OF LONGITUDINAL LOADS

E. S. Mailyan *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 349 350 (See N67-11401 02-04) CFSTI: $8.40

Tissue respiration under conditions of increased gravitation was studied in an effort to determine the nature of developing disorders and possible methods for preventing changes associated with oxygen starvation. Experiments were conducted on white rats which had been subjected to longitudinal positive loads having magnitudes of 6, 13, and 20 to 26 g's for two minutes. A study of tissue respiration of the brain (large hemispheres), heart, liver, and muscle of the diaphragm was conducted using a Warburg apparatus in an atmosphere of 100% O_2 and in a hypoxic mixture (11% O_2 + 89% N_2). Results showed that loads of 6 and 13 g's caused slight changes in the intensity of respiration in all tissues studied. With extreme loads of 26 g's, the intensity of respiration of all tissues except the heart was lower in animals which survived. In establishing the respiration patterns of tissues in an atmosphere consisting of the hypoxic mixture, it was also found that there was a certain pattern in changes of tissue respiration intensity. It was established that temporary parameters of load action play an important role in disturbances of tissue respiration and that increased disturbances depend upon load magnitude. S.C.W.

N67-11588# Joint Publications Research Service, Washington, D. C.

THE MECHANISM OF ADAPTATION TO HYPOXIA

V. B. Malkin, I. D. Bogacheva, V. K. Martens, and N. A. Roshchina *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 351-352 (See N67-11401 02-04) CFSTI: $8.40

The role of the adrenal glands, the hypophysis, and the cortex of the large hemispheres of the brain in the development of the adaptation syndrome in mammals subjected to prolonged conditions of reduced barometric pressure was studied. Tests were conducted on mature white rats and the following was determined: the adaptation of the animals to altitude after hypophysectomy, adrenalectomy, and the removal of the cortex. Indices of adaptation were weight, red blood count shifts, and resistance to acute hypoxia. In animals which were adapted to altitude there was a noticeable decrease in the growth rate. This was sharply expressed in intact animals and less expressed in animals which had adrenalectomy or the cortex removed. The difference in weight of animals which had hypophysectomy was slight. Control animals gained almost no weight. After prolonged stay under conditions of reduced atmospheric pressure the intact rats, those having adrenalectomy, and those with the cortex removed showed an increase in the amount of erythrocytes, reticulocytes, and hemoglobin in peripheral blood. In all groups of test animals, both after a stay in a mountainous (simulated) altitude and after adaptation in a barometric chamber, there was an increase in resistance to acute hypoxia. Experiments showed that removal of the hypophysis the adrenal glands, or the cortex, does not preclude the development of adaptation to hypoxia. S.C.W.

N67-11589# Joint Publications Research Service, Washington, D. C.

ANALYSIS OF DISTURBANCES OF LIPOID EXCHANGE IN DOGS UNDER THE INFLUENCE OF RADIAL ACCELERATIONS

M. S. Martsevich and V. Ye. Potkin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 353-354 (See N67-11401 02-04) CFSTI: $8.40

The role of the small intestine in regulating the level of cholesterol in the blood after radial acceleration was studied. Isolated sections of the small intestine of dogs were prepared and the content of cholesterol in the blood and intestinal juice was determined before and after acceleration. On the day of the initial test it was established that the action of transversely directed radial accelerations caused an increase in the concentration of cholesterol in the blood and a lowering of cholesterol in intestinal juice. After two months (period of aftereffects) it was established that the increase in cholesterol in the blood was connected with a change of its secretion with intestinal juice. On the basis of these findings, the influence of radial accelerations after the addition of a large quantity of cholesterol to the food of the animals was studied. It was found that after an experimental cholesterol diet, the effect of accelerations caused an increase of cholesterol in the blood and a lowering of cholesterol secretion in the intestinal juices. During the period of aftereffects, the concentration of cholesterol in the blood was at a higher level in those animals fed the experimental cholesterol diet. Results demonstrated that the small intestine takes part in regulating the level of cholesterol in the blood under the influence of radial accelerations. S.C.W.

N67-11590# Joint Publications Research Service, Washington, D. C.

THE PROBLEM OF THE PARTICIPATION OF THE SYMPATHICOADRENALIN SYSTEM IN THE FORMATION OF COMPENSATORY REACTIONS IN RABBITS TO CHANGED ENVIRONMENTAL CONDITIONS

A. F. Maslova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 355 (See N67-11401 02-04) CFSTI: $8.40

Rabbits were confined to a hermetically closed environment in order to determine the role of the sympathetic-adrenal system in the formation of adaptational reactions to changing environmental conditions. The action of the environment on the functional state of the nervous system resulted in the secretion of large quantities of adrenalin and acetylcholine in the blood. The first two hours of isolation were the most severe and during this period large amounts

of catecholamines were required. After prolonged isolation a relationship developed between the organism and the environment which provided the condtions necessary for the secretion of noradrenalin which was vital to the formation of an adaptational reaction. Results were in agreement with a previous hypothesis that a certain time is required for the formation of an adaptational reaction by the nervous system. Experiments showed that readjustment of the organism to changed environmental conditions occurred during the first six hours. S.C.W.

N67-11591# Joint Publications Research Service, Washington, D. C.

COMPARATIVE STUDY OF THE CYTOGENETIC EFFECT OF PROTONS WITH AN ENERGY OF 630 MEV AND OF THE GAMMA RADIATION OF COBALT-60

V. M. Mastryukova and A. D. Strzhizhovskiy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 356-357 (See N67-11401 02-04) CFSTI: $8.40

Corneal epithelium of mice was subjected to irradiation with 630 mev protons and gamma radiation of Co^{60} to determine the damaging effects of high energy protons on tissue regeneration. Irradiation with 630 mev protons in doses of 100, 200, 700, and 1000 rad caused reversible suppression of mitotic activity in corneal epithelium. The intensity of mitotic activity restoration decreased with an increase in radiation dosage. The quantity of cells with chromosomal aberrations increased exponentially with an increase in dosage. The average effective dose was 560 rad. Damage to cell genetic structure sharply suppressed cell reproduction and resulted in the formation of pathological mitoses shortly after irradiation. Classification of chromosomal aberrations by types aided in establishing a correlation between the degree of suppression of cell reproducibility and the type of chromosomal aberration. Studies of the effects of Co^{60} yielded significant data on the nature of mitotic activity restoration and the distribution of chromosomal aberrations related to intracellular reparation and radiation effects. The relative biological effectiveness of 630 mev protons, as compared with gamma radiation of Co^{60} was 0.7. S.C.W.

N67-11592# Joint Publications Research Service, Washington, D. C.

THE RELATION OF THE BIOELECTRIC ACTIVITY OF THE MUSCLES, THE OXYGEN CONSUMPTION, AND THE TEMPERATURE OF WHITE RATS DURING HYPER-GRAVITATION

V. V. Matsynin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 358-359 (See N67-11401 02-04) CFSTI: $8.40

Rats were subjected to transversely directed accelerations of 3, 5, 10, 20, 30, and 40 g's for 3 to 5 minutes to determine the relationship of the bioelectric activity of external obliqus abdominal muscles, oxygen consumption, and body temperature. The primary objectives of the study was to assess the role of these indices in energy exchange and heat production. No relationship between these three factors could be established. It was found that the lowering of body temperature which began during the period of acceleration also continued during the post-gravitational period even when the bioelectric activity of the muscles and oxygen consumption remained at a level which was higher than initial levels. It is surmised that under conditions of an overload there is a divergence between the expected and actual heat formation. The cause of this divergence is attributed to a disruption of the mechanisms of heat formation. S.C.W.

N67-11593# Joint Publications Research Service. Washington, D. C.

SHIFTS IN THE STRUCTURE OF THE SYSTOLIC PART OF A PHONOCARDIOGRAM AND A BALLISTOCARDIOGRAM UPON A CHANGE OF THE RESISTANCE TO RESPIRATION

A. G. Mershchikov, I. A. Aleshin, and R. B. Chanysheva *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 360-361 (See N67-11401 02-04) CFSTI: $8.40

Using a respiratory device resembling a gas mask, healthy males were tested to determine the effect of increased resistance to respiration on the characteristics of phonocardiograms and ballistocardiograms. With an increase of resistance to respiration, changes in the duration of segments and intervals and slight changes in sound oscillations were observed in phonocardiograms. Analysis of ballistocardiograms showed that upon additional resistance, there were changes of interval duration, amplitude, ratios, and ballistic coefficients. Data from phonocardiographic and ballistocardiographic studies indicated that upon resistance to respiration, changes of the pumping function of the heart involve not only changes in the strength and rhythm of its contractions, but also the structure of the cardiac cycle. S.C.W.

N67-11594# Joint Publications Research Service. Washington, D. C.

THE INFLUENCE OF A SOUND SHOCK ON CERTAIN HUMORAL-ENDOCRINE OF THE HUMAN ORGANISM

B. M. Mirzoyev, Yu. I. Milov, and O. A. Vorovets *In its* Probl. in Med. 21 Oct. 1966 p 362-363 (See N67-11401 02-04) CFSTI: $8.40

Physiological studies with an imitated sound shock (clap) were conducted to study the cumulative effect of pulse noise under laboratory conditions. Two series of tests were conducted. Subjects in both series were subjected each day for five to six days to the influence of sound shock of an intensity of 7-7.5 kg/m^2 (first series) and 9-9.5 kg/m^2 (second series) with a 10 to 15 minute interval at the same time of the day. A series of physiological reactions (EEG, EKG, blood pressure, etc.) was recorded prior to and at 1, 5, and 10 minutes after each sound shock. An analysis was also made of the blood sugar and urine before and after the test. The blood sugar was checked for sugar and corticosteroids; the urine was checked for adrenalin, noradrenalin, creatinine, potassium, sodium, and the extent of diuresis. Tests showed that all indices did not change significantly under the influence of a sound shock; however, reliable shifts in diuresis and the excretion of sodium and creatinine in the first series with a lesser intensity of sound shock were more pronounced than in the second series. Results of corticosteroid analyses indicated that a sound shock of a certain intensity can activate the hypophyseal-adrenal system and have an unfavourable effect on the organism. S.C.W.

N67-11595# Joint Publications Research Service, Washington, D. C.

SOME ASPECTS OF THE INFLUENCE ON AN ORGANISM OF THE SHOCK LOADS OF LANDING

G. P. Mirolyubov, N. I. Frolov, and N. P. Morozova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 364-365 (See N67-11401 02-04) CFSTI: $8.40

The systemic effects of shock loads on rats and dogs were studied to determine the possible characteristics of these loads during emergency landings of spacecraft. Focused upon were the damaging effects of shock loads on parenchymatous organs, organs filled with air (pulmonary alveoli and the abdominal cavity), and organs filled with liquid (gastrointestinal tract, vena cava, etc.). Tolerance of landing loads was strongly related to the application of additional overloads occurring upon vibration of the falling platform and the supporting surface at the moment of impact. Upon landing, the animals perished at a rate of 6 meters/sec, whereas after the elimination of additional overloads, they were able to tolerate landing at a rate of 14 meters/sec without injury. Damaging effects of shock loads on organs containing air were directed within the organ, whereas damage to parenchymatous organs was induced by externally applied forces. Changes of arterial pressure, pulse rate, and respiration were observed along with damage to internal organs. The repeated application of shock

overloads which were not damaging caused a decrease in tolerance. It was further found that the cumulative nature of the effects of shock overloads depended on the intensity of the effect (frequency of the applied effects and magnitude of the overloads) and on the degree of disturbances affecting functional regulation and adaptation. S.C.W.

N67-11596# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF RADIATION-PROTECTIVE PREPARATIONS ON THE FUNCTIONAL STATE OF THE HUMAN ORGANISM

A. S. Mozzhukhin, V. I. Kuznetsov, M. S. Kuzhakovskaya, O. K. Makhalova, I. A. Goryachev et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 366 (See N67-11401 02-04) CFSTI: $8.40

It is reported that a study was made of the influence of cysteamine on the functional state of the human organism. It was found that the preparation does not cause significant changes in working ability or the functional state of the cardiovascular, respiratory, digestive, excretory, and nervous systems. C.T.C.

N67-11597# Joint Publications Research Service, Washington, D. C.

THE STUDY OF HEMODYNAMIC FUNCTIONING OF THE HEART BY INSTRUMENTAL METHODS DURING HYPOXIC HYPOXIA

V. M. Murayenko *In its* Probl. in Aerospace Med. 21 Oct. 1966 p (See N67-11401 02-04) CFSTI: $8.40

A study is reported in which 126 persons were examined to determine the functional condition of the heart on a valvular, muscular, and mechanical phenomena basis. Also studied was the reaction of the myocardium during the cardiac cycle. The frequency of systoles, an arterial oscillogram, and a ballistocardiogram were recorded under ordinary conditions and at a simulated altitude of 5000 meters. A polycardiographic method of recording was used to determine the duration of the phases and periods of cardiac contraction. Among the conclusions are that the changes of phases and periods of the cardiac cycle in the case of hypoxia in healthy persons consists of a shortening of their duration, and that all test subjects showed an increase in the amplitudes of the waves of the systolic complex at the 5000 meter altitude. C.T.C.

N67-11598# Joint Publications Research Service, Washington, D. C.

A METHOD OF CHRONIC SOUNDING OF THE ARTERIAL VASCULAR CANAL

A. N. Nazin, O. D. Anashkin, Ye. N. Zhuravleva, V. K. Podymov, and N. A. Maslova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 369-370 (See N67-11401 02-04) CFSTI: $8.40

A method is discussed for embedding a chronic probe into the vascular canal of dogs for studying the hemodynamics and the effect of pharmacological agents. The discussion includes techniques of inserting the probes, major problem areas, structural materials for the probes, and preliminary results of experimentation. C.T.C.

N67-11599# Joint Publications Research Service, Washington, D. C.

THE EFFECT OF IONIZING RADIATION ON THE CHROMOSOME APPARATUS OF HIGHER PLANTS

L. V. Nevzgodina and N. M. Grigor'yan *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 371 (See N67-11401 02-04) CFSTI: $8.40

The genetic effectiveness of protons to induce plant chromosome aberrations is compared to the effectiveness of gamma radiation. In small doses differences were not detected, but in large doses protons caused a greater effect than gamma rays. Within the limits of the test doses the values of the coefficients of relative genetic effectiveness increases as the dose does from 0.7 to 2.6 for potatoes, from 1 to 3.6 for cabbage, and from 1 to 11 for carrots. A.G.O.

N67-11600# Joint Publications Research Service, Washington, D. C.

THE PROBLEM OF THE FORMATION OF THE HABITATIONAL ENVIRONMENT OF THE CABIN OF A SPACE SHIP

Yu. G. Nefedov, S. N. Zaloguyev, V. M. Shilov, and V. V. Borshchenko *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 372-373 (See N67-11401 02-04) CFSTI: $8.40

Consideration is given to bacterial contamination of the living environment within a sealed space cabin and certain shifts in the immunological reactivity of the human organism. The study of mutual exchange processes of microorganisms between people is also briefly mentioned. A.G.O.

N67-11601# Joint Publications Research Service, Washington, D. C.

REGULATION OF HYPOXIC ERYTHROCYTOSIS

Yu. V. Nikolayenkov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 374-375 (See N67-11401 02-04) CFSTI: $8.40

In a search for ways to increase the resistance of the nervous system to the action of extreme factors, experiments on the regulation of hypoxic erythrocytosis are evaluated. An assumption is made that in the absence of the chemoreceptors of the sinocarotid zones which are especially sensitive to oxygen insufficiency, information of change of the oxygen pressure in the blood comes from other interoceptors which are less sensitive to hypoxemia to the central nervous system with a delay; therefore, the starting and stopping of the implementing organs which participate in the formation of hypoxic erythrocytosis are also delayed. Thus, the sinocarotid interoceptive zone is an important link in the complex mechanism of hypoxic erythrocytosis which provides for a rapid rate of development and for cessation of this protective-adaptive reactions of the organism. Data obtained from other experiments make it possible to conclude that the cerebral cortex, in light of its particular sensitivity to oxygen insufficiency, plays a decisive role in the formation of the hypoxic erythrocytic reaction. R.LI.

N67-11602# Joint Publications Research Service, Washington, D. C.

THE RELATION OF THE GASEOUS METABOLISM OF HIGHER PLANTS TO THE CONCENTRATION OF CARBON DIOXIDE IN THE AIR

N. T. Nilovskaya and M. M. Bokovaya *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 376 (See N67-11401 02-04) CFSTI: $8.40

A study was made of the effect of a different content of carbon dioxide in the air on the intensity of photosynthesis and respiration of vegetable plants, as well as the method of growing: hydroponics. It was established that saturation of photosynthesis with respect to CO_2 for twelve kinds of plants is not the same and occurs at 0.15 to 0.35%. R.LI.

N67-11603# Joint Publications Research Service, Washington, D. C.

THE POSSIBILITY OF USING ACTIVE SLUDGE OBTAINED IN THE PROCESS OF THE BIOLOGICAL PURIFICATION OF WASTE WATER AS A FEEDING MEANS FOR ANIMALS

R. F. Novopashina and G. S. Ratner *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 377-378 (See N67-11401 02-04) CFSTI: $8.40

The possibility of using active sludge, (obtained upon processing the residue of sedimentation tanks by prolonged blowing of air into the water) as a means of feeding animals is reported. This

method is based on the high content of nitrogenous and organic matter and also the presence of certain vitamins. Effects of experiments on rams and hogs are mentioned. R.Ll.

N67-11604# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF STEROID HORMONES ON THE NATURE OF THE ELECTRIC ACTIVITY OF THE VEGETATIVE NERVOUS SYSTEM UNDER STRESS CONDITIONS

A. D. Nozdrachev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 379-380 (See N67-11401 02-04) CFSTI: $8.40

For space physiology purposes, the matter study of the physiological mechanisms of the adaptation of an organism to existence under extraordinations is reported. Afferent and efferent impulsation in the conductors of the sympathetic nerves, and the electrical activity of the inframesenteric sympathetic ganglion in dogs were studied under conditions of stress, and against a background of the introduction of steroid hormones. R.Ll.

N67-11605# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF RADIAL ACCELERATIONS ON THE CONDITIONED REFLEX ACTIVITY OF RATS

S. I. Nudman and J. K. Fedorov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 381 382 (See N67-11401 02-04) CFSTI: $8.40

For application to aviation and space flights, studies of experiments on rats are evaluated for the influence of acceleration on various physiological functions of an organism. Results of observations show that under stress conditions there is a lowering of the electrical activity of the sympathetic structure; the preliminary administration of hydrocortisone prevents the development of these changes; and, the use of desoxycorticosterone does not have a significant desoxycorticosterone R.Ll.

N67-11606# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF THE INFLUENCE OF HORMONAL PREPARATIONS ON THE RESISTANCE OF AN ORGANISM TO LOADS

V. G. Ovechkin, G. A. Nikulina, and Yu. M. Rodin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 383 (See N67-11401 02-04) CFSTI: $8.40

The biological effects of crew reaction during space flight motivated a study of the effect of various hormonal preparations on the resistance of small animals to radial accelerations. R.Ll.

N67-11607# Joint Publications Research Service, Washington, D. C.

A PHYCHOPHYSIOLOGICAL EVALUATION OF THE DYNAMICS AND QUALITY OF THE PERCEPTION OF AVIATION INSTRUMENTS UPON THEIR BRIEF PRESENTATION

V. G. Ovchinnikov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 384-385 (See N67-11401 02-04) CFSTI: $8.40

Investigations of the dynamics of the perception of aviation instruments and numerous signal devices located in the cabin of a modern airplane were conducted. The data obtained show that upon a time exposure of 4 to 5 seconds, the pilots are able to perceive correctly the readings of seven instruments (gyrohorizon, variometer, the altitude, speed, turn, and glide indicators, radio compass, and remote gyromagnetic compass). Data for other specified exposures are also mentioned. R.Ll.

N67-11608# Joint Publications Research Service, Washington, D. C.

SPACE PHYSIOLOGY AS A NEW SCIENTIFIC FIELD

V. V. Parin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 386-388 (See N67-11401 02-04) CFSTI: $8.40

Space physiology, closely linked with aviation physiology, is defined as a new field. Space physiology can be divided into fields which consider the effect on the organism of certain factors in flight: vibrations, accelerations, weightlessness, isolation, etc. An important task is to study the reaction of the organism under conditions of weightlessness, prolonged isolation, and hypodynamics. R.Ll.

N67-11609# Joint Publications Research Service, Washington, D. C.

ESTABLISHMENT OF THE POSSIBILITY OF USING MOUNTAIN ACCLIMATIZATION FOR PREPARING AND TRAINING ASTRONAUTS

V. V. Parin, N. A. Agadzhanyan, A. G. Kuznetsov, A. S. Barer, V. A. Isabayeva et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 389-391 (See N67-11401 02-04) CFSTI: $8.40

Outlined are: (1) the conduct of complex clinical-physiological investigations during the process of mountain acclimatization; (2) the study of the influence of acclimatization in the mountains on the tolerance of the extreme factors of space flight on man; (3) the study of comparative resistance to extreme factors on the part of inhabitants of a high mountainous area, the inhabitants of a plain, and alpinist athletes; and, (4) the development of a plan of mountain acclimatization for crews of space ships and the recommendation of the use of acclimatization in the mountains to prepare and train astronauts. R.Ll.

N67-11610# Joint Publications Research Service, Washington, D. C.

EXPERIENCE IN USING ELECTROENCEPHALOGRAPHY IN CONNECTION WITH MEDICAL-FLIGHT EXPERT TESTIMONY

I. A. Peymer, M. L. Modin, and N. A. Govorova *In its* Probl in Aerospace Med. 21 Oct. 1966 p 392-394 (See N67-11401 02-04) CFSTI: $8.40

To study the possibilities of the method of electroencephalography medical-flight expert testimony, electroencephalographs were made of more than 1000 pilots during their regular physical examination. It was shown that this method facilitated the detection of individual cases of latent forms of diseases (epilepsy, trauma, and tumors of the brain), among flight personnel, and also of functional disorders of the nervous system. It is therefore considered that this finding justifies wider application. R.Ll.

N67-11611# Joint Publications Research Service, Washington, D. C.

THE SIGNIFICANCE OF CHANGES OF THE FUNCTIONING OF THE CENTRAL NERVOUS SYSTEM, ADENOHYPOPHYSIS, AND ADRENAL CORTEX IN THE CASE OF OXYGEN STARVATION

I. R. Petrov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 395-396 (See N67-11401 02-04) CFSTI: $8.40

Results of experimental investigations were analyzed to show the sensitivity of animals to oxygen deficiency of various origins, in relation to the functional condition of the central nervous system, the adenohypophysis, and the adrenal cortex. Experiments conducted on white rats show that it is possible to artificially change the sensitivity of animals to oxygen insufficiency. To increase resistance to oxygen insufficiency, it is considered useful to concurrently use agents which cause inhibition of the central nervous system (narcotics) and agents which cause excitation of the bulbar centers. R.Ll.

N67-11612# Joint Publications Research Service, Washington, D. C.

A METHOD OF PSYCHOPHYSIOLOGICAL INVESTIGATION IN OPEN SPACE

Yu. A. Petrov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 397-398 (See N67-11401 02-04) CFSTI: $8.40

For application to extravehicular tasks of astronauts, methods are outlined which would permit the experimental evaluation of the dynamics in the change of certain human psychic functions under conditions of open space. Tests mentioned include those of spatial orientation, redoing tasks on geometrical figures and colors, oral correction of attention fixation on combinations of letters, and visual estimation with coordination of movements. It is pointed out that weightlessness is a necessary condition for this study method. R.Ll.

N67-11613# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF INCREASING THE RELIABILITY OF THE WORK OF OPERATORS BY THE METHOD OF DIRECTED PHYSICAL TRAINING

I. I. Petrushevskiy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 399-400 (See N67-11401 02-04) CFSTI: $8.40

Since the effectiveness of using equipment is determined to some extent by human factors, data obtained from experimental investigation of the activity of radio telegraph operators and vehicle drivers were analyzed for operator reliability. It is considered that physical training can be employed successfully to increase working ability directly during operator work tasks, and also to better prepare subjects for future tasks. R.Ll.

N67-11614# Joint Publications Research Service, Washington, D. C.

CHANGE OF THE BIOELECTRIC ACTIVITY OF THE MYOCARDIUM IN HEALTHY AND SICK PEOPLE ACCORDING TO DATA FROM VECTOROMETRIC ANALYSIS OF AN EKG UPON BREATHING OXYGEN UNDER EXCESS PRESSURE

I. P. Poleshchuk *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 401-402 (See N67-11401 02-04) CFSTI: $8.40

Electrocardiograms (EKG) following increased intrapulmonary pressure were analyzed vectorometrically for reliability. It was found that the increased load on healthy persons causes an adequate reaction to an increase of such pressure, while persons with cardiovascular ailments show obvious changes of the bioelectric phenomena in the myocardium. Furthermore, in persons with myocardiodystrophy, there are clear signs of overloading of the atrium dextrum. R.Ll.

N67-11615# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF THE USE OF PHYSIOLOGICAL AND PSYCHOLOGICAL INVESTIGATIONS ON FLIGHT TRAINERS

N. M. Polonskiy and V. M. Strel'tsov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 403-404 (See N67-11401 02-04) CFSTI: $8.40

For application to training large numbers of civil aviation pilots the advantages of the physiological and psychological methods of studying man in flight trainers are briefly mentioned. Simulated flight training data show close comparisons with data obtained during actual flight conditions. It is stated that medical-biological investigations can be conducted in a trainer to solve such problems as the physiology of labor, medical flight analysis to include professional selection, analysis and prevention of flying accidents, and the physiological hygienic evaluation and improvement of the operation positions of the aircraft crew. R.Ll.

N67-11616# Joint Publications Research Service, Washington, D. C.

VESTIBULAR-VEGETATIVE ADAPTATION UPON PROLONGED PERIODIC ACTION OF CORIOLIS ACCELERATIONS ON AN ORGANISM

B. I. Polyakov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 405 (See N67-11401 02-04) CFSTI: $8.40

To investigate the possibility of creating artificial gravity by rotating a space ship about its own axis, studies were made on the vestibular apparatus of rabbits subjected to prolonged rotation. The change in threshold, and the times of the onset and nature of the vestibular-vegetative adaptation, depending on the duration of the effect, were established. The Coriolis accelerations, motion sickness, and nystagmic reactions are mentioned. R.Ll.

N67-11617# Joint Publications Research Service, Washington, D. C.

THE DYNAMICS OF THE BLOOD PRESSURE IN THE RIGHT VENTRICLE OF THE HEART UPON AN INCREASE IN INTRAPULMONARY PRESSURE

V. L. Popkov and I. N. Chernyakov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 406 (See N67-11401 02-04) CFSTI: $8.40

The theory of hyperfunctioning of the right ventricle following an increase of intrapulmonary pressure was assessed by heart soundings conducted on dogs. The dynamics of the blood pressure were ascertained by analyzing the systolic and diastolic pressure recorded. It was concluded that a lag of pressure in the right ventricle of the heart from the increase of intrapulmonary pressure, repudiates the old concept that an increase of the pressure in the right ventricle of the heart, under these conditions, is connected with a mechanical transfer of heart pressure from the expanding lungs. R.Ll.

N67-11618# Joint Publications Research Service, Washington, D. C.

EXPERIENCE IN USING AN ELECTRONIC COMPUTER TO PREDICT THE ACTION OF EXTRA STIMULANTS UNDER CONDITIONS OF SPACE FLIGHT

A. K. Popov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 407-408 (See N67-11401 02-04) CFSTI: $8.40

The multiple presentation of a limited number of stimuli observed during space flights that cause suppression of the orientational reflex, and the negative effect on the process of inhibition on the functional state of the astronaut analyzers are mentioned. The electronic computer model of the inhibition process is presented in connection with prediction of the action of extra stimulants under space flight conditions. R.Ll.

N67-11619# Joint Publications Research Service, Washington, D. C.

EVALUATION OF THE PHENOMENON OF ZERO MINIMUM ARTERIAL PRESSURE ACCORDING TO KOROTKOV IN ASTRONAUT FLIERS

Ye. A. Poruchikov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 409-410 (See N67-11401 02-04) CFSTI: $8.40

Studies of the occurrence of zero minimum arterial pressure in astronauts are briefly mentioned in connection with the phenomenon of infinite tone. It is pointed out that conclusions reviewed are not only contradictory but are, at times, in direct opposition. The occurrence of infinite tone after laboratory loads and sports loads is noted. It is pointed out that the use of the method of analyzing the peculiarities of the sound of an artery in the case of the phenomenon of infinite tone for functional evaluation of the cardiovascular system in astronauts provides diagnostic assistance for doctors. R.Ll.

N67-11620# Joint Publications Research Service, Washington, D. C.

A CALCULATED ESTIMATE OF THE STRENGTH OF THE SPINE OF A MAN UNDER A LONGITUDINAL BLOW WITH THE LOAD INCREASING AT GREAT SPEED (COMPARISON WITH AN EXPERIMENT)

B. A. Rabinovich *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 411-412 (See N67-11401 02-04) CFSTI: $8.40

Experimental analysis are briefly reviewed of human physiological capabilities to withstand shock during spacecraft landings. It is reported that the sagging of the human body under a shock action is significantly reduced as the speed of the increase of the load becomes larger. Pain sensations experienced in the spine during landing are mentioned. R.Li.

N67-11621# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF THE INFLUENCE OF ADEQUATE VESTIBULAR STIMULI ON THE FUNCTIONING OF EXTERNAL RESPIRATION IN MAN

L. A. Radkevich *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 413-414 (See N67-11401 02-04) CFSTI: $8.40

Consideration is given to the phase duration of inspiration and expiration, the ratio of inspiration phase duration to the duration of the expiration phase, and the frequency of respiratory movements per minute. It is reported that the tests which characterize the functioning of external respiration can serve as a specific criterion of resistance to vestibular stimuli. A.G.O.

N67-11622# Joint Publications Research Service, Washington, D. C.

RESULTS OF AN EXPERIMENTAL INVESTIGATION OF AIR SICKNESS

N. A. Razsolov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 415-416 (See N67-11401 02-04) CFSTI: $8.40

Modelling of motion sickness according to the method of double rotation under ordinary conditions and in a barometric chamber was used as a special functional diagnosis technique for determining partial insufficiency of individual organism physiological systems. Experimental results from modelling studies are discussed, and suggestions for prevention and treatment of air sickness are briefly covered. A.G.O.

N67-11623# Joint Publications Research Service, Washington, D. C.

FUNCTIONAL-HISTOLOGICAL CHANGES IN THE LIVER UNDER ACCELERATIONS

M. I. Razumov and I. M. Khazen *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 417-418 (See N67-11401 02-04) CFSTI: $8.40

The investigations on dogs subjected to chest back directed accelerations of an 8 g magnitude for three minutes are reported. The general reaction in the liver was determined to be moderate fat infiltration of cells of the epithelium from the second to the thirtieth day after acceleration. In the nuclei of many cells, brilliant crystals of a prismatic form which strongly refracted light were noted. Damage to the intracellular structures of the epithelium involved displacement of the nuclei in the cytoplasm and disturbance in the chromatin of the nuclear matter. This disruption in protein synthesis is considered to cause the formation of the large prismatic crystals. N.E.N.

N67-11624# Joint Publications Research Service, Washington, D. C.

HIGHER HETEROTROPHS (BIRDS) AS A SOURCE OF FOOD IN SPACE

G. S. Ratner *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 419 (See N67-11401 02-04) CFSTI: $8.40

The possible use of chickens and ducks in feeding systems for extended space flights is reviewed. It is suggested that poultry would provide rich food products and economical use could be made of the residues and wastes which are formed. N.E.N.

N67-11625# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF THE USE OF CERTAIN KINDS OF HIGHER AND LOWER HETEROTROPHS IN A SYSTEM OF LIFE SUPPORT FOR SMALL CLOSED AREAS

G. S. Ratner, N. M. Tikhonravova, A. N. Atamanenko, R. F. Novopashina, and A. M. Pakhorukov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 420-421 (See N67-11401 02-04) CFSTI: $8.40

A series of heterotrophic organisms which may be promising for use in life support systems to supply astronauts with products of animal origin is surveyed. Plant-eating and omnivorous fish, and water invertebrates are mentioned. The inclusion of primary utilizers of organic matter for animal food and for the utilization of waste products is recommended. N.E.N.

N67-11626# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF PREDNISOLONE ON THE RESISTANCE OF THE NEURO-MUSCULAR APPARATUS TO THE EFFECTS OF REPEATED ADMINISTRATIONS OF ADRENALIN

A. M. Rafikov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 422-423 (See N67-11401 02-04) CFSTI: $8.40

The electric potentials of the musculus gastrocnemius of narcoticized cats were recorded under the influence of an electronic stimulus alone, with adrenalin, and with adrenalin administered after prednisolone. It was found that adrenalin administered after prednisolone did not suppress the electrical potentials. N.E.N.

N67-11627# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF THE PHYSIOLOGICAL MECHANISMS OF WRITTEN SPEECH

N. M. Rachkov *In its* Probl. in Aerospace Med. 21 Oct. 1966 424-426 (See N67-11401 02-04) CFSTI: $8.40

The dynamics of writing spoken words were studied using an electric pencil. The magnitude of the latent period of the response reaction, the magnitude of the pressure on the point of a pencil, the time for writing a word and a phrase, the nature of the pressure curve, the quantity of breaks of pencil from paper, and the intervals between words were recorded. It was found that the pressure is greatest at the end of the the word when the spoken word is familiar. On the other hand, the pressure is greatest at the beginning or the middle when the word is unfamiliar or when writing the first word which comes to mind which begins with the last letter of the previous word. Physiological explanations are suggested. N.E.N.

N67-11628# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF PARTIAL RESTRICTION OF MOTOR ACTIVITY ON THE HIGHER NERVOUS ACTIVITY OF APES

Ye. S. Rogovenko *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 427-428 (See N67-11401 02-04) CFSTI: $8.40

The effects of restriction on the ability of monkeys to solve problems connected with distinguishing the probability of some event, with grasping a certain sequence of these events, and with developing certain rules of behavior were studied. Four restricted and four free monkeys (Macaca, Capuchin, and Pavian-Hamadril) were tested, using three programs. The procedures are described, and it was shown that the monkeys are able to evaluate their

own actions with respect to the probability of their reinforcement. However, they did not establish connections between separate actions. It was further concluded that complex behavioral reactions in the restricted monkeys did not differ from those in the control group. N.E.N.

N67-11629# Joint Publications Research Service, Washington, D. C.

MOTION AND LIFE

D. Ye. Rosenblyum *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 429 (See N67-11401 02-04) CFSTI: $8.40

Abstracted data are summarized on the movements at the molecular, subcellular, cellular, and systemic levels. The evolution of movements at the organism level with control mechanisms, and data from fresh water fish in a turbulent water flow are mentioned. N.E.N.

N67-11630# Joint Publications Research Service, Washington, D. C.

THE RELATIVE BIOLOGICAL EFFECTIVENESS OF PROTONS OF 126 MeV UPON REPEATED IRRADIATIONS WHICH HAVE BEEN LIKENED IN FREQUENCY TO SOLAR FLARES

N. I. Ryzhov, N. N. Derbeneva, V. M. Seraya, T. Ye. Mashinskaya, D. Ya. Aparina et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 430–431 (See N67-11401 02-04) CFSTI: $8.40

Two groups of Vistar rats were irradiated, one group with 126 MeV protons and the other with 180 kilovolt X-ray doses in one-time doses of 25, 50, 100, 200, and 400 rad. During the year, the animals were subjected to 9-time action in total doses respectively of 225, 450, 900, 1800, and 3600 rad. The results showed that with repeated irradiation there developed a reaction, the severity of which depended on the single and total doses. The individual differences in reaction to proton and X-ray irradiation are outlined, and it was concluded that the general biological effectiveness of repeated proton irradiation does not differ qualitatively or quantitatively from X-ray radiation. N.E.N.

N67-11631# Joint Publications Research Service, Washington, D. C.

PHYSIOLOGICAL ANALYSIS OF CHANGES OF ELECTRO-ETINOGRAMS AND PRIMARY RESPONSES OF VARIOUS PARTS OF THE VISUAL ANALYZER UNDER CERTAIN EXTREME INFLUENCES (ACCELERATION, DROP OF PRESSURE, HYPOXIA)

B. M. Savin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 432–433 (See N67-11401 02-04) CFSTI: $8.40

During chronic tests on non-narcoticized cats, recordings were made of electroretinograms and the primary responses of the corpi geniculatum laterale, the upper tubercles of the lamina quadrigemina, and the visual cortex. The experiment included loading in the head–pelvis direction, decompression and compression pressure changes, and hypoxia upon ascent and altitude simulation in a barometric chamber. It was established that the electroretinogram and primary responses are different, and the results are summarized. N.E.N.

N67-11632# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF THE SPATIAL DISTRIBUTION OF AN ABSORBED DOSE ON THE COURSE OF RADIATION INJURY TO DOGS

N. Ya. Savchenko *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 434 (See N67-11401 02-04) CFSTI: $8.40

A study of biological action of radiation with a large drop in the absorbed doses with depth is reported. Uneven spatial distribution was achieved by multi-sided irradiation with soft and hard X-rays. N.E.N.

N67-11633# Joint Publications Research Service, Washington, D. C.

PROBLEMS OF THE PHARMACOCHEMICAL PROTECTION OF AN ORGANISM FROM IONIZING RADIATION ON SPACE FLIGHTS

P. P. Saksonov, V. V. Antipov, N. N. Dobrov, V. A. Kozlov, and V. S. Shashkov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 435–436 (See N67-11401 02-04) CFSTI: $8.40

The present state-of-the-art of increasing the radiation resistance of organisms using pharmacochemical agents is briefly summarized. The radiation effects are mentioned, and the directions which future investigations should take are outlined. N.E.N.

N67-11634# Joint Publications Research Service, Washington, D. C.

ASPECTS OF NERVE-REFLEX REGULATION OF RESPIRATION UNDER CONDITIONS OF INTRAPULMONARY PRESSURE

V. A. Safonov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 437–438 (See N67-11401 02-04) CFSTI: $8.40

Studies on the changes in afferentation under respiration with excess intrapulmonary pressure and also on the character of the excitation of the respiratory center are briefly reported. The electrical activities of the vagus and phrenic nerves, the musculus rectus abdominis, and the inner musculus intercostalis were recorded. A profound readjustment in the functioning of the cellular components of the respiratory center of the medulla oblongata was found. N.E.N.

N67-11635# Joint Publications Research Service, Washington, D. C.

THE USE OF CERTAIN CONCEPTS OF THE FACTOR STRUCTURE OF AN EXPERIMENT FOR ANALYSIS OF CHANGES OF THE LATENT PERIOD OF CONDITIONED REFLEX REACTIONS OF MAN UNDER THE INFLUENCE OF PHYSIOLOGICAL STIMULI

I. V. Svistunov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 439–440 (See N67-11401 02-04) CFSTI: $8.40

The influence of differently applied stimuli on the duration of the latent period of the conditioned motor reactions was studied. The following factors were considered: number of different applied stimuli, sequence number of experiment, duration of the interval between stimulation, and the probability of the applied stimuli. No statistically reliable interrelation of the factors was determined. N.E.N.

N67-11636# Joint Publications Research Service, Washington, D. C.

THE EFFECT OF CHANGES OF GRAVITATION ON THE VASCULAR REFLEXES FROM THE SINOCAROTID REGION

Yu. A. Senkevich, V. A. Lashchenova, and I. N. Kotova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 441 (See N67-11401 02-04) CFSTI: $8.40

Investigations were made of dogs' reflexes upon the application of pressure to the common carotid artery, distention of the sinuses of the electrostimulation of the Hering nerve, and also the administration of cytitone and a hypertonic solution of sodium chloride. Tests were conducted on an inclined table and under the influence of transverse loads of up to 9 g, and the effect of loads was found to decrease and distort the indicated reflexes. N.E.N.

N67-11637# Joint Publications Research Service, Washington, D. C.

CHANGES IN THE HEMATOPOIETIC SYSTEMS OF RATS IRRADIATED WITH PROTONS WITH AN ENERGY OF 126 MeV AND GAMMA RAYS OF COBALT-60

V. M. Seraya, N. I. Ryzhov, N. N. Derveneva, T. Ye. Mashinskaya, D. Ya. Oparina et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 442–443 (See N67-11401 02-04) CFSTI: $8.40

Hematological changes caused by proton irradiation from a synchrocyclotron and by Co^{60} gamma radiation were compared. A phase character was noted in the changes in quantity of leucocytes and the nucleus-bearing cells in bone marrow. Details are given on these phases. It was found that the processes of the disturbance of hematopoiesis are identical but that the degree of their manifestation and the times of their occurrence are somewhat different. N.E.N.

N67-11638# Joint Publications Research Service, Washington, D. C.

PSYCHOPHYSIOLOGICAL ASPECTS OF THE ACTIVITY OF A PILOT DURING INSTRUMENT FLYING AFTER A BREAK IN FLYING LASTING 1.5 TO 2 MONTHS

V. A. Sergeyev, D. V. Abayev, L. P. Vokhmyanin, V. V. Davydov, I. G. Dlusskaya et al *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 444 (See N67-11401 02-04) CFSTI: $8.40

Investigations conducted on a specially equipped fighter aircraft using a complex of physiological--clinical and psychological methods is reported. It was found that the quality of the techniques was retained in most pilots, but the timing and accuracy of the correcting reactions changed. N.E.N.

N67-11639# Joint Publications Research Service, Washington, D. C.

THE SENSITIVITY OF THE RECEPTORS OF THE LUNGS WHICH HAVE BEEN INNERVATED BY BEING DEMYELINIZED WITH FIBERS AGAINST CHANGES IN THE GASEOUS COMPOSITION OF INHALED AIR

Z. N. Sergeyeva *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 445 (See N67-11401 02-04) CFSTI: $8.40

Results of tests conducted on cats with an open chest cage employing chloralose urethane narcosis and artificial respiration are briefly described. It was found that lung receptors innervated with unmyelinized fibers possess a constant tonic activity, and that the activity does not change when the animals breathe a mixture containing 5–12% CO_2 or nitrogen. It was concluded that pulmonary receptors innervated with unmyelinized fibers are not chemoreceptors. N.E.N.

N67-11640# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF ESTABLISHING THE RELATIONSHIP BETWEEN SPEED OF DECOMPRESSION AND THE ALTITUDE RESISTANCE OF AN ORGANISM

A. V. Sergiyenko *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 446–447 (See N67-11401 02-04) CFSTI: $8.40

The relation between altitude resistance in rats and the speed of decompression was observed in a barometric chamber. It was found that the slower the rate of ascent, the lower the altitude ceiling was, and vice versa. No clear relation was determined between the cardiac activity and the rate of ascent, however the period of restoration occurred more slowly with the slower rate of ascent. The rectal temperature reduced more with slow ascents, and practically not at all with quick ascents. Intense spasms were also noted in during fast rates of ascents, and only slightly with slow rates. It was concluded that the optimum decompression speed is 2 m/sec, at which rate the compensatory mechanisms were developed most fully. N.E.N.

N67-11641# Joint Publications Research Service, Washington, D. C.

INVESTIGATION OF THE OPERATING MEMORY UNDER SPECIAL CONDITIONS

L. A. Sivokon' *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 448–449 (See N67-11401 02-04) CFSTI: $8.40

The effect of limited mobility, partial isolation, and noise on the memory process is briefly surveyed. Experimental data obtained from memorizing special texts are listed. R.Ll.

N67-11642# Joint Publications Research Service, Washington, D. C.

RESTORATION OF VITALLY IMPORTANT FUNCTIONS OF AN ORGANISM UPON CLINICAL DEATH CAUSED BY ACUTE ANOXIA AND RADIAL ACCELERATION

N. N. Sirotinin, V. D. Yankovskiy, N. P. Adamenko, Yu. F. Gerya, and A. P. Morozov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 450–451 (See N67-11401 02-04) CFSTI: $8.40

Reanimation experiments of organisms following clinical death are recapitulated. Time lapses in restoration of vital functions are briefly enumerated for death following respiratory failure, electric shock and asphyxiation of the newborn. Reanimation of dogs after clinical death from radial acceleration and acute anoxia is also mentioned. R.Ll.

N67-11643# Joint Publications Research Service, Washington, D. C.

THE INTERACTION OF A SERIES OF INDICES OF THE OXYGEN REGIME OF AN ORGANISM UNDER THE INFLUENCE OF REDUCED BAROMETRIC PRESSURE AND LONG-ACTING ACCELERATIONS

Ye. I. Sorokina *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 452–453 (See N67-11401 02-04) CFSTI: $8.40

The dynamics of the regulation of oxygen in an organism are reviewed for the following cases: hypoxic hypoxia for varying barometric pressures, and a mixed form of hypoxia with the presence of a hemodynamic factor under the influence of transverse accelerations. Experiments on white rats, and determinations of oxygen pressure and the oxidizing- reducing potential in muscular and brain tissues are also mentioned. R.Ll.

N67-11644# Joint Publications Research Service, Washington, D. C.

A DEFICIT OF EXCITATION AND STIMULATION

G. N. Sorokhtin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 454–455 (See N67-11401 02-04) CFSTI: $8.40

For application to theoretical and practical neurology and space physiology, the physiological reaction of systems to an insufficiency of excitation and stimulation are reviewed. Outlined briefly are studies on: spinal shock syndrome of a deficit of excitation; passive hyperpolarization development in the skeletal muscle, salivary gland, and sympathetic ganglion; central inhibition blockage interrupting impulse excitation; strychninization leading to active depolarization; natural, hypnotic, and barbiturate sleep accompanied by hyperpolarization of the cerebral cortex. R.Ll.

N67-11645# Joint Publications Research Service, Washington, D. C.

THE MECHANISM OF THE ACTION OF DEEP HYPOTHERMIA ON THE FUNCTIONING OF THE BRAIN

P. M. Starkov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 456–457 (See N67-11401 02-04) CFSTI: $8.40

The effects of cold and hypoxia on brain function are reviewed. Conclusions are briefly outlined on: the processes of exclusion of conditioned reflexes, of a convulsive reaction, of the direct excitability of the cortical cells, of the electroencephalograms (EEG) caused by potentials and strychnine excitation. Hypothermia experiments down to 3 degrees and lower are mentioned. R.Ll.

N67-11646# Joint Publications Research Service, Washington, D. C.

SOME QUESTIONS OF THE MECHANISM OF THE ACTION OF NOISE ON AN ORGANISM

A. B. Strakhov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 458–459 (See N67-11401 02-04) CFSTI: $8.40

Reaction to noise stimuli, in particular on the central nervous and cardiovascular systems, is surveyed. Generalized changes recorded on human and animal electroencephalograms, accompanying

changes in respiratory function, in the cardiovascular system, and in the subcortical brain structure are mentioned. The administration of scopolamine preparations to prevent the development of suppressed responses to the influence of noise is also reviewed. R.Ll.

N67-11647# Joint Publications Research Service, Washington, D. C.

PRINCIPLES OF THE PHYSICAL TRAINING OF ASTRONAUTS

Yu. A. Surinov and G. F. Khlebnikov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 460–461 (See N67-11401 02-04) CFSTI: $8.40

To increase their resistance to unfavorable space flight conditions, the physical training of astronauts was evaluated. Various forms of general and special activities are enumerated, and the three-stage training is reviewed. A conclusion reported is that the present system of training has prepared astronauts physically for flights up to 5 days. R.Ll.

N67-11648# Joint Publications Research Service, Washington, D. C.

REDUCTION OF THE EFFECTIVENESS OF CHEMICAL PROTECTION WITH SMALLER DOSES OF RADIATION

V. I. Suslikov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 462–463 (See N67-11401 02-04) CFSTI: $8.40

For the radiation safety of man during space flights, experiments with chemical protective agents were conducted. The toxicity pattern of chemical agents for nonirradiated animals, and the increased sensitivity of irradiated specimens to the toxic action of these agents are mentioned. It is stated that the existing view on the non-toxicity of cystaphos is incorrect, according to experiments reported. R.Ll.

N67-11649# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF MUTUAL COMPENSATION OF CERTAIN QUALITIES OF MOTOR ACTIVITY IN PERFORMING COMPLEX COORDINATED MOVEMENT

N. V. Sysoyev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 464–465 (See N67-11401 02-04) CFSTI: $8.40

For training purposes, test series of motor task capabilities of flying personnel are summarized. It is reported that motor skill was formed and fixed more rapidly, reliably, and adequately in persons with better functional abilities for differentiation of the spatial, time, and strength characteristics of movement. The mutual compensation of certain complex movements is mentioned. R.Ll.

N67-11650# Joint Publications Research Service, Washington, D. C.

THE GAMMA-AMINOBUTYRIC ACID SYSTEM IN THE BRAIN OF ANIMALS UNDER THE INFLUENCE OF LOADS

I. A. Sytinskiy and Ye. L. Avenirova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 466 (See N67-11401 02-04) CFSTI: $8.40

The gamma-aminobutyric acid system, which has an inhibiting effect on the bioelectric processes in the cerebral cortex, is studied to determine the effect of accelerations. Under the influence of loads the system of gamma-aminobutyric acid in the brain did not change. The hemato-encephalic barrier effectively blocked the penetration of the acid into the brain when administered. However, the effect of loads was manifested in a disturbance of the integrity of the hemato-encephalic barrier with the occurrence of a depressive action in the central nervous system due to the penetration of the gamma-aminobutyric acid. S.P.

N67-11651# Joint Publications Research Service, Washington, D. C.

THE EFFECT OF COMPLEX PREPARATIONS IN PREVENTING MOTION SICKNESS ON REFLEX ACTIVITY

P. I. Syabro *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 467–468 (See N67-11401 02-04) CFSTI: $8.40

Preparations of platybrin, plavephyn, and pheplavine were administered to dogs to test their effectiveness in preventing motion sickness during flight. The complex preparations did not cause a lowering of the reflex activity or a change in the content of acetycholine, catecholamines, and cholinesterase of the blood. S.P.

N67-11652# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF HUMAN TOLERANCE OF BRIEF GYRATIONS WITH LARGE MAGNITUDES OF ANGULAR ACCELERATIONS AND SPEEDS

V. M. Tardov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 469–470 (See N67-11401 02-04) CFSTI: $8.40

Human resistance to the effect of brief angular accelerations (0.2 and 0.25 seconds) was demonstrated in a series of rotation tests. Rotation was accomplished around a transverse axis passing near the center of gravity of the test subject, and also around a longitudinal axis of the body passing vertically between the pyramids of the temporal bonesj In both series of experiments there was an absence of vestibular disorders and nystagmus. It was concluded that brief specific action on the semicircular canal of the labyrinth, even in the case of considerable angular accelerations, is a weak stimulus for the vestibular analyzer. S.P.

N67-11653# Joint Publications Research Service, Washington, D. C.

NEW METHODS FOR STUDYING THE INTERACTION BETWEEN THE VISUAL AND VESTIBULAR ANALYZERS

Ye. T. Ter-Gazaryabts *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 471–472 (See N67-11401 02-04) CFSTI: $8.40

Methods for investigating the reactivity of stimulated visual and vestibular analyzers are presented. One method consists of recording the electroretinogram and the electrocardiogram of animals, not under narcosis, located in a screened chamber on special swings which perform attenuating oscillations. A second method is directed toward examination of the peripheral part of the visual apparatus of insects under centrifuging. S.P.

N67-11654# Joint Publications Research Service, Washington, D. C.

FUNDAMENTAL PROBLEMS OF THE MINIMIZATION OF VITAL ACTIVITY

N. N. Timofeyev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 473 (See N67-11401 02-04) CFSTI: $8.40

The study of physiological patterns in animals with phylogenetic development of different complexity was advocated in the interest of space biology and medicine. It was shown experimentally that a lowered vital activity considerably increased the resistance of an organism to various simultaneously acting extreme factors not compatible with a normal life. G.G.

N67-11655# Joint Publications Research Service, Washington, D. C.

THE EFFECT OF BREATHING OXYGEN UNDER EXCESS INTRAPULMONARY PRESSURE ON THE ELASTIC PROPERTIES OF THE LUNGS

M. A. Tikhonov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 474–475 (See N67-11401 02-04) CFSTI: $8.40

Elastic lung properties of 38 dogs under morphine-urethane narcosis were investigated by observing the influence of increased intrapulmonary pressure without the use of external compensation

and also with compensating clothing. Tensility as measured immediately after cessation of respiration under excess pressure without external compensation increased in all animals by an average of 60% and returned close to the control level after about 2 to 2.5 hours. In tests employing external compensation, lung tensility increased only by 17% and returned to the initial level within 15 to 30 minutes. It was concluded that the above observed lung tensility increase was mainly a manifestation of hysteresis due to a change of volume in the lungs, the quantity of the functioning alveoli, and the strength of the surface tension in the alveoli. G.G.

N67-11656# Joint Publications Research Service, Washington, D. C.

THE EFFECT OF HELIUM ON THE CONDITIONED REFLEX ACTIVITY AND GASEOUS METABOLISM OF ANIMALS

G. V. Troshikhin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 476 477 (See N67-11401 02-04) CFSTI: $8.40

Observed was the development speed of defensive conditioned reflexes and the dynamics of gaseous exchange in male white mice exposed for one month to an atmosphere containing 21% oxygen and 79% helium at various environmental temperatures. Experiments showed that mice exposed to the gaseous mixture at 21 to 23°C had a slower development of their conditioned reflexes; in a similar atmosphere but with temperatures increased by 3 to 4°C, the conditioned reflexes of the mice formed at almost the same time as those in controls animals kept in a normal atmosphere. No differences were detected in the level of oxygen consumption, although the rectal temperatures of mice kept in the helium-oxygen atmosphere was slightly lower than those of the control group. G.G.

N67-11657# Joint Publications Research Service, Washington, D. C.

FUNCTIONAL SHIFTS IN THE CORTICAL PART OF THE VISUAL ANALYZER UNDER THE INFLUENCE OF FLIGHTS

A. I. Ustinova *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 478–479 (See N67-11401 02-04) CFSTI: $8.40

Fatigue studies on flying personnel were performed by determining their threshold magnitudes to an inadequate stimulus, the critical frequency of phosphene disappearance, and the duration of a visual successive image with its latent period. A portable impulse generator was used to transmit single stimuli of 1–1000 microamperes and rhythmic stimuli of 2–150 cps frequency at a duration of 2 to 50 milliseconds. Results showed that functional shifts in the state of excitability and lability during flight depended upon duration, number of take-offs and landings, and the length of the work day and flight time. Flight personnel displayed a parallel increase of excitability and lability of the visual analyzer after 2–3 and 4–5 hours of continuous flight; physiological reactions after 6–7 hours of continuous space flight were individual in nature and varied in direction. G.G.

N67-11658# Joint Publications Research Service, Washington, D. C.

THE PROBLEM OF FEEDING ON SPACE FLIGHTS

A. S. Ushakov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 480–481 (See N67-11401 02-04) CFSTI: $8.40

Dehydrated food products in combination with regenerated water were considered for their quantitative and qualitative adequacy in human diets during space flights. At the present time, a closed biological system employing unicellular algae, higher plants, and food animals seems to hold the best promise of providing proper spacecrew nutrition. Physical-chemical synthesis of carbohydrates from the products of vital activity along with the creation of amino acids, fatty acids, mineral compounds, and vitamins on board of the space ship also seems feasible. G.G.

N67-11659# Joint Publications Research Service, Washington, D. C.

THE QUESTION OF THE QUANTITATIVE CHARACTERIZATION OF THE FUNCTIONAL STATE OF THE VESTIBULAR ANALYZER OF MAN BY THE METHOD OF ROTARY TESTS

Yu. V. Farber *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 482–483 (See N67-11401 02-04) CFSTI: $8.40

The correlation between sensory reaction and vestibular analyzer stimulation was examined by rotating 50 persons at 15, 30, 60, 90, 120, 150, and 180° per/seconds, respectively. Nystagmus was recorded by electronystagmography. It was found that the duration of the post-rotational reactions was proportional to the logarithm of the magnitude of the stop stimulus; up to 60°/sec for the illusion of counterrotation, up to 90°/sec for nystagmus, and up to 120°/sec for the number of nystagmic movements. A relationship between nystagmus and the illusion of counterrotation with respect to threshold and duration was not established. G.G.

N67-11660# Joint Publications Research Service, Washington, D. C.

CHANGE OF THE ELASTIC-COHESIVE PROPERTIES OF THE MUSCLES OF MAN UNDER THE INFLUENCE OF HYPOKINESIA

V. L. Fedorov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 484–485 (See N67-11401 02-04) CFSTI: $8.40

Seismotonographic and tonometric recordings on mechanical fluctuations of the musculus rectur femoris, the musculus bicepts brachii, and the extensor muscles of the lumbar part of the spinal column of man were reported. Results of strictly dosed blows were judged according fluctuation; (1) the frequency of muscle fluxtuation; (2) the logarithmic dampening decrement of the muscle fluctuations; and (3) the tonometer readings. It was concluded that functional properties of all muscles changed under the influence of many days of hypokinesis; the increase of cohesiveness and the lowered elasticity of the skeletal muscles was pronounced. G.G.

N67-11661# Joint Publications Research Service, Washington, D. C.

THE POSSIBILITY OF THE ADAPTATION OF AN ORGANISM TO EXTREME EFFECTS OF THE EXTERNAL ENVIRONMENT

L. A. Fel'dman *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 486–487 (See N67-11401 02-04) CFSTI: $8.40

Examinations of pilots in routine flights on a familiar airplane while performing monotonous flight assignments are reported. A 40%–50% increase in pulse rate was found in simple uncomplicated flight, and greater pulse rates with increasingly complicated flight assignments. The frequency of pulse was noted to be the highest as the culminating moment of the assignment drew near. N.E.N.

N67-11662# Joint Publications Research Service, Washington, D. C.

CHANGE OF THE SPEED OF A RESPONSE REACTION AFTER THE ACTION OF SHOCK LOADS

N. I. Frolov and G. P. Mirolyubov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 488–489 (See N67-11401 02-04) CFSTI: $8.40

A physiological evaluation of human tolerance to shock loads of various magnitudes is reported. The latent period of simple motor reactions to light stimuli was studied. It was determined that: (1) In repeated tests with shock loads there is a relative adaptation which is manifested by a decrease of the shifts of the latent period. (2) The quality of the reaction changes. (3) There is a shortening of the latent period with small magnitude loads, and a lengthening of the period with large magnitude loads. N.E.N.

N67-11663# Joint Publications Research Service, Washington, D. C.

NEW DATA ON THE INFLUENCE OF ACCELERATIONS ON THE SECRETORY AND MOTOR FUNCTIONING OF THE DIGESTIVE SYSTEM

I. M. Khazen *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 490-491 (See N67-11401 02-04) CFSTI: $8.40

The influence of accelerations of various magnitude, direction, and duration on dogs is reviewed. Regular changes of the functioning of the salivary, gastric, pancreatic, and intestinal glands were noted. Shifts in the phasic nature in the secretion of pancreatic juice and the formation of enzymes, and pathomorphological and histochemical disturbances of tissue structures are mentioned. The results showed the importance of the neuroglandular apparatus of the digestive system as an indicator of the reaction of the organism to accelerations. N.E.N.

N67-11664# Joint Publications Research Service, Washington, D. C.

SOME INDICES OF THE ACTIVITY OF AN OPERATOR IN THE PROCESS OF TRACKING

G. V. Khlyustikov and S. D. Khoruzhaya *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 492 (See N67-11401 02-04) CFSTI: $8.40

Experiments on tracking performance, based on error compensation, are briefly reviewed. It was found that the quality of tracking depended on the characteristics of both the input signal and the regulated object. N.E.N.

N67-11665# Joint Publications Research Service, Washington, D. C.

THE BIOLOGICAL EFFECT OF MAGNETIC FIELDS

Yu. A. Kholodov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 493-494 (See N67-11401 02-04) CFSTI: $8.40

The effects on biological organisms of increased or decreased magnetic fields are briefly reviewed. It is pointed out that the effects have been established at the molecular, cellular, and systemic levels, and also on the whole organism. N.E.N.

N67-11666# Joint Publications Research Service, Washington, D. C.

THE EFFECTIVENESS OF USING EXTERNAL COMPENSATION IN THE CASE OF EXPLOSIVE DECOMPRESSION

A. S. Tsivilashvili and A. Ye. Ivanov *In its* Probl. of Aerospace Med. 21 Oct. 1966 p 495-496 (See N67-11401 02-04) CFSTI: $8.40

Protecting humans and animals from pathological changes caused by explosive decompression was investigated. It was found that it was safe for humans to have changes of barometric pressure of 220-295 mm of mercury in 0.5-0.8 seconds when wearing an altitude-compensating suit and oxygen apparatus to create excess pressure in the lungs. No pathological changes in man were noted after prolonged period of time or after repeated pressure changes, and no changes were detected in animals. N.E.N.

N67-11667# Joint Publications Research Service, Washington, D. C.

DYNAMIC MEDICAL CONTROL OF FLIGHT PERSONNEL UNDER CONDITIONS OF FLYING ACTIVITY

A. V. Chapek and V. P. Yerokhin *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 497-498 (See N67-11401 02-04) CFSTI: $8.40

Physiological research in flight trainers and in aircraft under flight conditions is briefly reviewed. Electrocardiograms and recordings of arterial pressure, frequency of respiratory movements, and body temperature are mentioned. Reference is made to results of tests on subjects with partially inadequate health. N.E.N.

N67-11668# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF IMPULSE NOISE CREATED BY MODERN AIRPLANES ON THE HUMAN ORGANISM

A. V. Chapek, B. M. Mirzoyev, and V. N. Somonov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 499-500 (See N67-11401 02-04) CFSTI: $8.40

Physiological responses in humans to sonic booms at a point directly beneath the flight trajectory were investigated. With a boom intensity of 8.4 kg/m^2, a slight quickening of the pulse and a lowering of the alpha rhythm of the EEG were noticed. The biopotentials of the heart, acuteness of hearing, visual image duration and latent periods, and corticosteroids of the blood did not change significantly. With an intensity of up to 7.5 kg/m^2 no shifts of physiological functions were detected. N.E.N.

N67-11669# Joint Publications Research Service, Washington, D. C.

A DEVICE FOR STUDYING INTERDEPENDENT GROUP ACTIVITY (FROM 2 TO 8 OPERATORS)

L. S. Chesalin, N. Ye. Dmitriyev, F. D. Gorbov, M. A. Novikov, and V. I. Ushakov *In its* Probl. of Aerospace Med. 21 Oct. 1966 p 501-502 (See N67-11401 02-04) CFSTI: $8.40

The portable instrument is described which consists of 8 small identical panels, indicating devices, and potentiometers. It is possible to create commands and to divide the group into unrelated subgroups. Formulas are presented establishing the instrumental readings at an individual panel and for the whole instrument. N.E.N.

N67-11670# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF RADIAL ACCELERATIONS ON THE IMMUNOLOGICAL REACTIVITY OF AN ORGANISM

V. M. Shilov, N. N. Dobronravova, and M. I. Kozar *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 502-504 (See N67-11401 02-04) CFSTI: $8.40

Experiments to determine the effect of transversely directed radial accelerations on physiological systems of rats are briefly described. It was found that under 20, 25, and 30 g's the rats displayed brief shifts of immunological reactivity. N.E.N.

N67-11671# Joint Publications Research Service, Washington, D. C.

THE MECHANISMS OF INJURY AND DEFENSE OF THE BONE MARROW OF ANIMALS IN THE CASE OF PROTON AND X-RAY RADIATION

N. L. Shmakova and S. P. Yarmonenko *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 505-506 (See N67-11401 02-04) CFSTI: $8.40

Experimental data on radiation effects on the bone marrow of mice are reviewed. Cytologic analysis showed that the leading component of radiation damage during the first day is the delay of cellular division and the discharge of regular elements into the bloodstream. It was found that chromosome damage of the cells do not effect the rate of bone marrow exhaustion, but do determine the outcome of radiation injury. N.E.N.

N67-11672# Joint Publications Research Service, Washington, D. C.

THE REACTION OF THE ERYTHROPOIESIS OF ANIMALS TO INCREASED PARTIAL PRESSURE OF OXYGEN IN THE ENVIRONMENT

A. M. Shmeleva *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 507-508 (See N67-11401 02-04) CFSTI: $8.40

The dynamics of oxygen on the erythropoietic functioning was studied, using the acid resistance of the erythrocytes of white mice and rats. Exposures of 15 days, 36 hours, and 90 minutes

with different oxygen content are reported. It was concluded that the effect of an environment with an increased partial pressure of oxygen is not always the same, but depends also on the intensity and duration of the hyperoxic effect. N.E.N.

N67-11673# Joint Publications Research Service, Washington, D. C.

THE INTERRELATION BETWEEN THE CENTER AND THE PERIPHERY OF THE RETINA UPON THE ACTION OF BRIEF INTENSIVE LIGHT FLASHES AGAINST A BACKGROUND OF FULL ADAPTATION TO DARKNESS

V. I. Shostak *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 509-510 (See N67-11401 02-04) CFSTI: $8.40

The restoration of light sensitivity was investigated. After 30-minute darkness adaptation a flash was given while screening 10° of the center of the retina, and after restoration of light sensitivity a second flash was given without screening. It was found that light sensitivity was restored more quickly with screening. It was concluded that the central part of the retina has an inhibiting effect on the adaptation to light of the periphery. N.E.N.

N67-11674# Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF AMINAZINE ON THE RESISTANCE OF AN ORGANISM TO HIGH AND LOW TEMPERATURES

I. P. Shcherbachev *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 511 (See N67-11401 02-04) CFSTI: $8.40

Mice were given 5 mg/kg of aminazine to determine if aminazine can be used to increase resistance to temperature. It was found that resistance to low temperatures was decreased and resistance to high temperatures was increased. N.E.N.

N67-11675# Joint Publications Research Service, Washington, D. C.

THE VESTIBULAR APPARATUS AS THE ORGAN OF THE NON-SPECIFIC ADAPTATION OF AN ORGANISM

Ya. A. Egolinskiy *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 512-514 (See N67-11401 02-04) CFSTI: $8.40

Consideration is given to the vestibular apparatus effects in the adaptive reactions of the organism, including the adaptation to muscular activity and to the action of various stressors. Results are discussed from experiments conducted to determine systematic training influences on the resistance of an organism under a series of unfavorable conditions. Based on the data obtained, it is postulated that systematic action on the vestibular apparatus has a general toning effect on the organism. A.G.O.

N67-11676# Joint Publications Research Service, Washington, D. C.

THE SIGNIFICANCE OF CERTAIN FORMATIONS OF THE CENTRAL NERVOUS SYSTEM IN THE DEVELOPMENT OF AN OXYGEN INSUFFICIENCY AND ADAPTATION TO IT

N. Z. Epshteyn *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 515-516 (See N67-11401 02-04) CFSTI: $8.40

A study was conducted to determine the role of the hypothalamus in the mechanisms of development and compensation for oxygen deficiency. Experiments were performed on various parts of the hypothalamus to study the adaptation of an organism to an insufficiency of oxygen and its reaction to acute hypoxia. From an analysis of experimental data it is assumed that the breakdown of the anterior hypothalamus is accompanied by significant changes of the metabolic processes in the organism which affect the general reactivity of the organism, and especially, its resistance to an oxygen deficiency. A.G.O.

N67-11677# Joint Publications Research Service, Washington, D. C.

MATERIAL ON THE PHYSIOLOGICAL-HYGIENIC BASIS OF THE ALLOWABLE LEVELS OF IMPULSE NOISES (SOUND SHOCKS)

Ye. M. Yuganov, B. M. Mirzoyev, Yu. V. Krylov, and V. S. Kuznetsov *In its* Probl. in Aerospace Med. 21 Oct. 1966 p 517-518 (See N67-11401 02-04) CFSTI: $8.40

Sound shock effects on the physiological functioning of an organism were studied. Consideration was given to the effect of single sounds on the human organism, and the cumulative effect of sound shock over the course of 5 days. In experiments with cumulative sound shock action of an intensity of 7-7.5 kg/m^2 changes were noted in the indices of mental working ability, in the EEG and EKG, and in the functioning of the auditory, vestibular, and motor analyzers. A.G.O.

N67-11693*# Sandia Corp., Albuquerque, N. Mex.

DEVELOPMENT OF AN INCREASED SAMPLING RATE MONITORING SYSTEM

W. J. Whitfield and J. C. Mashburn Oct. 1966 9 p
(NASA Order R-09-019-040)
(NASA-CR-79537; SC-RR-66-585) CFSTI: HC $1.00/MF $0.50 CSCL 06B

This report briefly describes a developmental device that samples air for small particles in clean rooms. It differs from standard monitors in that it samples at an increased rate and is designed for very low concentrations of airborne particles. Test results indicate that this device is superior to present particle counters. Author

N67-11694*# West Virginia Univ., Morgantown. Biomechanics Lab.

ELECTRIC FIELDS AND CALCIUM MOBILITY IN BONE Final Report

James Mc Elhaney, Richard Stalnaker, and Robert Bullard 21 Sep. 1966 81 p refs
(Grant NsG-533)
(NASA-CR-79539) CFSTI: HC $3.00/MF $0.75 CSCL 06S

Investigations of the effect of electric fields on calcium mobility of the bone are reported. Each of 48 100-gram male rats had electric plates and a plaster of Paris cast placed on his right leg. A comparison was made between the right and left femurs of the treated rats to determine the per cent difference in measured parameters of weight, specific gravity, cross-sectional area, compression properties, hardness, osteone count, and chemical properties. Seventy-three percent of the measured parameters indicated that the 30 cps group caused the greatest change from the control group. Tumors were found on 63% of the right femurs treated with the 30 cps electric field. The results indicate that the treatment with the alternating high frequency electric field causes a change in the bone metabolism. S.P.

N67-11695* Kansas State Univ., Manhattan.

FURTHER EVIDENCE ON SECONDARY TASK INTERFERENCE IN TRACKING

Merrill Noble, Don Trumbo, and Frank Fowler [1966] 13 p refs Submitted for Publication
(Grant NsG-606)
(NASA-CR-79622) CFSTI: HC $1.00/MF $0.50 CSCL 05I

Two experiments indicate that (1) presence of a second task throughout training in pursuit tracking resulted in a learning as well as a performance decrement at either transfer or retention tests, (2) the locus of the interference appears to be in the selection of an overt response for the second task, since a covert response condition did not lead to a decrement in either task, nor, when divested of any response selection requirement, did an overt response condition interfere with tracking performance. Author

N67-11717# Oak Ridge National Lab., Tenn.
ECOSYSTEMS, SYSTEMS ECOLOGY, AND SYSTEMS ECOLOGISTS
George M. Van Dyne Jun. 1966 33 p refs
(Contract W-7405-ENG-26)
(ORNL-3957) CFSTI: HC $2.00/MF $0.50

This paper defines and discusses ecosystems, systems ecology, and systems ecologists, in that order. Some properties of ecosystems and the ecosystem concept are given as a basis for defining the area of study called systems ecology. Problems, methods, tools, and approaches of systems ecology are considered in defining tasks, problems, and training of systems ecologists. The interdisciplinary nature of systems ecology research and the importance of computers in this research are considered. Examples of methods, concepts, and applications are drawn from a diverse body of ecological, natural resource management, and mathematical literature, which further illustrate the interdisciplinary nature of systems ecology. Advantages and limitations, with respect to total-ecosystem problems, of research by ecologists in universities, in state and federal experiment stations, and in national laboratories are compared. An example is given wherein, possibly under International Biological Program support, the skills and resources of these three groups of ecologists might be combined for integrated attack on nationally important ecosystem problems.
Author (NSA)

N67-11740*# Naval School of Aviation Medicine, Pensacola, Fla. Naval Aerospace Medical Inst.
EXPOSURE OF TRADESCANTIA MICROSPORES TO PERIODIC VIBRATIONS OF 40–100 HERTZ
James C. Knepton, Jr. and Lynda J. Bales Oct. 1966 19 p refs
(NASA Order R-10-009-027)
(NASA-CR-79510; NAMI-981) CFSTI: HC $1.00/MF $0.50 CSCL 06M

Slight differences ($P < 0.05$) were found in the number of spherical chromosomal fragments observed in the experimental and control groups of microspores, the greater number being among the experimentals. It was also observed that specimens vibrated for a short period (3 min) exhibited larger effects than those vibrated for longer periods of time (15–60 min). No significant impairments of the mitotic mechanism or growth disturbances were observed. Future experimentation is indicated in which microspores would be subjected to periodic and random vibrations of higher frequencies (100–2000 Hz) and accelerations (up to 110 g).
Author

N67-11821*# Geophysics Corp. of America, Bedford, Mass.
INSTANTANEOUS MONITORING OF MULTICOMPONENT EXPIRED GASES
A. E. Barrington Washington, NASA, Dec. 1966 18 p refs
(Contract NAS4-830)
(NASA-CR-619) CFSTI: HC $1.00/MF $0.50 CSCL 06B

Gas analyzers for aerospace applications, using time-of-flight and magnetic deflection mass spectrometers, are described. For reducing the pressure, a sorption pump for the capillary and an ion pump for the mass spectrometer were chosen. Details are given on the type of measurements taken, and schematics of the instruments are included. It was concluded that the time-of-flight mass spectrometer sensor is relatively simple mechanically, but the associated electronic circuitry is considerably complex. On the other hand, the magnetic deflection mass spectrometer sensor is more complicated mechanically, but simpler electronically. N.E.N.

N67-11827# Joint Publications Research Service, Washington, D. C.
SOLAR ACTIVITY AND LIFE PROCESSES
V. Yagodinskiy 8 Nov. 1966 10 p Transl. into ENGLISH from Nauka i Tekhn. (Moscow), no. 5, May 1966 p 5–7
(JPRS-38538; TT-66-34963) CFSTI: $1.00

A narrative account is presented on the relation of tick-borne encephalitis epidemics and solar activity. It is pointed out that the encephalitis virus is comparatively scarce during the quiet sun, but the ticks become virus ridden at times of solar activity. The weather cycles, due to the solar sunspots, and their influence on tick bearing animals are mentioned. N.E.N.

N67-11832# Joint Publications Research Service, Washington, D. C.
PHYSIOLOGICAL ANALYSIS OF THE SO-CALLED FORESIGHT IN THE CHIMPANZEE
F. P. Mayorov and L. A. Firsov 30 Nov. 1966 7 p refs Transl. into ENGLISH from Nauchn. Soobshch. Inst. Fiziol. Akad. Nauk SSSR (Moscow), no. 3, 1965 p 112–116
(JPRS-38887; TT-66-35311) CFSTI: $1.00

Details are presented on experiments with chimpanzees to study the nature of their behavior at moments when some components of a standard problem were changed. Food, placed in a maze with a single exit, could only be obtained by using a stick. The animals were all right handed, and consistently achieved results more quickly when a counter-clockwise motion was required. It was noted that the behavior of the apes during the control trials was dissimilar, and that all animals secured the food more quickly in the second series. It was considered that against the background of a certain conditioned reflex activity, variation of some components of the problem is a weak stimulus for changing the form of motor activity or for inhibition of formed conditional reflexes. N.E.N.

N67-11834# Federal Aviation Agency, Washington, D. C. Office of Aviation Medicine.
INJURY POTENTIALS OF LIGHT-AIRCRAFT INSTRUMENT PANELS
John J. Swearingen Apr. 1966 5 p refs
(AM-66-12)

Results of head-impact tests against typical light-aircraft instrument panels to determine their g time–force parameters during deformation of structure are presented for three different velocities of impact. Evaluations of the energy attenuator recently added by one aircraft company to its aircraft instrument panel as well as other nonprotected panels are presented. Injury potentials of these impacts are determined based on recently established data of tolerances of the living human head to impact. According to this study, head impacts as low as 15 ft/sec against the rigid angular instrument panels studded with heavy instruments certainly would be fatal. The light cylinder of aluminum added by the one company will give adequate protection to head impacts up to 25 ft/sec. Protection could be afforded up to 40 ft/sec head impacts, however, by increasing the strength of the aluminum cylinder at a sacrifice in higher but not injurious head-impact loads. Author

N67-11835# Federal Aviation Agency, Washington, D. C. Office of Aviation Medicine.
PERFORMANCE TASKS FOR OPERATOR-SKILLS RESEARCH
Richard G. Pearson Jun. 1966 16 p refs
(AM-66-19)

The selection, development, and operation of several tasks for use in skilled operator performance research are described. The tasks are intended, collectively, to sample a broad spectrum of abilities required by complex operator systems; individually they vary to the extent with which demands are placed upon attentional, sensory input, decision, and motor processes. A tracking and monitoring task simulates some of the functions associated with pilot skill, while a radar ATC task simulates the en route controller's functions. Other tasks (auditory vigilance, problem solving, mental arithmetic, and choice reaction time) are of a more abstract nature.
Author

N67-11836# Federal Aviation Agency, Washington, D. C. Office of Aviation Medicine.
HUMAN FACTORS IN GENERAL AVIATION ACCIDENTS
J. Robert Dille and Edward W. Morris Jul. 1966 9 p refs
(AM-66-27)

During the twelve months ending October 31, 1965, there were 122 fatal general aviation accidents in the Western Region in which the Regional Flight Surgeon's office was notified and the wreckage was located within one week. Autopsies were obtained on 86 pilots and blood alcohol determinations were obtained on 83 of these. No accidents were found to be definitely due to medical conditions but a psychiatric problem is the probable cause of one. In addition, 25 wore corrective lenses and 20 had other recorded physical defects. Drugs were found on three but were not found to be a causal factor; possibly significant barbiturate levels were found in two accidents. Blood ethyl alcohol levels $\geq$30 mg % were found in 17 (20.5%); five had levels greater than 250 mg %. The relationships of experience, occupation, local reputation and time of day to alcohol involvement are discussed. Carbon monoxide, agricultural chemicals, and fatigue are among other causes found for fatal accidents. The role of medical conditions, alcohol and posticides are discussed for the few non-fatal accidents that were medically investigated. The development of human factors accident investigation is briefly discussed. Author

N67-11845*# Mayo Clinic, Rochester, Minn.
STUDIES OF THE EFFECTS OF ACCELERATION ON CARDIOVASCULAR AND RESPIRATORY DYNAMICS Semiannual Status Report, Apr. 1–Oct. 1, 1966
Earl H. Wood 10 Nov. 1966 9 p
(Grant NsG-327)
(NASA-CR-79912) CFSTI: HC $1.00/MF $0.50 CSCL 06S

On-line time-sharing electronic data processing and computer analysis techniques are discussed, along with programs developed for analyzing pressure data, accelerative force, respiration phases, cuvette oximetry, and indicator-dilution curves input to the computer in analog form during centrifuge runs. It is reported that analog vascular and pleural pressure data may be analyzed for mean, maximal, and minimal values, and cardiac output or stroke volume, heart rate, cycle length, duration of systolic ejection and peripheral resistance derived by real-time analysis of the contour of central aortic pressure pulses. Summary data are presented on regional pulmonary arterial-venous shunting during exposure to transverse acceleration, and on pleural and pericardial pressure measurements during G_x acceleration in primates. An experimental program is outlined for studying (1) acceleration effects on regional pulmonary blood flow using a roentgen videodensitometer, and isotopically labeled microspheres of variable specific gravity; and (2) a technique for dynamic measurements of ventricular volume and shape using biplane roentgen videometry. M.G.J.

N67-11847*# Kansas State Univ., Manhattan.
SEQUENTIAL PROBABILITIES AND THE LEARNING AND RETENTION OF TRACKING SKILL
Jane Quigley, Don Trumbo, and Merrill Noble [1966] 14 p Presented at the Midwestern Psychol. Assoc. Meeting, Chicago, 6 May 1966
(Grant NsG-606)
(NASA-CR-79915) CFSTI: HC $1.00/MF $0.50 CSCL 05I

Investigations were undertaken to determine whether task predictability, defined alternatively in terms of second-order probabilities among target events, would affect tracking performances in a similar way. Also considered were the response strategies which subjects developed to cope with varying degrees of uncertainty in a sequential tracking task. Subjects were randomly assigned to six experimental conditions; the principal performance measure was integrated absolute error obtained electronically by integrating the voltage differential between target and cursor inputs. The results show that the sequential probabilities appear to degrade overall tracking performance disproportionately to the amount of uncertainty they introduce; however, subjects apparently learn to cope with the uncertainties in a coherent, if not optimal, manner. The strategy which is developed seems rather complex, including differential decision times consistent with the amount of uncertainty involved, probability matching when the choices are dichotomous, and compromise-matching when the choice is continuous. M.G.J.

N67-11849*# Kansas State Univ., Manhattan.
THE ORGANIZATION OF SKILLED RESPONSE
Merrill Noble and Don Trumbo [1966] 42 p refs Submitted for Publication
(Grants NsG-606; AF-AFOSR-62-17)
(NASA-CR-79919) CFSTI: HC $2.00/MF $0.50 CSCL 05I

A series of experiments concerned with the ways in which responses become organized is discussed. The principle parameter in most studies was stimulus coherence, and tracking tasks were used as a vehicle because graded responses permit detailed and fine-grained analyses. Both spatial and temporal coherence are used in response organization, and type of response strategy varies with degree of stimulus coherence. The effects of secondary tasks, sequence length, and task coding were also examined. Author

N67-11850*# Kansas State Univ., Manhattan.
ON THE LENGTH–DIFFICULTY RELATION IN SKILL PERFORMANCE
Jay Swink, Don Trumbo, and Merrill Noble [1966] 18 p refs Submitted for Publication
(Grant NsG-606)
(NASA-CR-79920) CFSTI: HC $1.00/MF $0.50 CSCL 05I

Sequence length in an irregular step function tracking task was varied in order to evaluate the effect on acquisition and retention of a motor skill. A $5\times2\times2\times2$ factorial design was used with 5 sequence lengths, 2 degrees of task coherence, 2 training criteria (equal practice *vs* equal repetitions), and 2 long-term retention intervals. The results support Deese's contention, based on verbal serial learning, that repetitions *per item* do not increase with length of the series, although total learning time and total number of repetitions do increase approximately as suggested by Thurstone's exponential equation. Author

N67-11851*# Pennsylvania State Univ., University Park. Dept. of Biophysics.
PHYSICS OF CELLULAR SYNTHESIS, GROWTH AND DIVISION Progress Report, Apr. 1–Sep. 30, 1966
7 Nov. 1966 21 p refs
(Grant NsG-324)
(NASA-CR-79921) CFSTI: HC $1.00/MF $0.50 CSCL 06A

Brief articles regarding the following research are presented: (1) CaCl density gradient centrifugation of intact bacterial cells; (2) hydrostatic pressure effects on macromolecular synthesis; (3) centrifugal fields–effect on macromolecular synthesis of *E. coli*; (4) reversion of mutagens; (5) hydrogen atom–amino acid interaction; (6) dose saturation in gamma-irradiated organic solids; (7) radiation effects on thymine and related purine derivatives; (8) free radical production by decay of tritium in nucleic acid pyrimidines; (9) photodynamic action at the molecular level; (10) breaks in DNA; and (11) bacterial growth in high sugar concentrations. Also reported is progress in microspectrophotometry instrumentation and in the construction of a cell culture laboratory. K.W.

N67-11858*# Florida Southern Coll., Lakeland Southern B.o-Research Inst.
THE MALAISE OF SPACE-MAN AND ITS POSSIBLE RELATION TO SEROTONIN Semiannual Report, May 1–Oct. 31, 1966
31 Oct. 1966 64 p refs
(Grant NGR-10-012-001)
(NASA-CR-79928) CFSTI: HC $3.00/MF $0.75 CSCL 06S

Preliminary data essential for the experiments with animals placed in a simulated high altitude air chamber are reported together with findings of an investigation concerning the effects of simulated high altitude air on blood serotonin and serum ascorbone concentrations. The data relate to normal animals of various genera and their deviations in blood serotonin concentrations under various abnormal conditions, such as cancer and hypercholesteremia. Also given are data of blood concentration in normal men and cardiac patients. Preliminary tests with a simulated high altitude air chamber indicate that the blood serotonin concentration in rats was significantly increased at 30,000 feet. The increase was much less pronounced at the altitude of 20,000 feet. K.W.

N67-11884# School of Aerospace Medicine, Brooks AFB, Tex.
SPEED OF RECOVERY FROM CORIOLIS STIMULATION IN MOTION SICKNESS IN RELATION TO PILOTS AND NONPILOTS
Patrick J. Dowd Jul. 1966 4 p refs
(SAM-TR-66-63; AD-639598) CFSTI: HC $1.00/MF $0.50

Certain flight maneuvers, such as an aircraft banking and turning, can be simulated by the USAFSAM biaxial stimulator, resulting in a Coriolis effect. Motion sickness can easily be induced by Coriolis stimulation for both pilots and nonflyers. An ex post facto analysis of the rate of decay of vertical nystagmus was used to determine the differences between pilots and nonpilots who were sick or nonsick. Results implied that the more rapid the rate of decay of nystagmus, the more rapid the abatement of autonomic stimulation, which decreases the chances of summing activity over time to reach required levels for general visceral responses resulting in motion sickness. The findings demonstrate the effects of flying experience on the rate of decay of nystagmus elicited by a Coriolis stimulation Author (TAB)

N67-11887# Picatinny Arsenal, Dover, N. J. Explosives Lab.
AN INVESTIGATION OF BIOLOGICAL SYSTEMS BY SLOW NEUTRON INELASTIC SCATTERING
H. P. Boutin Sep. 1966 58 p refs
(PA-TR-3367; AD-638991) CFSTI: HC $3.00/MF $0.50

Several systems of biological interest have been investigated by slow neutron inelastic scattering. The frequencies of molecular vibrations in a 40–800/cm range have been obtained for several polypeptides (polyglutamic acid (PGA), polyglycine, polyleucine). Under certain approximations, the frequency distribution g(mu) of phonons in the sample can be extracted from the scattered neutron intensity. This function g(mu) can in turn be used to calculate some of the thermodynamic parameters such as free energy, enthalpy, or specific heat. This has been applied to the study of the alpha-helix-random coil transition in PGA, and to the denaturation of bovine serum albumun (BSA). Preliminary results on the melting of keratin structure in 7-8 LiBr solution are also presented. Author (TAB)

N67-11899# Wisconsin Univ., Madison. Mathematics Research Center.
CONFIDENCE REGIONS FOR MEAN MEASUREMENTS OF HUMAN CHROMOSOMES
Marvin A. Kastenbaum Apr. 1966 13 p
(Contract DA-11-022-ORD-2059)
(MRC-TSR-656; AD-638635) CFSTI: HC $1.00/MF $0.50

A statistical analysis of data on human karyotypes is presented. The data represent lengths of the chromosome arms in several cells from the same individual. A bivariate vector of means is computed, and confidence regions are estimated for each chromosome. These regions are ellipses whose center is at the point specified by the mean lengths of the long and short arms. When all ellipses are plotted on the same grid, the over lap gives some indication of the inability to distinguish between chromosomes. Author (TAB)

N67-11900# Illinois Univ., Urbana. Training Research Lab.
PROJECT SOCRATES: A FLEXIBLE RESEARCH FACILITY TO BE USED IN STUDIES OF PRE-PROGRAMMED SELF-INSTRUCTION (PSI) AND SELF-PROGRAMED INDIVIDUALIZED EDUCATION (SPIE) Final Report
Lawrence M. Stolurow Sep. 1966 31 p refs
(Contract Nonr-3985(04))
(AD-638676) CFSTI: HC $2.00/MF $0.50

This is the final report of work accomplished on Project SOCRATES (System for Organizing Content to Review and Teach Educational Subjects). The Project contributed to the development and operation of a computer-based facility for psychological research on variables associated with pre-programed self-instruction (PSI) and self-programed indivualized education (SPIE). The research was concerned with the development of psychological theory and research relating to the design and use of a computer-based instructional system. Author (TAB)

N67-11921# California Univ., Los Angeles. Western Management Science Inst.
COMPUTER SCIENCE DEVELOPMENTS RELEVANT TO PSYCHOLOGY
Earl B. Hunt Aug. 1966 37 p refs Presented to Div. 3 (Experimental Psych.), Am. Psych. Assoc., New York, Sep. 1966 *Its* Working Paper No. 104
(Contract Nonr-233(75))
(AD-638853) CFSTI: HC $2.00/MF $0.50

The application of computers in Psychology can be divided into three broad areas: mathematical computation, file manipulation, and on-line control of experimentation. New languages and better computing techniques will make the first area of application much easier. One-line consoles permitting rapid access to the computer will largely replace the present day desk calculators used in many psychological data processing problems. The use of electronically stored files will make record searching and screening much easier. The most interesting new applications, however, will be in the area of on-line control of experiments by man-machine interaction. The developments in computer science which make these applications possible are discussed in some detail. In addition, there are conceptual developments in computer science, particularly in the study of artificial intelligence, which may provide leads in the development of psychological theory. Author (TAB)

N67-11922# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
A SELECTIVE REVIEW OF THE LITERATURE ON TACTILE SENSITIVITY: 1940–1965 Final Report, Oct.–Dec. 1965
Thomas J. Moore Apr. 1966 24 p refs
(AMRL-TR-66-50; AD-638718) CFSTI: HC $1.00/MF $0.50

The literature from 1940 to 1965 concerned with the tactile sense has been selectively reviewed. The neurophysiological, psychophysiological, and communicatory aspects of the tactile system were considered. In each of the three areas, representative studies have been reviewed and current trends of research have been indicated Author (TAB)

N67-11925# Karolinska Institutet, Stockholm (Sweden). Dept. of Cell Research.
AUTOFLUORESCENT GRANULES IN CELLS OF HUMAN DERMIS. II: HISTOCHEMICAL OBSERVATIONS
Gunnar D. Bloom and E. Martin Ritzen 1963 19 p refs
(Grant PHS-C-4716)
(AD-636695) CFSTI: HC $1.60/MF $0.50

Cells with autofluorescent granules are common in the dermal connective tissue of human skin. The cytoplasmic granules appear to be of lipo-pigment nature. The cells show phagocytic properties and it can therefore not be excluded that the cytoplasmic granular structures are ingested material. There are certain

similiarties between the observed dermal autofluorescent cells (DAF-cells) and chromatophores (melanophages) of the dermis. Convincing histochemical evidence has not been obtained for the presence of catecholamines in these fluorescent cells, which has been suggested. Author (TAB)

N67-11938# Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.
AVIATION MEDICINE REPORTS: AN ANNOTATED CATALOG OF OFFICE OF AVIATION MEDICINE REPORTS, 1961 THROUGH 1965
Mary Ellen Allen and Stanley R. Mohler Jan. 1966 33 p
(AM-66-1; AD-638732) CFSTI: HC $2.00/MF $0.50

An annotated catalog of Office of Aviation Medicine Reports is presented as a quick reference for those engaged in civil aviation and related activities. It provides an applied summary, Author Index, and Subject Index of each OAM Report published from 1961 through 1965 Author (TAB)

N67-12033# Federal Aviation Agency, Oklahoma City, Okla.
A TABLE OF INTENSITY INCREMENTS
Jerry V. Tobias Jan. 1966 5 p
(AM-66-4)

Small intensity increments can be produced by adding larger intensity increments. A table is presented covering the range of small intensity increments from 0.008682 through 6.020 dB in 60 large intensity increments of 1 dB. Author

N67-11946*# Texas Inst. for Rehabilitation and Research, Houston.
THE EFFECT OF BEDREST ON VARIOUS PARAMETERS OF PHYSIOLOGICAL FUNCTION. PART X: THE EFFECT OF BEDREST ON THE CIRCULATORY RESPONSE TO A VALSALVA MANEUVER
C. Vallbona, F. B. Vogt, D. Cardus, and W. A. Spencer Washington, NASA, Dec. 1966 17 p refs
(Contract NAS9-1461)
(NASA-CR-180) CFSTI: HC $1.00/MF $0.50 CSCL 06P

Experimental design of studies of the effect of bedrest included an evaluation of the performance of a controlled Valsalva maneuver before and after bedrest. This report presents the quantitative results of the changes in arterial blood pressure during the performance of a controlled Valsalva maneuver before and after bedrest by a group of thirteen individuals who praticipated in this study. An analysis of the data indicates that after 14 days of bedrest the Valsalva maneuver may trigger a greater adrenergic reaction to compensate for the decreased venous return in the phase of forced expiration. This adrenergic reaction was evident also in subjects who developed poor tolerance to passive tilt following bedrest. The findings suggest that a mechanism of orthostatic hypotension after bedrest must be explained on basis other than deficit in the autonomic nervous system of these individuals. Author

N67-11968*# Bio-Dynamics, Inc., Cambridge, Mass.
RESPONSES OF HEALTHY SUBJECTS TO STRESSES OF SELECTED ATHLETIC EVENTS Final Report, Jan. 1963–Jul. 1964
19 Jan. 1965 115 p refs
(Contract NAS9-1246)
(NASA-CR-65538) CFSTI: HC $4.00/MF $0.75 CSCL 06S

Electrocardiographic measurements were obtained by telemetry from 49 participants during athletic events. Physiological measures plus timed blood and urine samples were also collected at specified intervals prior to and subsequent to the events. The physiological data and biochemical analyses of the blood and urine samples provide normative data which are descriptive of the stress response of expert and novice athletes. Athletic events monitored were: auto racing, sky diving, polo, bullfighting, hockey, skiing, crew, and track. The selection of sports includes team versus individual competition, life endangering versus low injury events, and tests of strength and stamina versus agility and skill. For most of the sports, both expert and relative novice participants were monitored. Author

N67-11985*# Hughes Research Labs., Malibu, Calif.
RESEARCH AND DEVELOPMENT PROGRAM FOR RADIATION MEASUREMENTS OF RADIOBIOLOGICAL HAZARDS OF MAN IN SPACE Summary Technical Report, 1 Aug. 1965–31 Jul. 1966
31 Jul. 1966 42 p refs
(Contract NAS2-2366)
(NASA-CR-73040) CFSTI: HC $2.00/MF $0.50 CSCL 06R

Data from experimental measurements of the center line depth dose distributions for protons with energies of 20, 45, 137, 220, 260, 630, and 730 MeV are presented and are discussed. The distributions for 20, 45, and 137 MeV protons are characterized by a gradual increase of dose with tissue depth, followed by a sharp peak as the protons approach the end of their range. In other work, spherical proportional counters with various electrode designs were investigated for measuring microscopic dose distributions; and the preparation of spherical silicon Au-i-Al detectors is described. L.S.

N67-12009# Joint Publications Research Service, Washington, D. C.
OPTIMAL TEMPERATURE REGIMES FOR THERMOPHILIC CHLORELLA INVESTIGATED
I. V. Smirnov 22 Nov. 1966 7 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 167, no. 6, 1966 p 1405–1408
(JPRS-38731; TT-66-35155) CFSTI: $1.00

A study designed to determine the optimal temperature for growing the thermophilic strain of chlorella with varying intensities of artificial illumination is reported. Focused upon was the dependence of growth rate reduction on the intensity of illumination of a cell suspension temperature at 39°. It was found that: (1) with an increase in illumination intensity the temperature corresponding to the maximal growth rate of the culture is shifted toward higher temperatures; (2) the temperature shift as a function of illumination intensity may be expressed by the empirical relation

$$T_{max}(I) = 36^\circ + \alpha(I - e^{-\beta I}),$$

where $\alpha = 4.43^\circ$, $\beta = 7.5 \times 10^{-6}$ erg^{-1}-cm^2-sec; and (3) to obtain maximal culture productivity with changes of the illumination intensity, it is necessary to vary the cell suspension temperature. If the range of variation of illumination intensity is small, for example, in the limits of $100-300 \times 10^3$ erg-cm^{-2}-sec^{-1}, then the cell suspension temperature may be stabilized at a single point corresponding to 39°. In this case the productivity is reduced by no more than one to two percent in comparison with the maximal. S.C.W.

N67-12013# Joint Publications Research Service, Washington, D. C.
BIBLIOGRAPHY ON BIOASTRONAUTICS
L. I. Boreva and E. M. Panoya, comp. 16 Nov. 1966 110 p refs Transl. into ENGLISH of the booklet "Ukazatel' Literatury, Aviakosmicheskaya Meditsina, Bioastronautika" Moscow, 1966 p 3–107
(JPRS-38661; TT-66-35086) CFSTI: $4.00

A bibliography of scientific literature on aerospace medicine and bioastronautics is reported. Cited are research in the following areas: biological, physiological and psychological effects of the space environment; problems of man–machine and life support systems; medical problems and pharmacology; toxicology; problems associated with selecting and training personnel; and research methods, biotelemetry, and data processing. S.C.W.

N67-12030# Library of Congress, Washington, D. C. Aerospace Technology Div.

THE EFFECT OF SPACEFLIGHT FACTORS ON CENTRAL NERVOUS SYSTEM FUNCTIONS Surveys of Foreign Scientific and Technical Literature

Christopher H. Dodge and Janice L. Smith 4 Aug. 1966 42 p refs Summary of data

(ATD-66-99)

Reported is an annotated bibliography of Soviet scientific and technical literature on the isolated and combined effects of space-flight acceleration and ionizing space radiation on the central nervous system. Cited are studies on respiratory changes during vibration; the comparative effects of neutron, proton, and gamma irradiation; the effect of radial accelerations on brain temperature; the effect of prolonged gamma irradiation on vestibular functions; and cerebral oxygen metabolism, bioelectricity, and conditioned reflex activity during vibration. S.C.W.

N67-12035# Federal Aviation Agency, Oklahoma City, Okla.

PROBLEMS IN AEROMEDICAL CERTIFICATION: CARDIOVASCULAR RESPONSES TO EXERCISE FOLLOWING MYOCARDIAL INFARCTION

J. Naughton, K. Shanbour, R. Armstrong, J. Mc Coy, and M. T. Lategola Jun. 1966 8 p refs

(AM-66-17)

There has been much speculation about a cardiac patient's ability to respond to physical conditioning. In order to evaluate the quality of the cardiovascular adjustments of cardiac patients to exercise, 12 men who had recovered from well-documented episodes of myocardial infarction were evaluated with a work-capacity test while sedentary and after 8 months of regular, vigorous physical activity. Their responses were compared with those of 12 other cardiac patients and 12 healthy men tested in a similar manner at 8-month intervals. Prior to reconditioning, the 12 cardiac patients had blood-pressure and pulse-rate responses similar to those recorded in the two sedentary groups at comparable levels of energy expenditure. Following the reconditioning, however, these 12 patients had significantly lower levels of systolic and diastolic blood pressure ($P < 0.05$) and significantly lower pulse rates ($P < 0.05$) throughout testing. These results suggest that the asymptomatic cardiac patient with a well-healed myocardial infarction has the ability to respond to physical conditioning in a manner similar to that observed to occur in presumably healthy individuals. These cardiovascular adjustments following training reflect a more efficient cardiovascular mechanism for adjusting to physical stress. Author

N67-12036# Federal Aviation Agency, Oklahoma City, Okla.

CLINICAL AVIATION MEDICINE: A PHYSICAL-CONDITIONING PROGRAM FOR CARDIAC PATIENTS Progress Report

John Naughton, Michael T. Lategola, and Kamal Shanbour Jun. 1966 11 p refs

(AM-66-21)

Twenty men with well-documented episodes of myocardial infarction participated in a physical-conditioning program for 3 months or longer during the past 2 years. The activity consisted of intermittent jogging, calesthenics, and competitive games conducted as 1-hour sessions 5 days a week. Average participation by each individual was 3 days a week. Nineteen patients returned to full employment; three were hospitalized five times for minor noncardiac complaints; ten have discontinued the program; and four have been vigorous participants for over a year. Three patients have died; two of presumed recurrent episodes of myocardial infarction and one of suicide. Two deaths have also occurred in an aged-matched group of sedentary cardiac patients but, they have had four more episodes of myocardial infarction. The results to date indicate that cardiac patients can be physically rehabilitated without fear of jeopardizing their clinical course. Author

N67-12067*# Denver Univ., Colo.

SHORT PERIOD FLUCTUATIONS IN INTELLIGENCE Final Report

Sep. 1966 57 p refs

(Grant NsG-518)

(NASA-CR-79740) CFSTI: HC $3.00/MF $0.50 CSCL 05J

The problem of isolating fluctuations in the intellectual function was investigated by measuring 14 primary mental abilities of 106 male adults on 10 separate occasions. The existing evidence indicating that measures of intelligence are stable and that intelligence is a highly stable attribute of man is reviewed. A method of analysis is described which identifies patterns representing stable differences between individuals (traits) and patterns representing between-person differences that are reliably observed on each of several occasions but which are not stable from one occasion to another (states). Test results indicated that fluid intelligence (as well as other attributes of intellectual test behavior) varies functionally within persons and also represents a stable pattern of performances that distinguishes one person from another. L.E.W.

N67-12073*# IIT Research Inst., Chicago, Ill. Astro Sciences Center.

MISSION REQUIREMENTS FOR EXOBIOLOGICAL MEASUREMENTS ON VENUS

W. H. Riesen and D. L. Roberts Sep. 1966 34 p refs

(Contract NASr-65(06))

(NASA-CR-79756; P-16) CFSTI: HC $2.00/MF $0.50 CSCL 06C

As the initial biological exploration of Mars and Venus will be based largely on the knowledge and experience gained with terrestrial life forms, these data are briefly reviewed. A possible evolutionary sequence, expressed in terms of chemical and biological constituents in the earth's environment, is tabulated. Two major considerations in determining the possible existence of life on Venus are identified: the ability of the present Venusian environment to support life; and the plausibility of life, of a terrestrial or nonterrestrial type, originating, becoming established, and evolving. The environmental parameters on Venus are listed and compared with the conditions under which life exists on earth. The biological measurements which should be made in the early exploration of Venus are discussed; these include entry probes for detecting organic compounds and life forms, and atmospheric probes which can remain at given altitudes for several days. Among the conclusions drawn are: (1) Life could survive on Venus probably in localized biotic zones. (2) Venus should be treated as a biological preserve. M.G.J.

N67-12080*# University of Southern Calif., Los Angeles. Dept. of Electrical Engineering.

AN ASYNCHRONOUS PULSE-AMPLITUDE PULSE-WIDTH MODEL OF THE HUMAN OPERATOR

M. J. Merritt Mar. 1966 42 p refs

(Grant NGR-05-018-022)

(NASA-CR-79760; USCEE-128) CFSTI: HC $2.00/MF $0.50 CSCL 06D

Details are given on the development of a human operator model which produces discrete pulse outputs in response to continuously presented Gaussian random inputs. The parameters of the model were identified from experimental data taken from a subject in an advanced state of training. Computer procedures for the complete identification of all model parameters are described. Results indicate: (1) The human operator reaction time of 200 milliseconds is in excellent agreement with other data. (2) Pulse amplitude and pulse width models for negative pulses produce better correlations with experimental data than for positive pulses. (3) Pulse amplitude models for positive and negative pulses are similar, despite considerable asymmetry in pulse amplitude distributions. (4) Human operators use pre-programmed pulse sequences. However, it is pointed out that it is not feasible to

determine whether the model errors observed are random or functionally dependent on the human operator inputs and input–output history. M.G.J.

N67-12085# Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.
THE ACHIEVEMENT OF THERMAL BALANCE AND ITS MAINTENANCE DURING ENVIRONMENTAL STRESS
P. F. Iampietro and Thomas Adams Jun. 1966 15 p refs (AM-66-23)

This paper describes in some detail the means, both physical and physiological, available to man for maintenance of thermal balance. It is also concerned with some aspects of thermal balance when work is performed in hot or cold environments and the enhancement of performance that thermal acclimatization imparts. Author

N67-12128*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
GAS CHROMATOGRAPHY COLUMN DEVELOPMENT FOR ANALYSIS OF THE MARTIAN ATMOSPHERE
W. F. Wilhite *In its* Space Programs Sum. No. 37–40, Vol. IV 31 Aug. 1966 p 119–123 (See N67-12101 02-34) CFSTI: HC $3.75/MF $1.25

By using a recently-developed porous polymer bead column packing material, resolution of nearly all the components of interest in the Martian atmosphere can be obtained with one gas chromatographic column for a period of less than 15 min. Development of the combined gas chromatograph-mass spectrometer experiment to separate atmospheric constituents is discussed, and the various constituents that require identification are listed. The poor baseline stability that resulted from the use of temperature programming during the separation of N and CO is noted; and the excellent stability obtained through the use of better flow control and a 50–80 mesh Porapak Q is reported. Further improvements permitted the resolution of all components of interest except oxygen, argon, and carbon monoxide which can easily be determined by mass spectrometry. The peak shape for all the components is excellent, except for ammonia and nitrogen dioxide which tail. M.W.R.

N67-12129*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SOIL STUDIES—DESERT MICROFLORA. XIII: IDENTIFICATION OF SOME ALGAE FROM ANTARCTICA
R. E. Cameron *In its* Space Programs Sum. No. 37–40, Vol. IV 31 Aug. 1966 p 123–133 refs (See N67-12101 02-34) CFSTI: HC $3.75/MF $1.25

Algal species were found in all of the 100 specimens collected in Antarctica, and detailed microscopic examination was made of 21 of these. Filamentous blue-green species accounted for most of the algae; and the most frequently observed were several varieties of oscillatoriaceae. Green algae were in lesser abundance, and Protococcus grevillei was found in 11 of the 100 specimens. Several of the specimens included diatoms. Most of the Antarctica algae are mesophilic or hydrophilic species which grow and reproduce when water is available. Protective mechanisms observed in some of the algae include lichenization, brownish pigmentation, increased amount and consistency of sheath or matrix materials, lamellation, and granule formation. Many of the 21 algae examined for fluorescence microscopy showed the red fluorescence of viable chlorophyll. Routine culture techniques did not promote the growth of these algae, although the cells remained viable throughout the incubation period. M.W.R.

N67-12152*# National Aeronautics and Space Administration, Washington D. C.
MORPHOLOGICAL CHANGES OF VARIOUS PERIPHERAL NERVOUS SYSTEM COMPONENTS UNDER THE INFLUENCE OF IONIZING RADIATION OF THE ORGANISM [O MORFOLOGICHESKIKH IZMENENIYAKH RAZLICHNYKH KOMPONENTOV PERIFERICHESKOY NERVNOY SISTEMY PRI DEYSTVII NA ORGANIZM IONIZIRUYUSHCHEY RADIATSII]
V. V. Anisimova-Aleksandrova Nov. 1966 10 p refs Transl. into ENGLISH from Med. Radiol. (Moscow), v. 4, 1959 p 309
(NASA-TT-F-10605) CFSTI: HC $1.00/MF $0.50 CSCL 06R

Nerve elements in the dura mater and the eye muscles of rabbits, rats, and guinea pigs subjected to Co^{60} irradiation were investigated. The highest radiosensitivity in the dura mater was manifested by the afferent nerve conductors, whose cylinders disintegrated 2 to 3 days after irradiation. Sympathetic fibers were found to be more resistant. The sensory nerves and their endings remained intact in the eye muscles while, at the same time, the motor nerve fibers and their terminal ramifications in the motor end plates appeared to be the least resistant and exhibited various degrees of injury up to complete degeneration and lysis of the end plate neurofibrillar apparatus from which only the protoplasmic soles were left. The elements of the peripheral nervous system exhibited a considerable reaction to the influence of ionizing radiation, but the radiosensitivity exhibited by the various system components is far from being uniform. Aurhot

N67-12177*# Naval School of Aviation Medicine, Pensacola, Fla.
ORIENTATION IN AEROSPACE FLIGHT
Ashton Graybiel 10 Oct. 1966 45 p refs Presented at 15th Intern. Congr. on Avaition and Space Med., Prague, 30 Sep. 1966 *Its* Spec. Rept.-66-6 Joint rept. with NASA
(NASA Order R-93)
(NASA-CR-80123) CFSTI: HC $2.00/MF $0.50 CSCL 05H

Attention is focused on some of the problems involved in spatial orientation which have been experimentally examined. Emphasis is placed on a consideration of the evolutionary manner in which orientational homeostasis is acquired under terrestrial conditions. Examples are given of interactions between cues from visual and force environments and the influence of nonvisual cues on the visually perceived direction of space. Weightlessness effects on the otilith organs are discussed, and reports of introspective observations by astronauts and cosmonauts from their experiences in weightless environments are included. A.G.O.

N67-12185# Naval Personnel Research Activity, San Diego, Calif.
PROMPTING VS FEEDBACK IN TRAINING AUDITORY JUDGMENTS OF VARYING DIFFICULTY
E. G. Aiken Aug. 1966 17 p refs
(STB-67-5; AD-639225) CFSTI: HC $1.00/MF $0.50

Two training procedures were compared for their efficiency in training two auditory judgments. One procedure (prompting) involved presentation of the correct answer before the presentation of the stimulus. The other procedure (feedback) involved presentation of the correct answer after the subjects had judged the stimulus. Results indicate: (1) A substantial trend toward superiority of feedback in improving pitch discrimination performance at two levels of difficulty, (2) a trend toward superiority of prompting in the training of pitch and intensity identification, (3) a substantial trend toward greater transfer to a Doppler discrimination problem following auditory identification as opposed to auditory discrimination training. Recommendations are made concerning implications of the data for Navy training and future research. Author (TAB)

N67-12192# Southwest Research Inst., San Antonio, Tex. Dept. of Physical and Biological Sciences.
THE EFFECTS OF IONIZING RADIATION ON OXIDATION STATES OF BIOLOGICAL SYSTEMS Final Report, Jul. 1965–Jul. 1966

Donald E. Johnson, James W. Register, Jr., William H. Storey, Jr., and James N. Bollinger 31 Jul. 1966 54 p refs
(Contract AF 41(609)-2816)
(SRI-05-1755; AD-639192) CFSTI: HC $3.00/MF $0.50

Changes in the oxidation state of biological systems as a function of ionizing radiation were studied by measuring the activity of two metalloenzymes and by evaluating electron spin resonance signals produced by mitochondria. The specific activity of liver cytochrome oxidase and xanthine oxidase was not altered in mice exposed to total-body irradiation of 150 to 22,500 rad. Iron (Fe(II)), molybdenum (Mo(V)), and free radicals (probably flavoquinones) yielded the most predominant signals in electron spin resonance analysis of liver mitochondria isolated from both irradiated and control mice. Both the electron spin resonance and cytochrome oxidase data suggest that the electron transport system is not damaged by the levels of ionizing radiation used in this investigation. The fact that molybdenum electron spin resonance signals occur in the mitochondrial preparations and that preliminary data indicate this metal undergoes oxidative changes due to radiation indicates the need for more extensive investigation of the relationship between this metal and ionizing radiation. Author (TAB)

N67-12201*# Consultants and Designers, Inc., Arlington, Va.
AN IMPORTANT CONTRIBUTION TO SPACE MEDICINE: SOME RESULTS OF THE EXPERIMENT ON THE AES "COSMOS-110" [VAZHNYY VKLAD V KOSMICHESKUYU MEDITSINU]
V. Pravetskiy, N. Gurovskiy, B. Yegorov, and A. Kiselev 19 May 1966 4 p Transl. into ENGLISH from Pravda (Moscow), no. 137, 17 May 1966 p 6
(Contract NAS5-9299)
(NASA-CR-80181; ST-PR-SM-10489) CFSTI: HC $1.00/MF $0.50 CSCL 06S

Physiological observations and experiments on two dogs during prolonged spaceflight are reported. Results of the Cosmos-110 space experiments showed an increased calcium content in urine and blood of the dogs; this calcium washout was confirmed by X-ray investigation of their bones. An extreme weight loss of the animals despite adequate food consumption was attributed to dehydration and muscular mass expense. The animals' cardiovascular activity stabilized after 10 to 14 days of weightless orbiting after initial sharp frequency oscillations. Gastrointestinal disruptions observed in both dogs upon landing ceased after 6 to 8 days. G.G.

N67-12209*# Northrop Space Labs., Hawthorne, Calif.
INVESTIGATION OF PEROGNATHUS AS AN EXPERIMENTAL ORGANISM FOR RESEARCH IN SPACE BIOLOGY Progress Report, 1 Jul.–30 Sep. 1966
R. G. Lindberg 30 Sep. 1966 25 p refs
(Contract NASw-812)
(NASA-CR-80173; NSL-64-29-12) CFSTI: HC $1.00/MF $0.50 CSCL 06C

Pocket mice were studied for their regulatory body temperature mechanisms in hypoxic atmospheres, and their responses to extreme environments in controlled chambers. It was found that the pocket mice possessed a critical body temperature of 22–24°C during cooling and warming cycles. Hypoxia induced in the animals a state of deep torpor; this state did not affect their circadian rhythm of arousal. A body temperature of 9.1°C in an ambient of 6.8°C was compatible with natural rewarming processes. Water balance and food consumption of the mice was not disturbed significantly in a dry environment if an adequate diet of high oil content seeds was provided. It was also demonstrated that pocket mice could be maintained under 100% oxygen reduced pressure for an extended period of time if the animals possessed a minimum weight. A daily period of torpor was documented in a pocket mouse that was exposed to oxygen concentrations from 14–46%. G.G.

N67-12225*# Miami Univ., Coral Gables, Fla. Inst. of Molecular Evolution.
[INVESTIGATIONS IN SPACE-RELATED BIOLOGY, INCLUDING MOLECULAR EVOLUTION AND RELEVANT ASPECTS OF THE EXTRA-TERRESTRIAL] Annual Report, 1 Jun. 1965–30 Sep. 1966
Sidney W. Fox 30 Sep. 1966 72 p refs
(Grant NsG-689)
(NASA-CR-79299; AR-2) CFSTI: HC $3.00/MF $0.75 CSCL 06C

Research accomplishments are reported in investigations of space related biology. A demonstration was made of heterotrophic proliferation of proteinoid particles which suggests how whole primitive systems could begin. It was found that proteinoids containing protein like proportions of all proteinogenous amino acids can be produced. Evidence was obtained which suggests that thermal proteinoids tend to be approximately as heterogeneous as unfractionated serum proteins. Stoichiometric relationships were found between thermal histone-like polymers and RNA. Hormonal activity was found in thermal polyamino acids, and it was demonstrated that the sea urchin egg lacks "fertilization antigens" at the egg surface. An experiment verified that conversion of multivalent to univalent fertilizin involves fragmentation of multivalent fertilizin into a least four large subunits. A study of fish sperms was conducted, and confirmed by thin sectioning that most species lack acrosomes. It is reported that a comparative, ultrastructural study of crustacean sperms was completed. C.T.C.

N67-12233*# Texas Univ., Austin. Defense Research Lab.
STIMULUS-ORIENTED APPROACH TO DETECTION RE-EXAMINED
Lloyd A. Jeffress 6 Sep. 1966 37 p refs Prepared for Navy
(NASA Order R-129; Contracts NObsr-93124; Nonr-3579(04))
(NASA-CR-78973) CFSTI: HC $2.00/MF $0.50 CSCL 05H

Motivated by some new insights resulting from attempts to replicate experiments with human observers through the use of an electrical model of the auditory system, the effect of signal duration on detection in the presence of a continuous masking noise is considered. The model, of those tried, that best fits human performance consisted of a bandpass filter obtained by subtracting the output of a 500 Hz sharp-cutoff, low-pass filter from another having a cutoff of 525 Hz. The filter was followed by a linear half-wave rectifier, and it in turn by an integrator having a 100 msec time. The integrator can be thought of as a device which takes a running average of its input. The probability density distributions for N and SN yielded by the model lie between the Rayleigh–Rice distributions on the one hand and a pair of normal distributions of unequal variance on the other. The exact shape of the two distributions depends upon both the bandwidth of the filter employed and the time constant of the averager. Author

N67-12237*# California Univ., Berkeley. Dept. of Nutritional Sciences.
CLINICAL NUTRITIONAL STUDY OF MINIMUM PROTEIN AND CALORIC REQUIREMENTS FOR MAN Annual Report, Sep. 1964–Sep. 1965
Sheldon Margen and Doris Howes Calloway Sep. 1966 266 p refs
(Grant NGR-05-033-068)
(NASA-CR-79394) CFSTI: HC $6.00/MF $1.50 CSCL 06P

Three sets of "penthouse" experiments were conducted in a nutritional study of the minimum protein and caloric requirements for man. The first was a 60-day study divided into 4 major 15-day metabolic periods each of 3 minor periods of 3-, 6-, and 6-day duration. A total nitrogen balance study on an adequate protein diet was performed, and the total endogenous nitrogen losses were determined on as close to zero protein intake as possible. In the zero protein diet, protein was removed, carbohydrate was substituted for protein to maintain calories constant, and all other

dietary constituents were unchanged. The second study was an 88-day investigation divided into 5 major metabolic periods (the first of 12-day duration and the remainder of 18-day duration), each of 3 minor periods of 6-day duration, and was a continuation of the first "penthouse" study. The total balance on an adequate protein diet and the minimum endogenous losses on a protein free diet were determined, and an attempt was made to maintain nitrogen equilibrium in subjects when they were given dietary protein at the level of the minimum endogenous loss. The third study was utilized to obtain further control data to increase the observations of the first two studies, and to test the nutritional adequacy of the Gemini diet. C.T.C.

N67-12250*# Naval Medical Research Inst., Bethesda, Md. Dept. of Microbiology.
EFFECTS OF HIGH AND LOW BAROMETRIC PRESSURES ON SUSCEPTIBILITY AND RESISTANCE TO INFECTION Quarterly Status Report, 1 Jul.–30 Sep. 1966
Francis B. Gordon 30 Sep. 1966 17 p
(NASA Order R-21-010-010)
(NASA-CR-80119; SC-R-21-010-010) CFSTI: HC $1.00/MF $0.50 CSCL 06M

The effect of prolonged increased oxygen tension at one atmosphere on enteric flora of mice was studied to investigate barometric pressure action on their susceptibility and resistance to infection. The completion of special chambers for holding mice under increased pressure, up to 95 psig, permitted initiation of a new series of experiments at this pressure. Analytical data are tabulated on stool cultures of mice in three types of gaseous environment. Numbers of bacteria per gram are listed for: *E. coli* (aberrant), slow lactose fermenters, *Klebsiella*, *Lactobacillus* (anaerobic and colony type), and *Bacteroides* of the colony type. Data are recorded for the effect of pressure on susceptibility of mice to mouse pneumonitis agent, as well as for pyruvic oxidase of meningopneumonitis agent (response to catalase). R.LI.

N67-12255*# Space-General Corp., El Monte, Calif.
PHOTOSYNTHETIC HALOPHILES FROM OWENS VALLEY Final Report
31 Aug. 1966 37 p refs
(Contract NASw-1294)
(NASA-CR-80104; SGC-917FR-1) CFSTI: HC $2.00/MF $0.50 CSCL 06F

Studies of growth of a halophilic, anaerobic, photosynthetic bacteria from an halite thenordite trona evaporite deposit have led to an increased understanding of the behavior of organisms under an extremely hostile environment. This small *Chromatium* was found to exist in small pockets in the crystal with dimensions approximately equal to the organism. The growth cycle of the organism in moving from lag to log stage involves oxidation of sulfide in the brine, the formation of a swollen cell, and finally the reduction in size to the normal short rod. A remarkable tolerance to temperature extremes is shown by the *Chromatium*. Temperatures as high as 180°C have been resisted for short periods of time and 110°C or −35 to −55° storage appears to have little deleterious effect on growth. These phenomenological studies strongly suggest the need for mechanistic investigations of the mode of water introduction under extreme environments, and of the mechanism of tolerance to extreme temperatures and pressures. Author

N67-12256*# California Univ., Berkeley. Space Science Lab.
CHEMISTRY OF LIVING SYSTEMS Semiannual Report, May 1–Sep. 30, 1966
Thomas H. Jukes 30 Sep. 1966 18 p refs *Its* Ser. No. 7 Issue No. 60
(Grant NsG-479)
(NASA-CR-79738) CFSTI: HC $1.00/MF $0.50 CSCL 06A

In a program to investigate the mechanisms by which life resists environmental extremes, technological progress directed toward certain aspects of the fundamental biochemical mechanisms of heredity and gene expression, their adaptation to environmental extremes, and their possible relationships to the origin and development of life are reported. Experiments are reported on: protection mechanisms of deoxyribonucleic acid /DNA/, thermostable proteins, ribonucleic acid /RNA/ polymerase properties, chromosome replication in *B. subtilis*, metabolic regulation in *E. coli*, optical rotary dispersion, X-ray scattering, and birefringence of DNA and RNA, and peptide chain synthesis. Experimental results are also presented on: optical properties of viruses, mutagen action on TMV and TMV–RNA, thymine metabolism in *E. coli*, and other related areas. R.LI.

N67-12281# School of Aerospace Medicine, Brooks AFB, Tex.
PHYSIOLOGY OF SLEEP AND CLINICAL ASPECTS OF SLEEP THERAPY, PART I
Rudolf Baumann [1966] 76 p refs Transl. into ENGLISH of the German Publ. "Physiologie des Schlafes und Klinik der Schlaftherapie" Berlin, Volk und Gesundh., 1963
(SAM-TT-G-569-0866; TT-66-62137; AD-637751) CFSTI: HC $7.60/MF $0.75

Contents: Sleep and internal inhibition; Is there a sleep center; Importance of cortical and cortico-autonomic regulation in sleep; Acquired conditioned sleep reflexes and foci of arousal; Foci of arousal and dreaming; Foci of arousal and hypnosis; Sleep theories; Mineral metabolism and electrobiologic processes in fatigue or sleep; The EEG in sleep and wakefulness; Cortico-autonomic regulation in sleep and wakefulness; Sleep and its connection with corticovisceral regulation; Psychosomatic medicine; Therapeutic use of protracted sleep. TAB

N67-12288# Army Chemical Center, Edgewood, Md.
EFFECT OF ACETIC ANHYDRIDE IN ANHYDROUS DIOXANE ON C-TERMINAL RESIDUES OF PEPTIDES, MARCH–JUNE 1966
Norwood K. Schaffer and Richard A. Balakir Sep. 1966 9 p refs
(EATR-4038; AD-638755) CFSTI: HC $1.00/MF $0.50

The reaction of 20 dipeptides, 2 tripeptides, and 1 heptapeptide with acetic anhydride in anhydrous dioxane was studied. After 6N HCl hydrolysis the yield of the c-terminal residue was less than that of the penultimate residue in all peptides except three of the dipeptides. The yield of the penultimate residue in the two tripeptides was less than that of the n-terminal residue. Tyrosyl arginine yielded ornithine to partly account for the lost arginine. These results suggest that the acetic anhydride-dioxane reaction can be used as a subtractive method for identifying c-terminal amino acid residues in some peptides. Author (TAB)

N67-12295# School of Aerospace Medicine, Brooks AFB, Tex.
EFFECTS OF HYDRAZINE ON BLOOD GLUCOSE AND MUSCLE AND LIVER GLYCOGEN IN THE ANESTHETIZED DOG Progress Report, Mar.–Nov. 1964
Gale D. Taylor (M.S. Thesis–Texas A&M Univ.) Mar. 1966 17 p refs
(SAM-TR-66-12; AD-633164) CFSTI: HC $1.00/MF $0.50

Intravenous injection of diluted hydrazine (25 mg./kg.) into anesthetized dogs caused prompt elevation of blood glucose levels, which reached a maximum in about 2 hours and decreased progressively during 4 hours thereafter. Liver glycogen levels fell rapidly during the first 4 hours after injection of hydrazine. Depletion of liver glycogen stores was associated with severe hypoglycemia and some depletion of muscle glycogen. Packed cell volume progressively increased after hydrazine administration. Microscopic examination of liver tissue from treated dogs showed swelling of hepatic cells and apparent fatty infiltration. Sections of liver stained

with PAS confirmed the rapid glycogen depletion. It is postulated that hydrazine affects the carbohydrate concentration of various tissues by a primary insult to the glycogenetic-glycogenolytic mechanism of the liver. Author (TAB)

IAA ENTRIES

A67-10336 #
COMBINED EFFECTS OF SPACE-FLIGHT FACTORS ON CERTAIN FUNCTIONS OF THE BODY [KOMBINIROVANNYE VOZDEISTVIIA FAKTOROV KOSMICHESKOGO POLETA NA NEKOTORYE FUNKTSII ORGANIZMA].
G. M. Frank, N. N. Lifshits, M. A. Arsen'eva, Z. I. Apanasenko, L. A. Beliaeva, A. V. Golovkina, V. Ia. Klimovitskii, M. A. Kuznetsova, L. D. Luk'ianova, and E. S. Meizerov (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Moscow, USSR).
Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, vol. 31, Sept.-Oct. 1966, p. 625-643. 40 refs. In Russian.

Consideration of the effect of such space-flight factors as acceleration, vibration, ionizing radiation, and the complex effect of dynamic and radiation factors on certain functions of the body and the oxidizing metabolism of the central nervous system, in addition to the fission processes in the hemopoietic tissues. The hemodynamic factor should be considered in reactions of the central nervous system to acceleration. The effects of vibration (70 cps, 0.4 mm) have caused changes in the oxidizing mechanism and the functional state of the central nervous system. The effects of accelerations of 8, 10, and 20 g combined with vibration (700 cps, 0.005 mm, 60 min) have led to a decrease in the mitotic activity of the bone-marrow cells for 30 days. Dynamic factors and ionizing radiation investigated have had the same sort of effect on the oxidizing metabolism in the tissues of the brain and on the cell-division processes in the hemopoietic system. W.A.E.

A67-10412 *
A SIMPLIFIED METHOD FOR THE EXTRACTION AND BIOASSAY OF RENIN.
Y. J. Katz, A. T. K. Cockett, and Raymond S. Moore (Southern California, University, School of Medicine, Dept. of Medicine, Harbor General Hospital, Torrance; California, University, School of Medicine, Dept. of Surgery / Urology, Los Angeles, Calif.).
Investigative Urology, vol. 4, no. 1, 1966, p. 64-68. 17 refs.
U. S. Public Health Service Grant No. HE-09834-01; Grants No. AF AFOSR 246-63; No. NsG-237-62.

A method for the extraction and bioassay of renin in rats is outlined. The rat unit is 1/20 of a dog unit, and raises the blood pressure 30 mm Hg. Extractions based on 0.5-g kidney sampling are possible. Careful attention to refrigeration with buffering before and during dialysis is necessary. Bioassay is simplified by using the microphonic method after injecting renin extract into the rat's tail vein. (Author)

A67-10488 *
PITUITARY ARYLAMIDASES AND PEPTIDASES.
Stanley Ellis and Manuel Perry (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.).
Journal of Biological Chemistry, vol. 241, Aug. 25, 1966, p. 3679-3686. 17 refs.

Study of the nature of the pituitary enzymes which hydrolize aminoacyl arylamides and their relationship to pituitary peptidases. The total hydrolysis of tetra- and pentapeptides is ascribed to the consecutive action of an aminopolypeptidase, a tripeptidase, and a dipeptidase. Since the aminopolypeptidase is associated with lysyl arylamidase during purification and displays the same properties as the latter, both activities are assumed to be due to the action of a single enzyme. F.R.L.

A67-10823 #
SPEECH COMMANDS IN CONTROL SYSTEMS [USTNYE KOMANDY V SISTEMAKH UPRAVLENIIA].
E. Kiunnap (Akademiia Nauk Estonskoi SSR, Institut Kibernetiki, Tartu, Estonian SSR).
Eesti NSV Teaduste Akadeemia, Toimetised, Füüsika-Matemaatika-ja Tehnikateaduste Seeria, vol. 15, no. 3, 1966, p. 377-399. 190 refs. In Russian.

Review of the literature dealing with automatic recognition of speech sounds. The problem of increasing channel carrying capacity is considered. A study is made of the mechanism of sound formation. The principles of operation of band-pass, formant, scanning, harmonic, and correlation voice coders are outlined. A number of special devices for recognizing speech signals are described, and the use of universal computers as means of studying and recognizing speech signals is discussed. A.B.K.

A67-10881 *
STERILIZING EFFECT OF HIGH INTENSITY AIRBORNE SOUND AND ULTRASOUND.
R. M. Boucher and A. Pisano (Macrosonics Corp., Cartaret, N.J.; St. John's University, Brooklyn, N.Y.).
Ultrasonics, vol. 4, Oct. 1966, p. 199-203. 11 refs.
NASA-supported research.

A study of the lethal effects of high intensity airborne sound (9.9 kc) and ultrasound (30.4 kc) on spores of B. Subtilis var niger ATCC 9372 deposited on paper strips was conducted in an experimental chamber. From the first series of collected data it appears that the acoustic intensity level and the irradiation time are the main governing factors in airborne acoustic sterilization. Preliminary observations in the 155-156 db level showed that large amplitude sonic waves were more lethal than ultrasonic waves. Thermal effects and acoustic turbulence at the microorganism interface appear to be the main physical mechanisms responsible for spore destruction. As expected theoretically, the death rate is greater at pressure antinodes under standing wave conditions. (Author)

A67-10932 #
MINIMIZING REDUCTIONS IN READINESS CAUSED BY TIME-PHASED DECREASES IN AIRCRAFT OVERHAUL AND REPAIR ACTIVITIES.
Jerome Bracken (Research Analysis Corp., McLean, Va.) and Kendall W. Simmons (U.S. Navy, Bureau of Naval Weapons, Washington, D.C.).
Naval Research Logistics Quarterly, vol. 13, June 1966, p. 159-165.

Investigation of an optimized approach for distributing a personnel reduction in the Navy's overhaul and repair activities among activities with minimum reduction in readiness. A two-stage procedure involving linear programing models was developed. Solutions involve either extensions of aircraft overhaul cycles or a combination of such extensions with reductions in aircraft inventories. M.M.

A67-10949 *
EFFECTS OF 10 DAYS RECUMBENCY ON THE RESPONSE TO THE BICYCLE ERGOMETER TEST.
David Cardus (Texas Institute for Rehabilitation and Research, and Baylor University, College of Medicine, Texas Medical Center, Houston, Tex.).
Aerospace Medicine, vol. 37, Oct. 1966, p. 993-999. 10 refs.
Contract No. NAS 9-1461.

Eleven healthy men were subjected to three periods of 10-days bed recumbency with intervening 3-week periods of normal activities. In one of the bed recumbency periods, they were subjected to bed rest alone. In another period, half of the subjects followed a program of muscular exercises with limited movement and the other half a program of intermittent venous occlusion in the lower extremities. In the third bed recumbency period, the treatments were switched. Bicycle ergometer tests were conducted before and after bed recumbency periods. Heart rate, pulmonary ventilation and metabolic gas exchange measurements were done at different work load levels. After bed recumbency the heart rate at rest and during exercise was higher than before bed recumbency. The oxygen intake at the heart rate of 160 was diminished after bed recumbency. No changes were observed in pulmonary ventilation, frequency of breathing and mechanical efficiency. The effect of muscular exercises and intermittent venous occlusion as preventive treatments for the altered heart rate response observed after bed recumbency seemed to be different for the two groups of subjects. Possible interpretations of this observation are discussed. (Author)

A67-10950 #
NORMAL HUMAN SERUM PARAMETERS FOR SIMULATED ALTITUDE AND AEROSPACE FLIGHTS. I - ESTIMATION OF CHANGE IN SERUM PROTEIN CONCENTRATION.
William G. Glenn and Carmen F. Garcia (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Microbiology Section, Immunobiology Unit, Brooks ABF, Tex.).
Aerospace Medicine, vol. 37, Oct. 1966, p. 1000-1003. 5 refs.

Discussion of the results of a series of samplings made to determine changes in serum protein concentration in subjects under normal stress. The data are based on a longitudinal sampling of a male population selected by criteria appropriate for aerospace endeavors. From 240 samples representing three serum samples per week from each of 20 male subjects for four weeks, serum protein determinations coupled with statistical treatment established that with 95% confidence, 95% of the differences between serum protein concentrations on the same subject under normal stress will be within ±1.57% protein of the previous concentration. The data are pertinent for comparison with studies of human sera from subjects exposed to simulated altitude and aerospace flights in the absence of longitudinal preflight characterization. S. Z.

A67-10951 #
NORMAL HUMAN SERUM PARAMETERS FOR SIMULATED ALTITUDE AND AEROSPACE FLIGHTS. II - ESTIMATION OF CHANGE IN ALBUMIN, GAMMA GLOBULIN, ALBUMIN/GAMMA GLOBULIN RATIO, AND A/G RATIO.
William G. Glenn and Iowa W. Marable (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Microbiology Section, Immunobiology Unit, Brooks AFB, Tex.).
Aerospace Medicine, vol. 37, Oct. 1966, p. 1004-1007. 14 refs.

This report provides essential guidelines whereby the flight surgeon remotely monitoring sera from subjects exposed to simulated altitude or from astronauts can determine when a subject is undergoing statistically significant changes in serum values. Especially are these guidelines needed in the absence of a longitudinal preflight study of the subject(s). Albumin and γ globulin concentrations, albumin/γ globulin ratios, and albumin/globulin ratios are considered for a population sampling of 20 normal males, each contributing three samples a week for four weeks. The result is a tolerance interval on each variable which includes 95% of the changes with 95% confidence - between two readings taken on different days on a given individual. (Author)

A67-10952 #
NORMAL HUMAN SERUM PARAMETERS FOR SIMULATED ALTITUDE AND AEROSPACE FLIGHTS. III - ESTIMATION OF CHANGE IN SERUM POTASSIUM, SODIUM, AND CHLORIDE.
William G. Glenn and Ira L. Shannon (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Microbiology Section, Immunobiology Unit and Dental Sciences Div., Experimental Dentistry Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 37, Oct. 1966, p. 1008-1010. 6 refs.

Specimens of sera were obtained from each of 20 normal males three times a week for four weeks. These samples were analyzed for concentrations of Na, K, and chloride by flame photometry. On the basis of concentration changes over time, tolerance intervals were computed for each substance to establish a range that would include 95% of the population with 95% confidence. Considering the same subject on different days, the tolerance intervals for K, Na, and chloride were ±1.27, ±15.60, ±7.53 mEq/liter and for two different subjects on the same day, ±0.68, ±12.03, ±8.97 mEq/liter. These intervals were the ultimate goal of the investigation and can be applied by the flight surgeon when evaluating the results of inorganic analyses of sera from subjects exposed to simulated altitude or aerospace flight. These data are especially pertinent when longitudinal preflight sampling of the test subjects was inadequate. (Author)

A67-10953
COMPLEX REACTION TIMES AT SIMULATED CABIN ALTITUDES OF 5,000 FEET AND 8,000 FEET.
D. M. Denison, F. Ledwith, and E. C. Poulton (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants.; Medical Research Council, Applied Psychology Research Unit, Cambridge, England).
Aerospace Medicine, vol. 37, Oct. 1966, p. 1010-1013. 12 refs.

Light work was performed on a bicycle ergometer in a decompression chamber while carrying out spatial transformations on pictures of a man in one of four orientations. At a pressure equivalent to a height of 8000 ft, four laboratory personnel breathing air started by responding more slowly and more variably ($p < .02$ in each case) than four matched personnel breathing an enriched mixture providing the sea-level partial pressure of oxygen, while three out of ten apprentices started by responding randomly. Even at 5000 ft eight apprentices started by responding more slowly ($p < .05$) than nine matched apprentices breathing the enriched mixture. After practice these relatively mild degrees of hypoxia had no reliable effect upon performance. Conclusion: mild hypoxia affected performance while the task was being learned, but not after practice. (Author)

A67-10954 *
ELECTROENCEPHALOGRAM DURING ORBITAL FLIGHT.
R. L. Maulsby (Baylor University, College of Medicine, Dept. of Physiology, Section of Neurophysiology; Methodist Hospital, Houston, Tex.).
Aerospace Medicine, vol. 37, Oct. 1966, p. 1022-1026.
Contract No. NAS 9-1200.

The electroencephalogram of Command Pilot Frank Borman was recorded continuously during the first two days of the Gemini 7 flight in December 1965. This first U.S. attempt to record EEG during orbital flight was designed to study sleep cycles during flight and to assess the effect of weightlessness upon the electrical activity of the brain. This report gives the technique used and the preliminary results of visual interpretation of the record. The recording was of good technical quality. The two sleep periods which occurred during the record were evaluated visually for depth of sleep vs time on a minute-to-minute basis. The first sleep period was found to be inadequate in terms of depth and length, but the second sleep period was normal. The tracing during the alert state, including ascent and orbital flight, showed no pathological changes and no definite alterations which could be attributed to weightlessness. It is concluded that these preliminary results confirm the view that orbital flight has no apparent deleterious effect on cerebral function. (Author)

A67-10955
PHASE SHIFTS OF THE HUMAN CIRCADIAN SYSTEM AND PERFORMANCE DEFICIT DURING THE PERIODS OF TRANSITION. II - WEST-EAST FLIGHT.
G. T. Hauty (Delaware, University, Dept. of Psychology, Newark, Del.) and T. Adams (Michigan State University, Dept. of Physiology, East Lansing, Mich.).
Aerospace Medicine, vol. 37, Oct. 1966, p. 1027-1033. 5 refs.

At periodic intervals throughout the day, biomedical assessments were made during the week prior to jet flight to Rome, throughout a 12-day layover period in Rome, and during the week following return to Oklahoma City. Completion of the primary shift of phase of the circadian periodicity manifested by internal temperature and heart rate required from 4 to 6 days and 6 to 8 days, respectively. Increase in subjective fatigue occurred during the primary period of transition and following return to the environment of origin but psychological performance was not impaired to any statistically significant extent during either of these periods. Compared to the time lag of the physiological phase shift, the duration of subjective fatigue was very short. Comparison of these results with those obtained from a previous East-West flight did not reveal striking bidirectional differences save for the possible exception of psychological performance which was significantly impaired in the case of the East-West flight. (Author)

A67-10956
ANALYSIS OF QUALITATIVE DATA IN THE BIOLOGICAL SCIENCES.
Norman E. Lane (U.S. Naval School of Aviation Medicine, Pensacola, Fla.).
Aerospace Medicine, vol. 37, Oct. 1966, p. 1033-1036. 6 refs.

Description of a method of converting categorical or qualitative data in the biological sciences into a series of so-called pseudo-variables which permits their inclusion in correlational analysis and prediction studies. Examples illustrate the method as applied to a study of the relationships of occupation and cholesterol level. Extension of the technique and additional applications are suggested. M. M.

A67-10958
WATER HANDLING IN THE ABSENCE OF GRAVITY.
Martin Macklin (Case Institute of Technology, Bioengineering Group, Cleveland, Ohio).
Aerospace Medicine, vol. 37, Oct. 1966, p. 1040-1045. 17 refs.

The problems of collecting humidity control condensate, urine and feces; controlling water flow in showers; and washing clothes in the absence of gravity are discussed in terms of the practical and theoretical problems in space vehicles due to the absence of gravitational field. For use in the absence of gravity two approaches for air-water separation are described - creation of a centrifugal force field with rotation, or the use of static impingement separation. Examples of the former are cyclone separators and rotating impeller separators. The latter types include sponge and wick separators and the recently developed packed bed, porous plate water separator. The static separators are particularly attractive since they require a minimum of power and have high inherent reliability. An analysis of the porous plate separator is presented in terms of dimensionless numbers. (Author)

A67-10959
METABOLIC COSTS OF UPPER TORSO EXERCISES VS TORQUE MANEUVERS UNDER REDUCED-GRAVITY CONDITIONS.
E. J. Prescott and E. C. Wortz (Garrett Corp., AiResearch Manufacturing Co., Los Angeles, Calif.).
Aerospace Medicine, vol. 37, Oct. 1966, p. 1046-1049. 8 refs.

The object of the present study was to determine whether metabolic requirements for upper torso activity under reduced-gravity conditions would parallel those for walking under reduced-gravity conditions. The results showed that torque maneuvers increased oxygen consumption as the force of gravity was reduced, but that exercises caused no significant change in oxygen consumption with changes in the level of the force of gravity. Also, no significant difference was observed between oxygen consumption at rest at 1 g and at rest at reduced gravity. The observed differences in metabolic rate during exercise as opposed to those during torque maneuvers lead to the tentative conclusion that metabolic work penalties usually reported for low-traction environments apply to external work only. (Author)

A67-10960
EFFECTS OF 9-ALPHAFLUOROHYDROCORTISONE AND VENOUS OCCLUSIVE CUFFS ON ORTHOSTATIC DECONDITIONING OF PROLONGED BED REST.
Paul M. Stevens, Theodore N. Lynch, Robert L. Johnson, and Lawrence E. Lamb (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Internal Medicine Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 37, Oct. 1966, p. 1049-1056. 19 refs.

The effects of 9-alphafluorohydrocortisone (9-FF) and venous occlusive cuffs on the plasma volume and orthostatic tolerance were evaluated following 28 to 78 days of bed rest. In five subjects the plasma volume and orthostatic tolerance were decreased after 29 days of bed rest, and no further change occurred up to 50 days. Venous occlusive cuffs inflated around the upper thighs of four subjects for 16 hr per day during the last two days of a 30-day period of bed rest restored plasma volume but had no significant effect on orthostatic tolerance. Oral administration of 9-FF 2 mg/day for 2 to 4 days following either 43, 53, or 74 days of bed rest caused complete repletion of plasma volume, but orthostatic intolerance persisted. (Author)

A67-10961
MEDICAL FACTORS IN 1964/1965 FATAL AIRCRAFT ACCIDENTS IN THE SOUTHWEST.
Harry L. Gibbons, John W. Ellis, Jr., and Judith L. Plechus (Federal Aviation Agency, Southwest Region, Office of the Regional Flight Surgeon, Fort Worth, Tex.).
Aerospace Medicine, vol. 37, Oct. 1966, p. 1057-1060. 10 refs.

A nationwide study of 1963 fatal general aviation accidents with a 30% sampling revealed 35.4% of the cases studied to have alcohol involvement. Medical investigation of fatal general aviation accidents in the Federal Aviation Agency's Southwest Region during 1964 and 1965 revealed measurable blood alcohol in 30.8% of the cases studied. This represents a 72% sampling of 162 fatal accidents. On 28% of the fatal accidents studied, blood alcohol was over 50 mg per 100 ml. In two cases, otherwise unremarkable levels of hypoxia plus carbon monoxide were thought to have been potentiated by alcohol. The combined effects of drugs, fatigue, alcohol, hypoxia, and other factors generally not recognized by an automobile-orientated public are considered to be a significant hazard in air transportation. (Author)

A67-10962
RADIOTELEMETRIC RECORDINGS OF THE ELECTROENCEPHALOGRAMS OF CIVIL AVIATION PILOTS DURING FLIGHT.
C. Blanc, E. Lafontaine, and M. Medvedeff (Compagnie Nationale Air France, Central Medical Dept., Paris, France).
Aerospace Medicine, vol. 37, Oct. 1966, p. 1060-1065.

Study of the aspects of brain radiotelemetry among civil aviation pilots as an introduction to further applications to space medicine. Continuous radiotelemetric recordings of the pilot's EEG activities have been obtained on long flights between Paris and Rio de Janeiro. The results show that radiotelemetric apparatus makes it possible to obtain EEG tracings of correct quality on board an aircraft. Cerebral telemetry provides an objective technique for seizing the oscillations of "neurophysiological wakefulness" on long flights, especially at night. It is expected that this technique will shortly provide new psychophysiological data on occupational fatigue. S.Z.

A67-11029
LONG-TERM BIOMEDICAL INSTRUMENTATION IN THE AIR FORCE SPACE PROGRAM.
R. J. Allemandi and G. E. Zichterman (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Sunnyvale, Calif.).
Instrument Society of America, Annual Conference and Exhibit, 21st, New York, N.Y., Oct. 24-27, 1966, Preprint. 15 p. Members, $0.75; nonmembers, $1.00.

Description of the biomedical instrumentation system used in the 30-day test phase of the Air Force Biosatellite program, using chimpanzees as the test animals. The system was designed for a metabolic load equivalent to a 50-lb chimpanzee in terms of oxygen consumption, and provided an environment reproducing the standard earth atmosphere as closely as possible. The sensors used and the methods of attaching them to the animal are described. During the tests the life cell was installed in an altitude chamber, and the pressure was reduced to simulate an altitude of 180,000 to 200,000 ft. Samples of each physiological signal recorded by the data collection system are illustrated and described. W.A.E.

A67-11392 * #
LUNEX II - A STUDY ON MANNED LUNAR EXPLORATION.
M. J. Vaccaro, H. Y. Grubbs (NASA, Marshall Space Flight Center, Huntsville, Ala.), S. Deutsch (NASA, Office of Advanced Research and Technology, Washington, D.C.), J. E. Haaland, and N. M. Burns (Honeywell, Inc., Systems and Research Center, Minneapolis, Minn.).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 13 p. 10 refs.

Evaluation of crew performance by integrated behavioral and psychophysiological tasks in the Lunex II simulated lunar mobile laboratory for a period between 14 and 21 days. The Lunex II is divided into a driving and workspace-living area and an airlock; it is crewed by two men in a shirtsleeve environment. Crew tasks involved simulated driving and various geological tasks. Of significance is the fact that both subjects maintained consistent and improving performance for 14 days and did not show serious performance decrements throughout the entire 18 days of the study. Minimum cabin volume for a lunar surface vehicle appears to be set by emergency conditions which require the use of pressurized suits. No remarkable physiological effects were observed except for loss of weight during the last few days of the simulation. F.R.L.

A67-11394 * #
MAN'S RESPONSE TO A NEW ENVIRONMENT INCLUDING WEIGHTLESSNESS - GEMINI BIOMEDICAL RESULTS.
Charles A. Berry (NASA, Manned Spacecraft Center, Houston, Tex.).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 21 p.

Summary of biomedical data from the total U.S. manned space flight experience. Functioning of the central nervous system and of the respiratory and cardiovascular systems are discussed. Changes in blood composition are described, and results of urine and plasma analysis are given. The effects of space flight on the gastrointestinal and musculoskeletal systems, exercise capacity, and metabolism are noted. Problems in extravehicular activity are discussed. B.B.

A67-11397 * #
DETERMINING THE EFFECTIVENESS OF FRACTIONAL G LEVELS IN REDUCING CIRCULATORY DECONDITIONING OF SPACE FLIGHT CREWS - A NEW TECHNIQUE AND PRELIMINARY RESULTS.
A. B. Thompson (General Electric Co., Command Systems Div., Apollo Support Dept., Houston, Tex.), A. Graybiel, and D. B. Cramer (U.S. Navy Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 13 p. 11 refs.
NASA-sponsored research.

Discussion of experiments in reducing the effects of conditioning to zero gravity on prolonged space flights. During the process of evolution man has developed adaptive mechanisms which counteract the effect of gravity on the various systems of the body, notably the cardiovascular system, skeletal bone mass, and certain muscle groups. Prolonged exposure to zero gravity produces various degrees of deconditioning of the physiological systems, and on very long space flights the effect may be so intense that the ability of astronauts to readapt to normal or increased g-forces on return to earth will be seriously impaired. To counteract this deconditioning, experiments have been made with various devices that would maintain a small amount of artificial gravity by rotation of the spacecraft. It was found that application of a small gravitational force field to subjects simulating a spacecraft crew tends to maintain their postural tone. W.A.E.

A67-11400 #
SPACE EXTRAVEHICULAR OPERATIONS - A REVIEW OF THE REQUIREMENTS AND ALTERNATE SYSTEM APPROACHES.
Leonard M. Seale (Bell Aerospace Corp., Bell Aerosystems Co., Buffalo, N.Y.) and Peter N. Van Schaik (USAF, Systems Command, Research and Technology Div., Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 20 p. 6 refs.

Review of requirements and alternate system approaches for extravehicular operations (EVO) in space. EVO is defined as a group of activities which take place outside of a parent spacecraft and involve the employment of an astronaut, either directly or through the use of remote control, in the support of operational missions or in the conduct of scientific or engineering investigations. Such activities may include antenna calibration, maintenance, and development; assembly and erection of large structures; telescope support; rescue missions; cargo transfer; monitoring or investigation of plasma wakes, radiation, magnetic fields, or gravitation; propellant transfer support; and space suit evaluation. Manned EVO systems may include surface walks and tethered missions, a simple propulsion system, a back-mounted manned maneuvering module, or a shuttle vehicle. Unmanned systems might include a remote-controlled manipulator or a small maneuvering subsatellite. Finally, dual maneuvering units could be operated either manned or unmanned. W. A. E.

A67-11405 #
AN EVALUATION OF MAN'S CAPABILITY TO PERFORM SUPPORT FUNCTIONS IN SPACE.
C. B. May, (USAF, Systems Command, Research and Technology Div., Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio) and A. E. Holmes (Martin Marietta Corp., Martin Co., Baltimore, Md.).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 18 p. 13 refs.

Discussion of factors affecting the capability of man to provide support functions in space. The expected mission roles and types of activities are considered, and the factors affecting the selection of maintenance and support concepts, as well as the logic of the tradeoffs related to the total system development, are examined. The initial efforts that have been made to date in the development of an in-space support technology are reviewed. M.M.

A67-11414 #
THE DEVELOPMENT AND OPERATION OF EXTRAVEHICULAR EQUIPMENT.
Richard S. Johnston and Edward L. Hays.
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 17 p.

Review of the manned extravehicular activities (EVA) in the Gemini space flight program. The EVA hardware is described, the test program is outlined, and each specific EVA system configuration is reviewed. The Gemini flights are considered primarily as tests of the life-support system, protective provisions and mobility of the spacesuit, tether line operations, and the astronauts' ability to make transfers and maneuver with a hand-held propulsion unit. The equipment developed to support the Gemini extravehicular ssion can be classified into four major systems: (1) spacesuits, (2) life-support systems, (3) maneuvering units, and (4) ancillary equipment, including experiment support articles, tethers, handholds, lights, visual aids, and so forth. W.A.E.

A67-11425 #
EFFECT OF PROLONGED ACCELERATION ON GAS EXCHANGE AND RESISTANCE TO HYPOXIA IN RATS [O VLIIANII PRODOLZHITEL'NYKH USKORENII NA GAZOOBMEN I USTOICHIVOST' K GIPOKSII U KRYS].
A. A. Giurdzhian (Akademiia Nauk SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 7 p. In Russian.

Study of the effects of acceleration and a shortage of oxygen on rats, as an experiment in the combined effect of different spaceflight factors. In the experiments, the laboratory animals were placed in sealed chambers which were whirled on a centrifuge. The carbon dioxide and water vapors expired by the rats were absorbed by chemicals, and the oxygen was gradually evacuated from the chamber by inhalation by the animals. Experiments in the effect of acceleration alone showed a decrease in gas exchange to 65 to 80% of the rates noted in control animals. When the rats were subjected to both acceleration and "fatal hypoxia" (nitrogen was pumped into the chamber as the oxygen in it was consumed), the acceleration appeared to cause a deterioration in the ability of the rats to resist hypoxia. W.A.E.

A67-11473
WHY DOES THE HUMAN RETINA POSSESS A FOVEA?
R. A. Weale (London, University, Imperial College of Science and Technology, Institute of Ophthalmology, Dept. of Physiological Optics, London, England).
Nature, vol. 212, Oct. 15, 1966, p. 255, 256. 13 refs.

Brief discussion of recent experiments on the manner in which light is reflected from the ocular background, on the assumption that retinal neuroglia interfere with vision by scattering light. It is believed that the case for the detrimental effect of the retinal neuroglia on visual resolution has probably been overstated. Visual acuity in particular and vision in general appear to be influenced by the internal retinal blood supply. It is suggested that the fovea exists because it is this blood supply, not the retinal neuroglia, that interferes with steady and acute vision. S. Z.

A67-11545 #
DATA ON THE CONDITION OF THE COSMONAUTS DURING THE FLIGHT OF THE SPACECRAFT VOSKHOD [NEKOTORYE DANNYE O SOSTOIANII KOSMONAVTOV VO VREMIA POLETA KOSMICHESKOGO KORABLIA "VOSKHOD"].
Iu. M. Volynkin, I. T. Akulinichev, P. V. Vasil'ev, A. D. Voskresenskii, I. I. Kas'ian, and D. G. Maksimov.
Kosmicheskie Issledovaniia, vol. 4, Sept.-Oct. 1966, p. 755-767. 11 refs. In Russian.

Characterization of the methods of investigating the physiologica functions of the cosmonauts during the flight of the spacecraft Voskhod. The dynamics of the subjective impressions made on cosmonauts Komarov, Feoktistov, and Yegorov by their stay in conditions of weightlessness during the orbital flight are considered. The basic results of vestibulometry, electrooculargraphy, electroencephalography, writing samples, dynamography, and the investigation of the functions of the visual apparatus during the flight are included. Data from the statistical analysis of the ECG and pneumograms of the cosmonauts are presented. The dynamics of the pulse, respiration frequency, and the variation in the R-R interval of the ECG of Komarov, Feoktistov, and Yegorov showed certain differences, which may be caused by the individual features of their reaction to weightlessness. W.A.E.

A67-11546 #
METHOD OF PROGRAMED PHYSIOLOGICAL MEASUREMENTS AND EXPERIENCE IN ITS APPLICATION ABOARD THE SPACECRAFT VOSKHOD [METODIKA PROGRAMMIROVANNYKH FIZIOLOGICHESKIKH IZMERENII I OPYT EE PRIMENENIIA NA KOSMICHESKOM KORABLE "VOSKHOD"].
R. M. Baevskii and D. G. Maksimov.
Kosmicheskie Issledovaniia, vol. 4, Sept.-Oct. 1966, p. 768-780. 10 refs. In Russian.

Description of the methods used for physiological measurements of the Soviet cosmonauts during the flight of the spacecraft Voskhod. The general principles of the method are described and the stages of laboratory data processing are analyzed. Variations of the research programs are included. Special attention is directed to the study of the cosmonauts' ability to work and perform certain physical and mental functions. The results of the programed investigations during the flight of the Voskhod are presented in the form of sample recordings from physiological pickups and some of the more important results are tabulated. W.A.E.

A67-11551
ENCOUNTER BETWEEN MAN AND MACHINE IN FLIGHT GUIDANCE [DIE BEGEGNUNG ZWISCHEN MENSCH UND MASCHINE IN DER FLUGFÜHRUNG].
K.-H. Doetsch (Deutsche Forschungsanstalt für Luft- und Raumfahrt, Institut für Flugführung, Braunschweig, West Germany).
(Deutsche Gessellschaft für Flugwissenschaften, Mitgliederversammlung, Berlin, West Germany, Nov. 19, 1965, Vortrag.)
DFL-Mitteilungen, Feb. 1966, p. 149-156. In German.

Discussion of the modern aspects of "flight guidance" defined as the connecting research on human behavior, anthropotechnology, and flight mechanics. From the historical point of view, the development of flight guidance is closely linked to the development of onboar instruments, autopilots, etc., which provide the possibility of coexistence between the incompatible partners, man and machine. It is shown that modern flight guidance incorporates additional factors. These factors, common to both man and machine, are analyzed and used to illustrate interactions and relationships between man and machine. V.P.

A67-11816 #
THE PATH TO VOYAGER.
Colin S. Pittendrigh (Princeton University, Graduate School, Princeton, N.J.).
Astronautics and Aeronautics, vol. 4, Nov. 1966, p. 76, 77, 79, 80, 82, 84, 86, 89.

Examination of the questions of scientific validity, allocation of resources, and the readiness of the biologists to guide the effort involved in the biological exploration of the planets. The nature of biological evolution and the question of minimal molecular organization are briefly sketched. The biologists' goals in planetary explorationare reviewed. The formulation of an adequate program of explora tion and the establishment of a quasi-permanent organization that will facilitate the effective contribution and responsible participation of the nation's talent in this direction is proposed. S.Z.

A67-11861 *
OPTIMAL AND DYNAMIC CHARACTERISTICS OF A CONTINUOUS PHOTOSYNTHETIC ALGAL GAS EXCHANGER.
John A. Howell, Arnold G. Fredrickson, and Henry M. Tsuchiya (Minnesota, University, Minneapolis, Minn.).
Chemical Engineering Progress, Symposium Series, no. 68, 1966, p. 56-68. 15 refs.
Grant No. NGR-24-005-056.

In an apparatus especially designed to program light-dark patterns, algal cells were continuously propagated at steady state conditions. The environmental quantities of liquid nutrient, flow rate of carbon dioxide, concentration of carbon dioxide, agitation, and light intensity were varied. An optimum efficiency for oxygen production was searched for and found by using a Box-Wilson approach. Efficiency is defined in both the engineering and biological situations. (Author)

A67-11928 #
A SYSTEM ENGINEERING APPROACH TO SPACECRAFT STERILIZATION REQUIREMENTS.
John B. Opfell (Philco Corp., Space and Re-Entry Systems Div., Newport Beach, Calif.) and Temple W. Neumann (Philco Corp., Space and Re-Entry Systems Div., Palo Alto, Calif.).
(AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND AMERICAN ASTRONAUTICAL SOCIETY, STEPPING STONES TO MARS MEETING, BALTIMORE, MD., MARCH 28-30, 1966, TECHNICAL PAPERS, p. 328-337.)
Journal of Spacecraft and Rockets, vol. 3, Nov. 1966, p. 1603-1609. 35 refs.

A67-12072
FACTORS AFFECTING THE USE OF SIMULATORS FOR TRAINING.
M. Hammerton (Medical Research Council, Applied Psychology Research Unit, Cambridge, England).
Institution of Electrical Engineers, Proceedings, vol. 113, Nov. 1966 p. 1881-1884. 12 refs.

The paper reviews and discusses the implications of a series of experiments germane to the use of simulators for training purpose Problems of measuring transfer of training are briefly discussed, and a series of nine experiments is summarized. Each of these experiments is concerned with visual or environmental factors which can affect the usefulness of a training simulator. The results obtained are discussed, and their limitations and fields of application are stated. A number of conclusions are presented, those chiefly of interest to designers and those chiefly of interest to users being given separately. (Author)

A67-12084
SYSTEM PHILOSOPHY OF AUTOMATIC LEARNING SYSTEMS IN APPLICATION TO AUTOPILOTS [DIE SYSTEMPHILOSOPHIE LERNENDER AUTOMATEN IN DER ANWENDUNG AUF AUTOPILOTEN].
Klaus J. Brauser.
Munich, R. Oldenbourg Verlag (Ausrüstung in Luft- und Raumfahrt. Volume 1), 1966. 112 p. In German.
$5.50.

Discussion of the theoretical foundations, development, and applications of advanced guidance and control systems, with a view toward the development of a fully automatic pilot. The feasibility of such a pilot is assessed on the basis of current research in the numerous associated fields. The considerations presented are based primarily on the methods used in cybernetics (in Wiener's sense), and particularly on the cybernetics of the man-aircraft system. A review is given of the results of current research on the activity and behavior of the human pilot (including data processing

in the nervous system, influence of environmental effects, and reliability problems). The analysis indicates that the principal element of the fully automatic pilot of the future will be a centralized computer (analog to the human nervous system), the construction of which will require the development of a "theory of thinking." A "totality" hypothesis proposed by the author and the "correspondence" principles that derive from it are seen to constitute the first steps toward the development of such a theory. V.P.

A67-12226 #
HUMAN OPERATOR EFFECTS ON SATELLITE CONTROL SYSTEM STABILITY.
Charles Kenneth Wood (Boeing Co., Launch Systems Branch, Huntsville, Ala.).
(American Institute of Aeronautics and Astronautics, Southeastern Regional Student Conference, Huntsville, Ala., Apr. 29, 30, 1965, Paper.)
AIAA Student Journal, vol. 4, Oct. 1966, p. 76-81.

Analysis of the effects of a human operator on manual satellite attitude control system stability. The effects of various human pilot dynamic characteristics on the system stability are illustrated. A root locus analysis of various mathematical pilot models is used to study the system stability, and an automatic model matching technique is used to evaluate an assumed mathematical pilot model. Root-locus plots are presented, and system equations for the model matching technique are given. A fixed-base simulator was used in conjunction with a mathematical model to obtain system responses to a step function input for both a system controlled by a model pilot and a system controlled by a real pilot. A realistic pilot model for the subject control task was derived. (Author)

A67-12229 #
THE "FEEL" OF ROTARY CONTROLS - FRICTION AND INERTIA.
William B. Knowles (Hughes Aircraft Co., Signal Processing and Display Laboratory, Culver City, Calif.) and Thomas B. Sheridan (Massachusetts Institute of Technology, Cambridge, Mass.).
Human Factors, vol. 8, June 1966, p. 209-215. 9 refs.

Study to determine the influence of friction and inertia levels on the "feel" of rotary controls. Detection thresholds for changes in friction and inertia were determined and found to be about 10 to 20% of the initial values. Preference ratings obtained for various combinations of friction and inertia increased as a function of inertia level and decreased as a function of friction level. Preferences for viscous friction were greater than for stick-slip friction. Psychophysical evaluations such as these are related to customer acceptance factors and provide a useful supplement to purely functional design criteria. (Author)

A67-12230 #
OPTIMUM ANGULAR ACCELERATIONS FOR CONTROL OF A REMOTE MANEUVERING UNIT.
Herbert J. Clark (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB; Ohio State University, Dept. of Psychology, Columbus, Ohio).
Human Factors, vol. 8, June 1966, p. 217-223. 8 refs.

Six subjects successfully reoriented the attitude of a simulated remote maneuvering unit (RMU) using an on-off acceleration command control system. RMU attitude was determined solely by viewing the space scene being televised by the RMU. The RMU was controlled under three conditions of angular acceleration; 4, 8, and 12°/sec^2; 4°/sec^2 resulted in least fuel expenditure and most accurate rate control without a sacrifice in time. These results and the subjects' preference data recommended pitch, yaw, and roll accelerations of 4°/sec^2 when using an on-off acceleration command control system. (Author)

A67-12231 #
BATCH VS. SEQUENTIAL DISPLAYS - EFFECTS ON HUMAN PROBLEM SOLVING.
James D. Baker and Ira Goldstein (USAF, Systems Command, Electronic Systems Div., Decision Sciences Laboratory, Hanscom Field, Mass.).
(USAF, Systems Command, System Effectiveness Symposium, Annual, 1st, Hanscom Field, Mass., Oct. 12, 1965, Paper.)
Human Factors, vol. 8, June 1966, p. 225-235. 11 refs.
Contracts No. No. AF 19(628)-2938; No. AF 19(628)-4368.

Study of problem-solving under two display conditions. In one condition ("sequential"), only those response alternatives permissible at any given time were displayed at that time. Under the other condition ("batch"), all response alternatives, permissible at the moment or not, were presented at all times. Significantly greater time was found to be required to learn solutions using the "batch" display. This requirement was attributed to the significantly greater display search-time which was found to be required in that condition. No significant difference in number of trials to reach the criterion of learning solutions was found, indicating that the additional material displaced in the "batch" condition carries no significant amount of useful information. It is concluded that displaying data which has only potential relevance is not only ineffective but actually degrades performance. (Author)

A67-12270 * #
INVESTIGATION OF MAN'S EXTRAVEHICULAR CAPABILITY IN SPACE BY WATER IMMERSION SIMULATION TECHNIQUES.
Otto F. Trout, Jr. (NASA, Langley Research Center, Hampton, Va.).
American Institute of Aeronautics and Astronautics, Annual Meeting, 3rd, Boston, Mass., Nov. 29-Dec. 2, 1966, Paper 66-903. 8 p.
Members, $0.75; nonmembers, $1.50.

Discussion of the use of water immersion techniques to simulate partial and zero gravity operations to determine the capabilities of man in space, determine man-machine interfaces, obtain design data, and provide premission training. The application of the method to ingress-egress operation through airlock systems is described, together with applications to manual locomotion, maintenance and assembly processes, crew and cargo transfer functions, rescue operations, and repair tasks. B.B.

A67-12278 * #
CLOSING THE ECOLOGY.
C. D. King (General Dynamics Corp., General Dynamics/Convair, San Diego, Calif.) and E. A. Zuraw (General Dynamics Corp., Electric Boat Div., Groton, Conn.).
American Institute of Aeronautics and Astronautics, Annual Meeting, 3rd, Boston, Mass., Nov. 29-Dec. 2, 1966, Paper 66-935. 11 p. 12 refs.
Members, $0.75; nonmembers, $1.50.
Contracts No. NAS 1-2934; No. NAS 2-3011.

Consideration of completely regenerative systems (closed ecologies) on spacecraft which receive and process all wastes and produce oxygen, water, and food at rates sufficient to sustain the crew. The rationale is presented and a survey is given of techniques for closing the loops of expendables for life support. The oxygen, water, and heat rejection loops may soon be closed, but conversion of wastes to food may be farther away. In recent studies physicochemical processes have shown the best potential for utilizing most of the carbon in the waste CO_2. Biological subsystems are more promising for producing protein and fat components of the diet and for utilizing the nitrogen and minerals in man's waste. The merit of a closed ecology, even for very long space missions, must be evaluated against alternates of various degrees of partial closure and other utilization of metabolic wastes. F.R.L.

A67-12285 * #
THE UTILIZATION OF SPACE TECHNOLOGY IN THE FIGHT AGAINST CARDIOVASCULAR DISEASE.
Benjamin W. Zweifach (New York University, School of Medicine, Dept. of Pathology, New York, N.Y.), Marcos Intaglietta (California Institute of Technology, Dept. of Engineering and Applied Sciences, Pasadena, Calif.), and Sidney J. Slomich (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).
American Institute of Aeronautics and Astronautics, Annual Meeting, 3rd, Boston, Mass., Nov. 29-Dec. 2, 1966, Paper 66-951. 4 p.
Members, $0.75; nonmembers, $1.50.

Consideration of shared techniques of the space program and cardiovascular research. The two disciplines examine common areas of phenomena - e.g., the detection, analysis, and continuous monitoring of chemical, biological, and physical events involving extremely small quantities of matter and energy. Having had the benefit of more systematic and intense application of effort and resources, the space technologist has developed a remarkable array of instrumentation which allows him to explore orders of magnitude even below those which circulatory research specialists would like to monitor regularly and systematically. Because of the possibility that techniques and instrumentation developed in the course of the space program may be modified with relative ease or applied directly to important areas of research on the human microcirculatory system, the way may be open for far-reaching advances in the understanding of heart disease and stroke. F.R.L.

A67-12313 #

THE CONSTRUCTION OF A LUNAR MICROCOSM.

N. W. Pirie (Commonwealth Bureau of Soils, Rothamsted Experimental Station, Harpenden, Herts., England).

International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 16 p.

Consideration of recycling methods depending on photosynthesis which could be located on the surface of the moon. It is assumed that it will be essential to recycle as much carbon and nitrogen as possible and advantageous to recycle water and oxygen. The various aspects of photosynthesis as it would probably take place on the moon are discussed. It is pointed out that the 14 earth-day periods of light and dark will affect the process. The characteristics of various types of potentially useful plant species are described and evaluated. F.R.L.

A67-12319 #

SPACECRAFT ATMOSPHERE SELECTION.

B. E. Welch (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.) and W. G. Robertson (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Sealed Environment Section, Brooks AFB, Tex.).

International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 34 p. 38 refs.

Investigation of environmental variables physiologically suitable for the mission requirements of manned spacecraft. Experiments were performed from which it would appear that oxygen at 258 mm Hg is tolerable, at least for the duration tested, but that it does result in a hematologic adaptation. This degree of adaptation is small and, unless synergistically combined with other environmental variables, it is physiologically insignificant. The presence of an inert gas also does not appear to influence significantly the degree of adaptation. Nitrogen likewise does not seem to be essential, since helium was used as a diluent gas without any demonstrable ill effects. It is suggested that designers and planners can be more flexible in developing manned spacecraft and programing space missions. M. M.

A67-12320 #

PROBLEM OF PHARMACOLOGY IN SPACE MEDICINE [PROBLEMA FARMAKOLOGII V KOSMICHESKOI MEDITSINE].

V. E. Belai, P. V. Vasil'ev, and G. D. Glod (Akademiia Nauk SSSR, Moscow, USSR).

International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 19 p. 70 refs. In Russian.

Results of studies of two important features of the general problem of the role of pharmacology in prolonged space flights. An attempt is made to ascertain the extent to which the resistance of the organism to extremal flight factors can be increased by the use of pharmaceuticals and the characteristics of the reactivity of the organism to pharmaceuticals during the simulation of certain flight conditions. It is found that by administering preparations from a number of pharmacological groups to various types of animal their functional state can be changed in such a way as to increase their resistance to transverse g-forces. A.B.K.

A67-12323 #

PROBLEMS OF BIOTELEMETRY IN LONG SPACE FLIGHTS [PROBLEMY BIOTELEMETRII V DLITEL'NYKH KOSMICHESKIKH POLETAKH].

I. T. Akulinichev, A. M. Zhdanov, and I. I. Popov (Akademiia Nauk SSSR, Moscow, USSR).

International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 10 p. In Russian.

Discussion of certain problems involved in using telemetry and other informational and measuring devices to determine biological effects on spaceships. The use of separate equipment for operative medical control and periodic medical examinations is recommended, as well as the need to ensure the possibility of maintaining operative medical control by radiotelemetric communication and by wire communication between the astronaut and the onboard medical equipment. A.B.K.

A67-12324 #

PROBLEM OF THE PROLONGED AUTONOMOUS EXISTENCE OF HUMANS IN SPACESUITS [K PROBLEME DLITEL'NOGO AVTONOMNOGO SUSCHCHESTVOVANIIA CHELOVEKA V KOSMICHESKOM SKAFANDRE].

A. M. Genin and L. G. Golovkin (Akademiia Nauk SSSR, Moscow, USSR).

International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 9 p. In Russian.

Study of the possibility of maintaining the heat balance of an astronaut in a spacesuit solely by physiological perspiration. In tests in which direct use is made of the vaporization of the fluid secreted on the skin surface and in the lungs to remove endogenous heat and to compensate for the external heat load, it is found that the heat balance of the subjects tested can be maintained for 3 or 4 days, after which symptoms of overheating of the organism appear. It is shown that certain conditions, under which 25 to 40% of the endogenous heat of the organism is removed by heating the ventilation air, can be withstood for a long period, although the thermal-control mechanisms of the organism are subjected to a certain amount of stress. A.B.K.

A67-12325 #

PRINCIPLES OF THE BIOMECHANICS OF HUMANS IN UNSUPPORTED POSITIONS [OSNOVY BIOMEKHANIKI CHELOVEKA V BEZOPORNOM POLOZHENII].

V. I. Stepantsov and A. V. Eremin (Akademiia Nauk SSSR, Moscow, USSR).

International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 5 p. In Russian.

Calculation of moments of inertia of the human body as a whole and of certain parts of it in unsupported positions under conditions of weightlessness. The average moments of inertia of the human body and certain parts of it are determined with respect to various axes. The ratio between the moments of inertia of various parts of the body relative to particular axes is calculated, and the most effective methods of turning the body about various axes are chosen and justified. A.B.K.

A67-12326 #

TRANSFORMATION OF HUMAN WASTE PRODUCTS AND THE BIOCOMPLEX TO MAINTAIN A LIFE CYCLE IN SMALL CLOSED SPACES [O TRANSFORMATSII PRODUKTOV ZHIZNEDEIATEL'NOSTI CHELOVEKA I BIOKOMPLEKSA PRI OSUSHCHESTVLENII KRUGOVOROTA VESHCHESTV V MALYKH ZAMKNUTYKH PROSTRANSTVAKH].

V. I. Iazdovskii, A. L. Agre, B. G. Gusarov, Iu. E. Siniak, S. V. Chizhov, and S. I. Tsitovich (Akademiia Nauk SSSR, Moscow, USSR).

International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 8 p. In Russian.

Study of the process of mineralization of human solid and liquid wastes to generate elements required by autotrophic and heterotrophic organisms. The use of the methods of thermal and thermocatalytic oxidation in the mineralization of solid and dehydrated human wastes is described. It is suggested that the method of "wet combustion" be

used in the mineralization of liquid human wastes and dilute urinary-fecal mixtures, the thermohydrolysis of urea, and the synthesis of ammonia and nitric acid. The catalytic method is recommended as a promising method of mineralizing gaseous materials. Methods of regenerating water from human waste products are discussed.
A. B. K.

A67-12327 #
SIMULATION OF ENERGY-EXCHANGE PROCESSES IN ECOLOGICAL SYSTEMS [MODELIROVANIE PROTSESSOV ENERGOOBMENA V EKOLOGICHESKIKH SISTEMAKH].
A. B. Rubin (Akademiia Nauk SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 6 p. In Russian.

Analysis of the energy-exchange processes occurring in artificial ecological systems. On the basis of a study of the equations for a three-component ecological system it is concluded that these systems are either characterized by stable, oscillatory energy-exchange conditions, or else do not attain steady-state conditions at all. The use of optical methods - in particular the recording of the chemiluminescence of photosynthesizing organisms - is regarded as a promising technique for obtaining continuous information concerning the conditions occurring in artificial ecological communities.
A. B. K.

A67-12328 #
CERTAIN PROBLEMS CONCERNING THE ACTION OF G-FORCES IN SPACE FLIGHT - CUMULATIVE AND ADAPTIVE EFFECTS [NEKOTORYE PROBLEMY DEISTVIIA PEREGRUZOK V KOSMICHESKOM POLETE - EFFEKTY KUMULIATSII I ADAPTATSII].
A. R. Kotovskaia (Akademiia Nauk SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 19 p. 38 refs. In Russian.

Comparative study of the effects of single and repeated transverse g-forces on animals. It is found that animals trained by being subjected to repeated, gradually increasing g-forces, rather than being subjected all at once to a high g-force lasting from 1 to 3 minutes, may show certain adaptive effects, on the one hand, but may also show pronounced cumulative effects of a harmful nature.
A. B. K.

A67-12329 #
OXYGEN BALANCE OF THE ORGANISM DURING PROLONGED ACCELERATIONS [KISLORODNYI BALANS ORGANIZMA PRI DLITEL'NYKH USKORENIIAKH].
A. S. Barer, G. A. Golov, V. B. Zubavin, E. I. Sorokina, and E. P. Tikhomirov (Akademiia Nauk SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 11 p. 8 refs. In Russian.

Study of the oxygen balance of the organisms of humans and animals under conditions of prolonged accelerations. It is found that the qualitative changes occurring in the gas composition of air exhaled by the subjects tested are related primarily to a disturbance of the gas exchange between alveoles and capillaries. It is established that during the action of g-forces against a background of heightened general consumption of oxygen a gradual decrease in the oxygen tension occurs in the tissues, as well as a shift in the oxidation equilibrium toward underoxidation and a progressive decrease in the temperature of the tissues.
A. B. K.

A67-12330 #
AN INFORMATIONAL MODEL OF THE DYNAMICS OF MOTION AND THE SPATIAL ORIENTATION OF A COSMONAUT OUTSIDE A SPACECRAFT [INFORMATSIONNAIA MODEL' DINAMIKI DVIZHENIIA I PROSTRANSTVENNAIA ORIENTIROVKA KOSMONAVTA VNE KORABLIA].
V. A. Popov, Iu. A. Rozanov, and M. M. Sil'vestrov (Akademiia Nauk SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 8 p. In Russian.

Development of design criteria for a system of manual control of the motion of a cosmonaut in free space. It is shown that an individual system for controlling the motion of a cosmonaut outside his spacecraft must include engines (which enable the cosmonaut to turn relative to three mutually perpendicular axes and to move in a straight line along the three coordinate axes), control elements, angular-velocity automatic stabilization circuits, and an informational model of the control process providing the cosmonaut with the required information concerning his spatial orientation and parameters of motion.
A. B. K.

A67-12339 * #
EFFECTS OF DEHYDRATED, LIQUID, AND COMPRESSED FOODS AND ENVIRONMENT ON HUMAN WASTE AND WATER CONSUMPTION IN DEVELOPING LIFE SUPPORT SYSTEMS REQUIREMENTS.
Arnold R. Slonim (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Life Support Div., Wright-Patterson AFB, Ohio).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 13 p.
NASA Contract No. R-85; Contracts No. AF 33(657)-11716; No. AF 33(615)-2182.

Outline of experiments to determine the precise nutritional and hygienic requirements for humans during space travel. Data are generated both on the effects of various diets and simulated space conditions on human excretory properties and on water consumption as a function of the diets and environmental conditions. The experimental results are intended to serve as a guide toward the development of life support system requirements.
B. B.

A67-12346 #
ASSESSMENT OF THE SENSIBLE HEAT TRANSFER PROPERTIES OF CONDITIONED CLOTHING.
D. McK. Kerslake.
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 14 p. 6 refs.

Examination of the probable relation between temperatures and heat transfers in a fixed clothing assembly at a fixed ventilating air flow. Only sensible heat exchanges within an air-ventilated assembly are considered. The linearity of the relations between skin heat loss and environmental air supply temperatures are examined. It is concluded that if local variations in skin temperature and tissue conductance are disregarded, the performance of a given clothing assembly at given coolant flow can be expressed by two empirical coefficients which represent the dependence of skin heat loss on coolant supply temperature and environmental temperature. These coefficients can be measured on a heated manikin, when skin temperature and skin heat loss are known, but not on the human subject.
S. Z.

A67-12374
PSYCHOSOCIOLOGICAL PROBLEMS OF SMALL ISOLATED GROUPS WORKING UNDER EXTREME CONDITIONS [PROBLEMES PSYCHOSOCIOLOGIQUES DES PETITS GROUPES ISOLES TRAVAILLANT DANS DES CONDITIONS EXTREMES].
Roger Angiboust (Direction Technique et Industrielle de l'Aéronautique, Centre d'Experiences Aériennes Militaires, Laboratoire d'Etudes Médico-Physiologiques, Mont-de-Marsan, Landes, France).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 16 p. In French.

Discussion of the various psychological factors likely to be encountered during the operation of a lunar laboratory. Before commencement of the mission, unsuitable personalities must be weeded out. The personnel must be acquainted with each other and must have a team spirit. They should familiarize themselves with the equipment and should progressively develop feelings of security, which are the first fundamental psychological element for mission success. A feeling of participation represents the second fundamental factor for successful psychological adaptation.
F. R. L.

A67-12380 * #
THE MANUFACTURE OF TYPICAL, BIOLOGICALLY CLEAN, PLANETARY LANDING SPACECRAFT TO BE STERILIZED.
F. J. Beyerle (NASA, Marshall Space Flight Center, Huntsville, Ala.), H. G. Lorsch, M. R. Stahler, and R. E. Waite (General Electric Co., Missile and Space Div., King of Prussia, Pa.).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 7 p.

Fabrication procedures for a biologically clean planetary landing module for later sterilization before use. By NASA regulations, the landing module must be assembled in cleanrooms at specified levels of assembly, the landing assembly must be subjected to an approved sterilization procedure (dry heat), and the landing assembly must be enclosed in a bacteriological barrier to maintain cleanliness and sterility. Assembly procedures for the landing module, pneumatic system, and pilot spacecraft are described. During the final stages of assembly, the efficiency of the workers is reduced by more than 50% because of the extensive biological cleanliness control that must be imposed. Personnel controls are more critical than environmental controls in achieving biologically clean hardware.
W.A.E.

A67-12387 #
A SPACE RADIATION MONITORING SYSTEM FOR SUPPORT OF MANNED SPACE FLIGHT.
E. Ewing (USAF, Kirtland AFB, N. Mex.).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 11 p.

Description of space radiation monitoring systems designed to provide solutions to medical problems associated with obtaining meaningful biological data, on an active real-time basis, so that knowledgeable decisions can be made by the astronaut, or any mission control directors. A readout system would allow an astronaut to quickly and easily assess his radiation environment and take appropriate protective action, if required. This same information would be transmitted to, and read out at mission control, thus giving ground-based medical personnel adequate data to assess potential medical problems at all times.
M.M.

A67-12388 #
CONTROL OF TRACE CONTAMINANTS FROM CANDIDATE MATERIALS IN SPACE CABIN ATMOSPHERES.
P. P. Mader and E. S. Mills (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Advance Biotechnology and Power Dept., Life and Environmental Systems Branch, Santa Monica, Calif.).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 14 p.
Research supported by the Douglas Independent Research and Development Program.

An accelerated procedure for the determination of gas-off products from space cabin materials is described. The method was successfully employed to survey all materials and supplies intended for use in space cabins. Results obtained with several of the more important materials, such as paints and insulations, are given. The information derived from this survey was successfully applied during the now completed 62 days of life support system tests, which were conducted with a crew of four men. The analytical support provided during the operation of the space cabin simulator is described. It involved the measurement of trace contaminants by continuous recording instruments and by gas chromatographic and IR analyses of regularly taken air samples. It was possible to observe the appearance of new compounds and to measure any increase in concentration of existing compounds. Frequently, chromatographic results did pinpoint the source of escaping contaminants, and remedial action was taken by the occupants. (Author)

A67-12393 * #
MAN'S LUNAR EXTRA VEHICULAR CAPABILITIES.
Walter Kuehnegger and Charles J. Martell (Northrop Corp., Northrop Space Laboratories, Life Sciences Section, Hawthorne, Calif.).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 11 p.
Contract No. NAS 1-4449.

Preliminary results of an investigation of the metabolic work requirements of a man wearing a pressure suit and associated biomechanical characteristics while locomoting on a lunar gravity simulator. Metabolic rate and biomechanical data were obtained on three test subjects while under self-locomotion on an inclined-plane lunar-gravity simulator. The subjects were evaluated in the shirtsleeve condition, while wearing a vent flow-operated pressure suit and while wearing a fully pressurized pressure suit. Similar metabolic and biomechanical data were obtained on the subjects while under self-locomotion on a standard laboratory treadmill for comparison purposes. Simulated lunar-locomotion activity-cycle frequencies were considerably lower than those under comparable earth gravity conditions for subjects in the same garmented conditions. Locomotion activity cycle frequencies of the pressure-suited subject under simulated lunar-gravity conditions closely approximated those of the shirtsleeved subject under earth-gravity conditions. The metabolic cost of self-locomotion on the lunar gravity simulator in a fully pressurized suit is approximately double that of self-locomotion in a vent flow-operated pressure suit or in the shirtsleeve condition.
M.M.

A67-12394 * #
RADIATION HAZARDS TO MAN ON THE MOON.
Hermann J. Schaefer (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 17 p.
11 refs.
NASA-sponsored research.

Study of lunar radiation hazards deriving from flare-produced solar particle beams and galactic radiation. Since the moon has no atmosphere or magnetic field which serve as biological shields, exposure to radiation on the moon will be substantially higher than on the earth. Galactic radiation acts as a continuous low-dose, long-term hazard, and its heavy component is high LET radiation which has no alleviating time factor for exposure at a low dose rate. It is at its maximum when solar radiation is at its minimum because the screening effect of the solar magnetic field in interplanetary space is missing. The estimated life-shortening effect of chronic low and high LET radiation is 20% of the exposure time - e.g., six days of life shortening per 30 days of lunar duty. The so-called thin-down hits of extremely high LET produced by the terminal sections of heavy-nucleus tracks in biological tissue are an unknown quantity.
W.A.E.

A67-12408 * #
VISUAL PROBLEMS OF EXTENDED SPACEFLIGHT.
Walton L. Jones (NASA, Office of Advanced Research and Technology, Biotechnology and Human Research Div., Washington, D.C.).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 21 p.
13 refs.

Discussion of the objectives of the NASA program on vision research designed to provide information on visual functioning in deep-space operations. The integration of data from the three research areas of space probe, operational, and laboratory research is considered. Data concerning the primary parameters of the visual environment in space are tabulated. These show that the general level of illumination in which astronauts will work during daylight on the moon is about one-fourth higher than that found on earth and that night illumination (from earthshine) may be over 30 times higher than on earth. The effective optical-transmission characteristics of the atmospheres of extraterrestrial bodies are treated, and the determination of the operational requirements for specific space missions is described.
S.Z.

A67-12409 * #
EFFECTS OF COMBINED LINEAR AND VIBRATORY ACCELERATIONS ON HUMAN BODY DYNAMICS AND PILOT PERFORMANCE CAPABILITIES.
Hubert C. Vykukal and Constantine B. Dolkas (NASA, Ames Research Center, Moffett Field, Calif.).
International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966, Paper. 17 p.
7 refs.

Several studies were conducted at the Ames Research Center to assess the effects of combined linear and vibratory accelerations on the various responses of pilot subjects. In three of the studies, the subjects were exposed to an environment typical of a spacecraft-booster system and were tested for their ability to monitor spacecraft and launch vehicle performance, to perform a compensatory tracking problem, and to read aircraft instrument dials. The conditions of the environment were sustained accelerations to 3.85 g_x combined with 11-cps vibration to ±1.6 g_x. Results of these studies indicated that vibration significantly impaired performance, with a rapid deterioration occurring at about ±0.7 g_x, 11-cps vibration. A more basic follow on study was conducted to determine the effects of a compound environment on human body dynamics in the frequency range from 2.5 to 20 cps, combined with linear accelerations of 1, 2.5, and 4 g_x. Results indicated that significant changes occurred as frequency increased; specifically, increased body stiffness, reduced damping, and increased dynamic response of the human body. (Author)

A67-12428
EFFECT OF TIME DIFFERENCES ON THE HUMAN ORGANISM IN MODERN SUBSONIC AND SUPERSONIC AIRCRAFT [ÜBER DIE FOLGEN DER ZEITVERSCHIEBUNG AUF DEN MENSCHLICHEN ORGANISMUS BEI HEUTIGEN FLUGZEUGEN UND ÜBERSCHALL-FLUGZEUGEN].
S. Ruff.
Flugwelt, vol. 18, Oct. 1966, p. 811-813. In German.

Consideration of the reaction of a human organism to time shifts experienced during flights on modern aircraft. The effect of systematic time shifts on the performance and physiological parameters of flying personnel are discussed. V. Z.

A67-12527 *
NONPHOSPHORYLATING RESPIRATION OF MITOCHONDRIA FROM BROWN ADIPOSE TISSUE OF RATS.
Robert E. Smith, Jane C. Roberts (California, University, Center of Health Sciences, School of Medicine, Dept. of Physiology, Los Angeles, Calif.), and Karl J. Hittelman.
Science, vol. 154, Nov. 4, 1966, p. 653, 654. 14 refs.
U.S. Public Health Service Grant No. HD-01826; Grant No. NsG-721.

Investigation of respiration of mitochondria from the brown adipose tissue of rats. Mitochondria from the brown adipose tissue of cold-acclimated rats oxidize α-ketoglutarate at a rate twice that of controls. In both groups, however, the phosphorus-oxygen ratio with α-ketoglutarate never exceeded unity. It is suggested that, although brown fat mitochondria are incapable of oxidative phosphorylation, they do phosphorylate at the substrate level. These findings provide an unusual example of electron transport by means of an energetically nonconservative pathway. They may have considerable significance in relation to thermogenesis by brown adipose tissue. W.A.E.

A67-12632 #
EFFECTS OF FREQUENCY OF VIBRATION ON HUMAN PERFORMANCE.
Charles S. Harris and Richard W. Shoenberger (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).
Journal of Engineering Psychology, vol. 5, no. 1, 1966, p. 1-15. 39 refs.
USAF-sponsored research.

Investigation of the effect on human performance of whole-body vibration at frequencies of 5, 7, and 11 cps. The minimum G level necessary to produce a significant decrement in tracking performance was determined at each frequency. The results showed that performance decrements tend to follow the general shape of physiological tolerance curves. M.M.

A67-12633 *
SIMULATED GRAVITY - THE AVERSIVE STIMULUS IN AN ESCAPE AND PUNISHMENT SITUATION.
R. Chris Martin (Hollins College, Hollins College, Va.), W. K. Richardson, and Wayne L. Martin (Kentucky, University, Lexington, Ky.).
Journal of Engineering Psychology, vol. 5, no. 1, 1966, p. 21-24. Grant No. NsG-456.

Experimental investigation in which squirrel monkeys learned a lever-press response to escape from the centrifugally produced accelerations of 2 G, as shown by decreases in latency of response. The onset of 2 G was then made contingent upon the response and resulted in increased latencies. After exposure to these conditions, performance on the escape task was disrupted. The results demonstrate the aversiveness of simulated gravity (2 G) and stress the importance of separating the effects of rotation from the effects of G-forces. M.M.

LC ENTRIES

A67-80001
RELATION OF BASAL METABOLISM TO CHANGES IN FOOD COMPOSITION AND BODY COMPOSITION.
Takashi Sasaki (Kumamoto U., Inst. of Constitutional Med., Dept. of Physiol., Japan).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1165–1168. 10 refs.

Monthly observations of basal metabolism in nine Japanese males and six females from 1949 to 1952 showed a seasonal variation of metabolism, with a maximum in January and a minimum in July–September. The nationwide survey of nutrition showed a steady decrease in consumption of food containing carbohydrates and an increase in fat consumption. Body composition was determined by the underwater weighing of various groups of subjects, and the basal metabolism was expressed in terms of lean body mass. The results indicated seasonal changes due to changes in cell activity. Body composition in terms of somatotypes was also used for the study of phases of metabolism, which showed a decisive annual periodicity. The stage-by-stage changes in somatotypes and their effect on the metabolism are also discussed.

A67-80002
CLIMATIC ADAPTATION OF BASAL METABOLISM.
Manabu Yoshimura, K. Yukiyoshi, T. Yoshioka, and H. Takeda (Kyoto Prefectural U. of Med., Dept. of Physiol., Japan).
(Proc. of the Intern. Symp. of Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1169–1174; discussion, p. 1175–1176. 13 refs.

A comparative study was undertaken to test the supposition that Americans show no seasonal variation in basal metabolism because they live in dwellings with heating and cooling systems, as opposed to Japanese who do not have such conveniences and must compensate by increasing or decreasing metabolic rate. Western people did not exhibit any consistent seasonal variations of metabolic rate even in the Japanese environment. In order to establish the cause for this difference, physical characteristics, diet, and thyroid activity of the subjects were compared. The conclusion was reached that metabolic variations were due to the adaptation of thyroid activity to changes in the environmental temperature, which itself is under the influence of physical build, diet, and physical exercise. The Americans utilized greater quantities of fat than Japanese, and varied their physical exercises. Both factors may affect the thyroid activity.

A67-80003
CELLULAR BIOCHEMISTRY AND ORGAN MASS OF COLD- AND HEAT-ACCLIMATED MONKEYS.
R. R. J. Chaffee (Calif. U., Los Alamos Sci. Lab., N. Mex.), S. M. Horvath (Calif. U., Environ. Stress Inst., Santa Barbara), R. E. Smith (Calif. U., Center for Health Sci., Los Angeles), and R. S. Welsh (Calif. U., Dept. of Life Sci., Riverside).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1177–1181; discussion, p. 1182–1184. 40 refs.
NASA Grant NsG 721 and Grants DA-49-193-MD-2558; PHS CA 04271-05 and HD 01826-01, Kaiser Found. 50; AEC supported research.

In squirrel monkeys (*saimiri sciurea*) exposed to heat and cold, changes in organ weights were essentially the same as those seen in rodents. A number of oxidative enzymes, all of which change in temperature-exposed rodents were assayed. Only three showed significant changes resembling those seen in rodents: alpha-glycerophosphate dehydrogenase activity of brown fat homogenate, and liver mitochondria, and succinoxidase activity of kidney mitochondria. Others showed no change in response to temperature exposure. Except for the pancreas, changes in total deoxyribonucleic acid ribonucleic acid paralleled changes in total protein of the organs assayed. In the pancreas the increase in ribonucleic acid (RNA) of cold-exposed monkeys exceeded the increase in protein. Neither myoglobin nor hematocrit levels changed in response to heat or cold exposure.

A67-80004
EFFECT OF HEAT AND COLD STRESS ON BRAIN GLUTAMIC ACID.
V. V. Subba Rao and M. L. Gupta (S. M. S. Med. Coll., Dept. of Physiol. and Biochem., Jaipur, India).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13 17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1185–1186. 10 refs.

Both cold and heat stress caused a reduction in the content of glutamic acid in the cerebellum, and the frontal and occipital lobes of the rat. Administration of reserpine alone caused a similar lowering of brain glutamic acid which was not further depressed by the temperature stress when rats were pretreated with reserpine. An attempt was made to correlate the impairment of brain function with the lowering of glutamic acid content.

A67-80005
RELEASE OF THYROTROPIN IN RELATION TO COLD EXPOSURE.
Shinji Itoh, Tsutomu Hiroshige, Toshiyuki Koseki, and Takamichi Nakatsugawa (Hokkaido U., School of Med., Dept. of Physiol., Sapporo, Japan).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13 17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1187–1192; discussion, p. 1193–1194. 45 refs.

It has been shown that chronic exposure to cold results in a parallel and sustained activation of adrenocorticotropin (ACTH) and thyrotropin (TSH) secretions in guinea pigs. The high TSH level in blood suggested that a decreased response of the thyroid gland to intense cold may not be due to a reduced TSH secretion. To elucidate this point plasma TSH levels were determined in rats, who were kept at 28°C. for over two weeks before subjecting them to temperatures of 15°, 8°, and 0°C. for various periods of time. The results of these experiments are discussed from the point of view of production and release of TSH and its utilization under varying temperature conditions. ACTH, TSH, and free fatty acid metabolism, phosphatase activity and other enzyme activity in various tissues connected with thyrotropin release are discussed in detail.

A67-80006
ADRENOCORTICAL ACTIVITY DURING ADAPTATION TO COLD IN THE RAT: ROLE OF PORTER–SILBER CHROMOGENS.

R. Boulouard (Museum Natl. d'Hist. Nat., Lab. de Physiol. Gén., Paris, France).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1195–1199. 25 refs.

During cold adaptation of rats to 0–1°C., the plasma level of corticosterone and Porter Silber chromogens (CPS) showed maximum values at the end of the first 24 hrs. and remained at this level for 96 hrs. This rise was concurrent with an adrenal hypertrophy and a loss in body weight. After 18 days there was a shift of adrenal metabolism toward an increase in CPS particularly in cases of mobilization of body reserves. This increase appeared to be associated with depletion of liver glycogen. If during acclimatization to cold the essential role of corticoids is concerned with glucose metabolism (gluconeogenesis or inhibition of glucose oxidation, or both), the CPS activity can be gluco-corticoid-like but different from corticosterone.

A67-80007
NEURAL CONTROL OF ADRENOCORTICAL FUNCTION IN RATS DURING ADAPTATION TO REPEATED ACUTE COLD.
V. Jonec, K. Murgaš, and R. Kvetňanský (Slovak Acad. of Sci., Inst. of Endocrinol., Bratislava, Czechoslovakia).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1200–1204. 19 refs.

During acute cold exposure of rats the adrenocortical function became activated. The activation was dependent upon the intensity of cold, but was primarily so on the stimuli attendant upon a change of environment. Repetition of cold exposures caused only a gradual decrease in adrenal cortex activation, but the rate of this decrease became significantly accelerated if, prior to the cold exposure proper, the rats were merely transferred into the exposure chamber without change of environmental temperature. However, the stimuli during these exposures need not always have been activating, but may also have been inhibitory, probably depending upon whether at the given moment activating or inhibiting processes predominated in the areas of the central nervous system.

A67-80008
CIRCULATORY AND METABOLIC EFFECTS OF NORADRENALINE IN COLD-ADAPTED RATS.
A. C. L. Hsieh, C. W. Pun, K. M. Li, and K. W. Ti (Hong Kong U., Dept. of Physiol., Hong Kong).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1205–1209; discussion, p. 1210–1212. 48 refs.
China Med. Board, N. Y. and Hong Kong U. supported research.

Heat production and the relationship of thyroid activity, propylthiouracil, noradrenaline and other biochemical factors to cold adaptation and metabolism were studied in rats. In warm-adapted rats an increase in noradrenaline dose was associated with an increase in non-esterified fatty acids (NEFA), while in cold-adapted rats the relationship was reversed. The results can be explained by assuming that noradrenaline stimulates oxidation of fatty acids as well as lipolysis. Adaptation to cold would therefore increase the NEFA oxidation by tissues.

A67-80009
INFLUENCE OF NORADRENALINE ON VASCULAR RESISTANCE IN THE INTACT PERFUSED EARS OF COLD-ADAPTED AND WARM-ADAPTED RABBITS.
Ola B. Reite, John Krog, and Loren D. Carlson (Ky. U., Med. Center, Dept. of Physiol. and Biophys., Lexington).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1213–1215. 7 refs.
Grant PHS 1 F05-TW-687-01.

The ears of intact rabbits were perfused with a physiological solution in order to study the effects of various environmental temperatures upon vascular sensitivity to noradrenaline. Rabbits exposed to fluctuating outdoor winter temperatures were included as well as cold-adapted and warm-adapted animals. The factor by which the initial vascular resistance was increased by noradrenaline was considered an indicator of blood vessel sensitivity to this substance. Experiments were carried out at 10°, 20°, and 30°C. the sensitivity of the vascular beds of the perfused ears to noradrenaline was markedly higher in warm-adapted than in cold-adapted animals. At 20°C. this difference was absent, while at 10°C. the cold-adapted vascular bed showed a slightly higher sensitivity than did the warm-adapted one. The animals kept outdoors showed highly variable sensitivities to noradrenaline, but the degree of their responses remained within the same range as that observed in the other groups.

A67-80010
COLD EXPOSURE: PHARMACOLOGIC INVESTIGATION OF THE COMPENSATORY MECHANISMS IN THE MAINTENANCE OF NORMOTHERMIA.
G. E. Johnson, E. Schönbaum, and E. A. Sellers (Toronto U., Dept. of Pharmacol., Canada).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1216–1219. 14 refs.
Grants MRC, Canada MA 1595 and DRB, Canada 9325-10.

The existence of compensatory mechanisms to maintain normothermia was investigated in rats. Two attempts were made to inhibit, through different mechanisms, the synthesis of norepinephrine, which is considered the neuromediator in non-shivering thermogenesis in cold exposed rats. Two compounds were tested separately: (1) a dopa decarboxylase inhibitor: R 04-4602 (N-(DL-seryl)-N'-(2, 3, 4 trihydroxybenzyl) hydrazine) and (2) the nerve growth-factor antiserum (NGF-AS). Free urinary norepinephrine and epinephrine were determined in micrograms per kilogram of body weight per 24 hrs. Each method showed a partial inhibition of norepinephrine synthesis, but neither diminished the animals' ability to withstand exposure to 4° C. These results indicated the adaptability of the cold-stressed animals to develop or expand alternate pathways to maintain body heat production when normal thermogenic mechanisms are blocked.

A67-80011
POSTHYPOXIC DRINKING RESPONSE OF RATS.
Melvin J. Fregly and Irving W. Waters (Fla. U., Coll. of Med., Dept. of Physiol., Gainesville).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1220–1226. 18 refs.
Contract DA-49-193-MD-2549.

Rats exposed for 26 days to an atmosphere containing either 11.0 or 12.5% oxygen increased their spontaneous water intake after returning to control environment (20% oxygen). The increased water intake persisted for two (after 12.5%) to 11 (after 11.0%) days. Rats exposed for 35 days to an atmosphere containing 12.0% oxygen decreased water intake below prehypoxic control levels during the first two weeks of exposure. In contrast, daily urinary output was uninfluenced by

hypoxia. During exposure to hypoxia, experimental rats had a smaller solute excretion rate at a given urinary flow rate than controls. Renal ability of experimental rats to concentrate urine following 24 hr. of dehydration was also less than that of controls. Drinking response to dehydration was slightly greater for rats exposed to hypoxia than for controls. Serum osmolality and specific gravity measured during the 32nd day of exposure to hypoxia were higher in experimental rats. After removal from hypoxia, experimental rats ingested more water than controls within one hr. and the greater drinking response persisted for four to five days posthypoxia. The results suggest that chronic exposure to hypoxia induces a relative dehydration in rats possibly as a result either of an attenuated response to, or reduced production of, endogenous antidiuretic hormone. The failure of spontaneous water intake to maintain normal serum osmolality during hypoxia is not explained nor is the persistent increase in water intake after removal from the hypoxic environment.

A67-80012
THYROID–ADRENAL RELATIONSHIP IN ALTITUDE TOLERANCE.

Domenic A. Debias (Jefferson Med. Coll., Dept. of Physiol., Philadelphia, Pa.).

(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1227–1229; discussion, p. 1230–1232. 24 refs.
Contract AF 41(657)-253.

The effect of various phases of thyroid activity on the survival of rats exposed to high altitude and the possible protective effect of corticol were studied. Thyroid activity was measured by: (1) the triiodothyronine-^{131}I uptake by the erythrocytes, (2) the 24-hr. thyroidal ^{131}I uptake, and (3) the rate of disappearance of labeled iodine from the thyroid. The limiting factor in acute altitude tolerance appeared to be the level of adrenocortical function, which paralleled thyroid activity. An increase in thyroid activity function increased the animal's sensitivity to changes in altitude; decreased thyroid activity decreased this sensitivity, presumably by regulating the rate of the adrenocortical hormone clearance from the circulating blood.

A67-80013
INSULIN, EPINEPHRINE, AND GLUCAGON ON THE METABOSLIM OF CARBOHYDRATES AT HIGH ALTITUDE.

E. Picon-Reategui (U. Nacl. Mayor de San Marcos, Fac. de Med., Inst. de Biol. Andina, Lima, Peru).

(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1233–1238; discussion, p. 1239. 32 refs.
Contract AF-41-(657)-249.

The effects of insulin, epinephrine, and glucagon on carbohydrate metabolism were studied in 12 native high-altitude males at 4540 m. above sea level and the results were compared with those of 12 native sea-level inhabitants at 150 m. Long-term exposure to high altitude had no effect on changes in blood glucose, pyruvate, and lactate brought about by insulin. The glycogenolytic action of epinephrine did not seem to be affected by high-altitude exposure, but there was a lower hyperglycemic response to glucagon by high-altitude residents. Plasma potassium depressions followed the administration of glucagon in both groups.

A67-80014
IRON METABOLISM DURING AND AFTER ALTITUDE EXPOSURE IN MAN AND IN ADAPTED ANIMALS (CAMELIDS).

C. Reynafarje (U. de San Marcos, Inst. de Biol. Andina, Lima, Peru).

(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1240–1242. 7 refs.
Grant NIH He-07416.

The iron turnover rate was studied at high altitude as an index of erythrocyte formation in humans and in alpacas, llamas, and vicuñas. Sea-level humans taken to 4,540 m. showed a 50% increase in iron turnover two hours after arrival at high altitude. The highest increase (approximately three times that at sea level) was observed 7–14 days after exposure to high altitude. Maximal intestinal iron absorption was reached after one week. The plasma and red cell turnover rate indicated that the camelids, at 4,200 m., utilized more iron for red cell formation than did human natives at a similar altitude. Although high-latitude natives brought down to sea level showed a decreased red cell turnover rate, no change was observed in camelids brought down to sea level.

A67-80015
ACCLIMATION TO SIMULATED HIGH ALTITUDE AND ACUTE CARDIAC NECROSIS.

O. Poupa, K. Krofta, J. Prochazka, and Z. Turek (Czech. Acad. of Sci., Inst. of Physiol., Lab. of Environ. Physiol. and Charles U., Paediat. Fac., Inst. of Pathol. Physiol., Prague).

(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul. Aug. 1966, p. 1243–1246. 16 refs.

Four series of experiments were performed on rats in order to ascertain the effect of altitude acclimatization on the subsequent change in heart metabolism under anoxia. The first experiment showed that after rats were acclimated to 5,000 or 7,000 m. there was an increase in the resistance of the right ventricle to acute anoxia. In the second experiment when adrenalectomized rats were acclimated to 7,000 m. there was still a rise in the resistance of the right ventricle to acute anoxia. Adrenalectomy did not prevent the increase in myoglobin induced by acclimatization to simulated altitude. The third experiment showed that when sideropenic anemia was induced in the rats again the resistance of the myocardium was increased against anoxia. The fourth experiment indicated that necrosis of the heart when induced by isoproterenol is less in animals adapted to altitude than in rats living at sea level.

A67-80016
BLOOD GASES OF RATS AT ALTITUDE AND SEA LEVEL.

Daniel H. Simmons, Fred H. Kahn, and Lucien B. Guze (Calif. U. Center of the Health Sci., Cedars-Sinai Med. Res. Inst., Depts. of Physiol. and Med. and Veterans Admin. Center, Los Angeles).

(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1247–1252; discussion, p. 1253. 19 refs.
PHS supported research.

Mean values for blood gases of normal unanesthetized rats at sea level using samples obtained by left ventricular puncture were pH = 7.48, pCO_2 = 26.3 mm. Hg, and base excess = 0.9 mEq/liter. Comparison with values using different sampling techniques suggested that these values were not significantly influenced by the technique of cardiac puncture. Exposure to 12,000- or 18,000-ft. simulated altitude resulted in production of moderate respiratory alkalosis but more marked metabolic acidosis, producing an over-all drop in pH. A significant portion of the metabolic acidosis appeared to be associated with

the decreased food intake of rats at altitude, but this did not account for the over-all acidosis. Changes in blood gases following either exposure to altitude or return to sea level were maximal within a period of 24-48 hr. following the change in barometric pressure. The suitability of rats for some altitude studies may be questioned because of their atypical blood gas changes.

A67-80017
ALTITUDE, TEMPERATURE AND THE IMMUNE RESPONSE.
Ignatius L. Trapani (Natl. Jewish Hosp., Div. of Res. and Labs., Dept. of Exptl. Immunol., Denver, Colo.).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1254–1259. 18 refs.
Contract Nonr 3545(00) (NR 108-599).

Environmental and physiological factors which can affect the immune response were studied in several groups of experiments. Immune response at high altitudes showed greater hemagglutinin and precipitin titers in high-altitude-adapted rabbits than in controls. Thyroidectomized high-altitude adapted rabbits had a delayed immune response. The maximum reached in these animals may be due to the longer half-life of the antibodies. In guinea pigs bred at higher altitudes the immune response to BSA-bentonite (bovine serum albumin) inoculation was greater than in animals bred at lower levels. There was also a correlation of higher titers with an increase in beta-globulins in some cases. Experiments in mice and guinea pigs showed better tolerance of viral infections of PR8 influenza and bacterial infection with tubercle bacilli at high altitudes. No evidence was found of antibody synthesis during hibernation of ground squirrels.

A67-80018
DISCUSSION OF ALTITUDE, TEMPERATURE AND THE IMMUNE RESPONSE.
Robert L. Dryer (Iowa U., Coll. of Med., Dept. of Biochem., Iowa City).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1260–1261; discussion, p. 1262–1263. 25 refs.

A discussion is presented of some of the problems arising from the results of a symposium paper presented by Trapani. Trapani maintains that the antigen-antibody reaction is sensitive to cold and that cold exposure affects antibody production as would thyroidectomy or adrenalectomy. The effects of altitude seem to be similar to those of thyroxine treatment. In relation to these findings the following problems are discussed: amino acid metabolism and antibody synthesis, effects of thyroxine on nculeic acids in control of protein synthesis, high altitude and adrenocortical activity, endocrine effects on enzymes such as tryptophan pyrrolase, and relation of cold stress, brown fat, and antibody formation.

A67-80019
EFFECT OFENVIRONMENTAL TEMPERATURE ON LETHALITY OF ENDOTOXIN AND ITS EFFECT ON BODY TEMPERATURE IN MICE.
L. Joe Berry (Bryn Mawr Coll., Dept. of Biol., Pa.).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1264–1270. 17 refs.
Contract AF 41(609)-1764; NSF and Smith Kline and French Labs. supported research.

Acute exposure of mice to an environmental temperature of either 5°C. or 37°C. reduced the LD_{50} of a crude *Serratia marescens* endotoxin from a high of 2,300 μg. in mice housed at 30°C. to an amount less than 40 μg. At 15°C. or 32°C., the LD_{50} was, respectively, 880 μg. and 550 μg., while at 25°C. it was 1,200 μg. Control animals placed at each of these temperatures were able to maintain normothermia except for those at the high and low extremes where they became slightly hyperthermic and hypothermic. Following an injection of either twice the LD_{50} or a dose of 1,000 μg., the thermoregulatory ability was upset at all temperatures except 30°C. Mice at temperatures below 30°C. became progressively more hypothermic as the environment was increasingly cold and vice versa at higher temperatures. It is believed that endotoxin sensitizes mice to heat and cold rather than these temperatures sensitizing to endotoxin. After one week of acclimatization at 5°C. or 37°C., the LD_{50} of endotoxin increased, respectively, to 790 μg. and 260 μg. Inducibility of the liver enzyme tryptophan pyrrolase, believed to play a role in an animal's response to endotoxin, was evaluated at each environmental temperature. Only at the extremes was it suppressed.

A67-80020
THERMOGENIC PROCESSES DURING COLD IN HYPOXIA.
Clark M. Blatteis (U.S. Army Res. Inst. of Environ. Med., Natick, Mass.).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1271–1274. 21 refs.

In order to determine the hypoxic effects on the metabolic action of catecholamines, either epinephrine or norepinephrine was given to dogs intravenously in a dose of 2 g./kg. per min. for 10 min. These were given either in an environment of air or 12% oxygen. Epinephrine produced the greater increase in oxygen consumption while breathing air, but in hypoxia this increase in oxygen consumption was greatly reduced. The normal rise in plasma free fatty acids and glucose was not affected by this level of hypoxia. To relate these results with those of the effects of hypoxia on the metabolic response to cold, similar experiments were done with dogs exposed to breathing air or 12% oxygen. Hypoxia depressed the metabolic response to cold by inhibiting the cold induced increase in oxygen consumption without any observable depression of the cold induced rise in the plasma level of free fatty acids and glucose. The mechanism for this hypoxic depression of cold induced metabolic response is unknown.

A67-80021
SEASONAL METABOLIC RESPONSES OF DEER MICE (PEROMYSCUS) TO TEMPERATURE AND ALTITUDE.
Jane C. Roberts, Raymond J. Hock, and Robert E. Smith (Calif. U., Dept. of Physiol., Los Angeles and White Mt. Res. Sta., Bishop).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1275–1283; discussion, p. 1284–1285. 61 refs.
NASA Grant NsG-721 and Grant PHS GM-09261.

Total metabolic rate (MR) and body temperature measurements were made on the deer mouse, *Peromyscus maniculatus sonoriensis,* native to high altitude. The animals were studied at sea level and altitude of 4,000 and 12,470 ft. Enzyme systems were studied in some mice kept at 12,470 ft. Also, some animals were exposed to cold at sea level to compare cold effects with those of altitude. In summer MR and oxygen tension (PO_2) were directly related. At 12,470 ft., the MR of native mice was less than that found at sea level at any time of the year. During the winter this relationship was reversed because of the decrease in MR at sea level and

an increase in MR at altitude. With mean July temperature of 6.5°C. at 12,470 ft. the mice were possibly cold acclimatized, which would explain the comparable results found between the cold- and altitude-induced changes in the cellular and enzyme systems. Effects of hypoxia were differentiated from cold effects by the phosphorous/oxygen ratio being depressed by the cold and not by altitude. The oxygen quotient of liver mitochondria and the MR were depressed by hypoxia but not by cold.

A67-80022
SYNOPSIS OF NEUROPHYSIOLOGICAL STUDIES OF THERMOREGULATION: ON INTEGRATION OF THERMAL AFFERENTS.

T. Nakayama (Nagoya U., School of Med., Dept. of Physiol., Japan).

(Proc of the Intern. Symp. on Metab. Adapations to Temperature and Altitude, Kyoto, Japan, Sep. 13 17, 1965).
Federation Proceedings, vol. 25, Jul.-Aug. 1966, p. 1286; discussion, p. 1286;1287.

A synopsis is presented of neurophysiological studies of body temperature regulation in man and cats. Concerning the neurogenesis of hemihydrosis it is suggested that efferent sudomotor activities and afferent activities from the cutaneous temperature receptors are modified by pressure stimuli in man. The rate of sweating can be modified by various factors (sleep, posture, emotional stress); this indicates that neural factors not concerned with thermal detection play a part in thermoregulation. The central thermodetector units vary in their response to a rise in local temperature. A unit in the preoptic region was found to have its discharge frequency proportional to the rate of temperature change. The second thermal neuron in the ventrolateral quadrant of the spinal cord was found to increase in discharge frequency as skin temperature decreased. Units of the reticular formation reacted to skin cooling and warming in such a way that some units decreased their discharge with rising temperature between 25 and 33°C. and increased it between 33 and 39°C. This indicated a convergence of afferent impulses from the cold and warmth receptors on the same reticular unit.

A67-80023
FUNCTIONAL CHARACTERISTICS OF TWO HIGH-ALTITUDE MAMMALS.

Robert W. Bullard and James Kollias (Ind. U., Dept. of Anat. and Physiol., Bloomington).

(Proc of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13 17, 1965).
Federation Proceedings, vol. 25, Jul.-Aug. 1966, p. 1288-1292. 16 refs.
Grant NSF GB-11.

Cardiovascular, respiratory, and metabolic functions in hypoxia were compared in native high-altitude ground squirrels, *Citellus lateralis,* and laboratory rats born at high altitude. Ground squirrels in hypoxia maintained oxygen consumption, cardiac output, heart rate, and body temperature while the same functions failed in hypoxic rats. The stroke volume of the rat was the same at high altitude as at low altitude, while the ground squirrel possessed a much greater stroke volume at high altitude.

A67-80024
EFFECT OF AROUSAL ON ATP LEVELS IN BATS.

R. L. Dryer and John R. Paulsrud (Iowa U., Dept. of Biochem., Iowa City).

(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13-17, 1965).
Federation Proceedings, vol. 25, Jul.-Aug. 1966, p. 1293-1296. 14 refs.
Grant PHS AM08476.

Heat production associated with the arousal phenomenon was studied in bats (*Eptesicus fuscus*) by enzymatic assays of brown fat and liver for adenosine triphosphate (ATP) and glucose-6-phosphate (G1-6-P), and by thin layer chromatography of nucleotides. The levels of ATP and G1-6-P in brown fat, as a function of temperature or stimulation by pain, did not vary between summer and winter bats. Higher levels of ATP in both liver and brown fat were found in winter than in summer bats. ATP levels in brown fat of hibernating or cold-aroused bats showed a progressive drop, but hepatic G1-6-P levels increased during arousal. The relative absence of G1-6-P in brown fat of arousing animals suggests that glycolysis is not a major contributor to thermogenesis.

A67-80025
BODY ORGAN THERMOGENESIS OF THE RAT DURING EXPOSURE TO COLD AND AT MAXIMAL METABOLIC RATE.

Ladislav Jansky (Natl. Res. Council, Div. of Biosci., Ottawa, Canada).

(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13-17, 1965).
Federation Proceedings, vol. 25, Jul.-Aug. 1966, p. 1297-1302; discussion, p. 1303-1305, 28 refs.

The problem of maximal metabolism and the conditions under which the values of maximal metabolism are obtainable are examined, with special emphasis on organ thermogenesis during maximal metabolic effort and during nonshivering thermogenesis. Maximal metabolism measured in vivo in rats averaged about ten times the basal rate. Total cytochrome-oxidase activity, as a measure of the highest possible tissue oxygen consumption, was determined in tissue and organ homogenates of seven rodents. A close agreement between in vivo and in vitro studies was found. In cold-acclimated rats, 57% of the metabolic activity was attributed to the carcass and 22.5% to the liver. Smaller quantities were contributed by the skin, kidneys, testes, brain, heart, lungs, and spleen.

A67-80026
EFFECT OF OXYGEN TENSION AND ENVIRONMENTAL TEMPERATURE ON THE OXYGEN CONSUMPTION AND BODY TEMPERATURE IN ALBINO MICE.

L. Chevillard (France Coll., Ecole Prat. des Hautes Etudes, Paris).

(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13-17, 1965).
Federation Proceedings, vol. 25, Jul.-Aug. 1966, p. 1306-1309. 10 refs.

Three groups of adult albino mice of about 25 g. were maintained for three weeks in individual cages. One group was kept at 4°C., the second at 20°C., and the third at 30°C. The animals' cages were kept in a chamber in which the oxygen tension (pO_2) could be regulated. In fed mice, sensitivity was observed to any fall in the pO_2 at all ambient temperatures studied. There was a decrease in oxygen consumption and body temperature, depending on both the ambient temperature and pO_2 in the environmental atmosphere. The lower the ambient temperature and pO_2, the steeper are the slopes of their curves. At 30°C., animals fasted six-eight hr. before starting the experiments exhibited decreased oxygen consumption with falling pO_2 more slowly than in fed animals; thus in 8% oxygen it dropped only 14% instead of 35%. At 5% pO_2, the oxygen consumption was about the same whether the animals were fed or not.

A67-80027
INFLUENCE OF ENVIRONMENTAL TEMPERATURE ON CIRCULATORY AND RESPIRATORY FUNCTIONS IN THE LABORATORY MOUSE.

Chuhei Yamauchi, Hiroshi Takahashi, and Tatsuji Nomura (Central Inst. for Exptl. Animals, Kamimeguro, Meguro-Ku, Tokyo, Japan).
(Proc. of the Intern. Symp. on Metab. Adapations to Temperature and Altitude, Kyoto, Japan, Sep. 13 17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1310 1311. 5 refs.

Changes were observed in heart rate, blood pressure, electrocardiogram, respiratory rate, electromyogram (EMG), and rectal temperature of mice exposed to environmental temperatures of 5–40°C. At temperature of 15° and below, heart rate, respiratory rate, and body temperatures decreased, and blood pressure dropped slightly. Between 20 and 30°C., heart rate, respiratory rate, and body temperature were relatively stable. At or above 35°C., sinoauricular block, sinus arrhythmia, and bradycardia were observed; respiratory rate increased markedly; body temperature gradually rose; and blood pressure dropped in accordance with bradycardia. All animals died when their body temperature became higher than 42°C. When the body temperature dropped to about 30°C. in the cold environment, bursts of EMG activity were seen.

A67-80028
FUNCTIONAL AND MORPHOLOGIC DEVELOPMENT OF BRAIN AND OTHER ORGANS OF RATS AT HIGH ALTITUDE.

Paola S. Timiras and Dorothy E. Woolley (Calif. U., White Mt. Res. Sta. and Dept. of Physiol., Berkeley).
(Proc. of the Intern. Symp. on Metab. Adapations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1312 1320. 49 refs.
Grant NIH GM-09267.

The offspring of rats bred at 12,470 ft. (3,800 m.) exhibited retarded brain maturation and delayed appearance of electroconvulsive responses. Carbonic anhydrase, acetylcholinesterase, and butyryl(pseudo)cholinesterase activities, gamma-aminobutyric acid (GABA), and total proteins of cerebral cortex, hypothalamus, cerebellum, brain stem, and remaining brain were measured on postnatal days 8 to 70. In all animals, enzyme activity as well as GABA and protein concentrations increased with age in all areas especially between days 10 and 24. Functional and biochemical alterations in developing brain accompanied other developmental changes, e.g., retarded growth, endocrine insufficiency, and cardiac hypertrophy of rats at altitude. It is suggested that the occurrence of developmental disturbances at an early and critical age might have profound consequences on adult central nervous system function, and directly or indirectly influence the animal's survival and its adaptation to high altitude.

A67-80029
TEMPERATURE REGULATION IN THE NEONATE AND THE INFANT.

Susumu Harashima and Masakazu Kurata (Keio U., Dept. of Prevent. Med. and Public Health, Tokyo, Japan).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1321–1323. 12 refs.

Simultaneous skin and rectal temperatures were measured in human neonates. Slightly higher dermal than rectal temperatures were recorded for two days immediately following birth; but as recovery from body weight loss began, dermal temperatures decreased as rectal temperatures increased. In infants up to one year old, there was a linear correlation between forehead skin and ambient room temperatures between 14 and 30°C. In this range the rectal temperatures remained 37 38°C.; but at room temperatures over 30°C. the rectal temperatures were higher and the fluctuations greater, indicating a not fully developed temperature regulation system.

A67-80030
BODY TEMPERATURE OF NEONATES.

Masakazu Kurata, Yuzo Funatsu, and Hisao Ishizuka (Keio U., Dept. of Prevent. Med. and Public Health, Tokyo, Japan).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13 17, 1965).
Federation Proceedings, vol. 25, Jul. Aug. 1966, p. 1323 1326; discussion, p. 1327–1328. 15 refs.

Variations in body heat were studied during the first week of life in 25 healthy, term, newborn babies of both sexes in both winter and summer with the following results: The rectal temperature curve showed two valleys after delivery before going into the type for infancy; the first was the initial drop immediately following delivery, and the other occurred so as to correspond to the time of the maximal body weight loss on the second to the fourth day. The skin temperature ran parallel to the rectal temperature but at a level of approximately 3.0 to 6.0°C. lower. The trunk, neck, and upper limb skin temperatures were the same as or higher than that of the rectum. After recovery of physiological body weight loss, however, the rectal temperature became higher than that in the other skin regions, and the former continued to be higher than the latter, as has been observed in adults. The reasons suggested to explain this unusual phenomenon might be: (a) blood distribution in the skin, (b) temperature gradient from the core to the surface of the body, (c) immaturity of sweating, and (d) the extent to which rectal temperature represents that of the body core.

A67-80031
DECLINE WITH AGE IN THE THERMOGENIC RESPONSE OF THE YOUNG RAT TO 1-NORADRENALINE.

Roland E. Moore and M. A. Simmonds (Roy. Free Hosp. School of Med., London, Great Britain).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13 17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1329 1331. 16 refs.

Oxygen consumption responses to subcutaneous doses of 1-noradrenaline (50–1000 μg./kg.) were recorded in rats from 1 to 42 days old at environmental temperatures of 30 and 25°C. The response curve obtained had a steep linear portion which rose to a plateau and then declined with increasing dose. Between 3 and 30 days of age at 30°C., and between 12 and 30 days at 25°C., the maximal oxygen consumption response was constant. From 30 to 42 days of age, there was a highly significant decline in the maximal response at both temperatures. Sensitivity to noradrenaline was the same for all rats from 3 to 36 days, provided that the responses were elicited at a subneutral environmental temperature.

A67-80032
INFLUENCE OF AMBIENT TEMPERATURE IN THE PROCESS OF REPLACEMENT OF NONSHIVERING BY SHIVERING THERMOGENESIS DURING POSTNATAL DEVELOPMENT.

Kurt Brück and Barbara Wünnenberg (U. Marburg, Physiol. Inst., West Germany).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1332–1336; discussion, p 1337. 29 refs.
Deut. Forschungsgemeinschaft (Br 184/4).

Experimental results are presented indicating that nonshivering thermogenesis, the prevailing mechanism of heat

production in the newborn guinea pig, almost totally disappeared within 4 weeks, if the animals were reared at neutral temperature (30–32°C.). By rearing the animals in a cold environment this process was considerably inhibited. It is thus suggested that the reduction of nonshivering thermogenesis, as observed during postnatal development, is to be thought of as a developmental process, which is modified by the environmental temperature. The interscapular fat tissue alone made up as much as 2 to 2.5% of the body weight of the newborn guinea pigs and the total mass was estimated to be about 5%. The different capacity for nonshivering thermogenesis in the neonatal stage and in the adult cold-adapted organism might be simply ascribed to the difference in the mass of multilocular adipose tissue.

A67-80033
INTERACTIONS BETWEEN HYPOTHERMIA AND HYPOXIA–HYPERCAPNIA IN NEONATES.
James A. Miller, Jr. and Faith S. Miller (Tulane U., New Orleans, La.).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1338–1341. 22 refs.

Unasphyxiated mammals exhibit elevated metabolism when exposed to cold; asphyxiated animals behave like poikilotherms and reduce their oxygen uptake under the same conditions. Cooling down to body temperatures of 15°C. for most species prolongs the time of last gasp under asphyxia. At this temperature asphyxiated puppies, kittens, and rabbits recover completely and spontaneously from exposures which are several times the lethal exposure for warm littermates. Exposure to hypoxia–hypercapnia during cooling enhances the protective effects of hypothermia against asphyxia. Mechanisms by which the hypoxia–hypercapnia effect may be mediated include prevention of generalized arterial vasoconstriction produced by very low temperatures and increase in blood flow resulting in better supplies of raw materials to and removal of waste metabolites from the vital organs such as the brain.

A67-80034
INFLUENCE OF AGE, PHYSICAL ACTIVITY AND AMBIENT TEMPERATURE ON ACCLIMATIZATION OF RATS TO HIGH ALTITUDE.
Wolf H. Weihe (High Altitude Res. Sta. Jungfraujoch, Bern, Switzerland).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1342–1346; discussion, p. 1347. 19 refs.
Max Planck Soc., Germany supported research.

Rats of different ages, raised at 540 m. altitude under standardized conditions with restricted activity were exposed to the altitude of 3,450 m. for three periods of up to 16 days with intervals of 8–10 days between the altitude exposures. There was no retained adaptation and the ability to acclimatize decreased with age and repetition of exposures as shown by the reduction of food consumption and body weight. Thyroxine treatment impeded acclimatization. Physically trained rats with unrestricted activity acclimatized more easily; they reduced voluntary running activity at high altitude. Vitamin E depletion had no adverse effect on the adaptability of physically trained rats. Decrease of ambient temperature from 22° to 12°C. during the altitude acclimatization period led to an increase of food consumption with constant body weight or weight loss with constant food intake.

A67-80035
COMPARISON OF ENERGY EXPENDITURE DURING EXERCISE AND COLD EXPOSURE IN THE DOG.
J. Chatonnet and Y. Minaire (Fac. de Méd., Lab. de Physiol. B, Lyon, France).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1348–1350. 27 refs.

The energy expenditures during strenuous work on a treadmill and while exposed to cold were measured in normal dogs and in dogs with demedullated adrenal glands. Heat production was generally slightly higher for work than for the cold. Anaerobiosis was more quickly manifested by muscular exercise than by shivering response to cold, as shown by blood lactic acid levels: between 10 and 15 kcal./kg./hr., the cold lowered while work increased lacticacidemia; and between 15 and 20 kcal./kg./hr., both series of tests produced hyperlacticacidemia.

A67-80036
METABOLIC AND CIRCULATORY ASPECTS OF TOLERANCE TO COLD AS AFFECTED BY PHYSICAL TRAINING.
K. Lange Andersen (Bergen U., Inst. of Physiol., Norway).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1351–1356. 7 refs.
Contract AF 61(052)-758.

Physiological factors underlying exercise fitness and cold tolerance were assessed in 19 young men. Tolerance to cold was increased by a period of vigorous physical training. The trained subjects were able to sleep and rest more comfortalbly under cold conditions than in the untrained state. The elevated basal metabolic rate could be due to a change in body composition, an increase in dietary protein, or an increase in endocrine activity, especially of the thyroid gland. The maximal oxygen uptake increased, although not in relation to body weight.

A67-80037
FIELD STUDY OF THE EFFECT OF COLD EXPOSURE AND INCREASED MUSCULAR ACTIVITY UPON METABOLIC RATE AND THYROID FUNCTION IN MAN.
Ove Wilson (Lund U., Dept. of Hyg., Sweden).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1357–1362. 50 refs.
Res. Inst. of Natl. Defense, Med. Res. Council, Folksam Res. Board, and Lund U., Sweden supported research.

Basal metabolic rate and thyroid function tests were made on 18 humans subjected to cold and increased muscular activity. The five-week period of increased physical activity induced a 20% increase in basal metabolic rate, but no additional effect appeared after cold exposure. Measurements made after a night in a comfortably warm environment gave no evidence of pituitary or thyroid stimulation as an after effect of continued exposure to cold or to increased physical activity. No measureable increase in thyroid stimulating hormone was found, and there was no change in circulating thyroid hormone levels. The short-term effects of increased protein-bound iodine (PBI) values and lowered triiodothyronine concentration after a night in the cold were attributed to a decrease in plasma volume rather than evidence of a change in glandular secretion. The high PB ^{131}I values in the post-conditioning period presumably represented an accelerated iodine turnover, but measurements of thyroid uptake and urinary excretion of ^{131}I gave no indication of changes in thyroid function.

A67-80038
MEASUREMENT OF WORKING CAPACITY BY ASSESSMENT OF THE AEROBIC CAPACITY IN A SINGLE SESSION.
F. Bonjer (Netherlands Inst. for Prevent. Med., Dept. of Occupational Med., Leiden).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13-17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1363–1365. 6 refs.

The procedure used in measuring aerobic capacity of population groups in Leiden (the Netherlands) is described and discussed. The experimental apparatus used included: (1) respiratory valve, (2) three-way cock, (3) tensimeter, (4) chest leads, (5) electrocardiograph, (6) cardiotachometer, (7) heart-rate recorder, (8) motor-driven resistance aiding continuously increasing load, and (9) indicator for pedalling rate. A comparison of results of a single session procedure and those of the classic multiple session method in an earlier study suggested that the former can be replaced by the latter with continuously increasing load. Not in all cases was there a constant level of oxygen intake, in spite of an increasing load, once the aerobic capacity was reached. In some cases the last sample of expired air before the subject quit revealed a higher or, in other cases, a lower value than the penultimate sample. Another investigation directed towards methodology was a comparative study of the aerobic capacity as measured at three different medical research centers in the Netherlands: Leiden, Utrecht, and Nijmegen. Each center made use of a single-session method, but there were slight differences in the loading scheme and only two of the three made use of the Douglas bag technique. Differences were observed in the results obtained at the three centers. Preliminary studies of this type should be undertaken to eliminate such differences. Only then can a definite and precise prescription be given in behalf of a standardize procedure for the measure of aerobic capacity.

A67-80039
ENERGY REQUIREMENTS OF ACCLIMATIZED SUBJECTS IN HUMID HEAT.
N. B. Strydom, C. H. Wyndham, C. G. Williams, J. F. Morrison, G. A. G. Bredell, M. J. Von Rahden, and J. Peter (Transvaal and Orange Free State Chamber of Mines, Human Sci. Lab., Johannesburg, South Africa).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13-17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1366–1371. 12 refs.

Five heat-acclimatized mine laborers were exposed to ten environmental conditions (five temperatures and two wind velocities) and required to work continuously for five hours at each of five different metabolic rates for each condition. The pulse rate responses varied with intensity of work and from one environmental temperature to another. There was a tendency for pulse rate to fall drastically from the first to the third hour and then to climb again. Rectal temperatures and sweat rates increased with the more stressful combination of work load and environmental conditions. Environmental temperatures within the range studied had no influence on oxygen consumption.

A67-80040
POTASSIUM DEPLETION UNDER HEAT STRESS.
R. S. Gordon, Jr. and H. L. Andrews (NIH, Bethesda, Md.).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13-17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1372–1374. 11 refs.

Potassium balance was followed in two normal young males under dietary conditions and work conditions which simulated those found in laborers in tropical countries. Within three weeks, the combination of restricted potassium intake and heat exposure resulted in overall loss of body potassium. Overall potassium losses in the five-week study were 176 and 281 mEq, respectively (approximately 7% of initial potassium content). Average sweat potassium concentrations were 4.9 and 6.6 mEq/liter. Neither man developed any symptoms attributable to loss of potassium. Physical performance was not impaired, but serum potassium level fell and the electrocardiogram showed loss of T-wave amplitude consistent with a diagnosis of hypokalemia.

A67-80041
VARIATION OF PLASMA POTASSIUM AND POTASSIUM TOLERANCE IN MAN IN RELATION TO CLIMATIC ADAPTATION.
J. G. Henrotte (Liège U., Lab. de Pathol. et Thérap. Gén., Belgium).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13-17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1375–1379. 10 refs.

Plasma potassium and sodium were determined among Indian, European, and African people in various climatic conditions. The potassium level was consistently higher among African Negroes than in the other two groups. Indian and European subjects had similar values which were more elevated in tropical than in temperate climate. In all groups seasonal fluctuations were observed: mainly a sharp but transient drop of plasma potassium in October–November, concurrently with a decrease of the surrounding temperature. These findings agree with the literature and suggest that plasma potassium level in man depends upon racial, climatic, and seasonal factors. Plasma sodium also showed some fluctuations but less definite than those of potassium. In some instances, potassium tolerance tests were carried out. In Europeans examined in India, the longer the stay in the tropics, the higher was the potassium increase during the test. Among Indian students tested in Europe, the opposite phenomenon was observed. These results suggest that hot climate depresses and cold climate enhances the salt regulating function of the organism. They have been confirmed recently by experiments on rats which showed that this phenomenon is partly independent of the diet.

A67-80042
ENERGY METABOLISM IN MAXIMUM AND SUBMAXIMUM PERFORMANCE AT HIGH ALTITUDES.
C. Frank Consolazio, Leroy O. Matoush, and Richard A. Nelson (Fitzsimons Gen. Hosp. U.S. Army Med. Res. and Nutr. Lab., Denver, Colo.).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13-17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1380–1385; discussion, p. 1386–1387. 18 refs.

Oxygen requirements and work performance were evaluated at 1,610-, 3,475-, and 4,300-m. elevations. Maximal oxygen consumption was decreased with an increase in altitude. The maximal performance, V_{O2} (milliters per kilogram body weight per minute), averaged 40.5 ml. at sea level, 37.0 at 1,610 m., 33.0 at 3,475 m., and 32.1 ml./kg. body weight at the 4,300 m. elevation. Basal metabolic rates, sitting rest, and submaximal work (liters per minute oxygen) were practically unchanged at all altitudes, even though the pulse rates were increased. One group showed a significant increase in basal metabolic rate at 4,300 m. during the first week of exposure. Pulse rates were decreased during maximal work at 3,475- and 3,400-m. altitudes. Pulse rates during sitting rest and submaximal

work were increased with an increase in high altitude. There seemed to be no great beneficial effects of ascending to altitude either gradually or abruptly or between exercise and no exercise, although the physical well-being (reduced "mountain sickness" symptoms) of the men who ascended to altitude gradually was greatly improved over the men who ascended to altitude abruptly.

A67-80043

BREATH HOLDING IN UNTRAINED AND WELL-TRAINED SUBJECTS AT HIGH ALTITUDE.

F. Kreuzer and Y. Honda (Nijmegen U., Dept. of Physiol., The Netherlands).

(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13-17, 1965).
Federation Proceedings, vol. 25, Jul.-Aug. 1966, p. 1388-1391. 17 refs.
Grant NHI HE-06446-02 and Dutch Found. for Basic Res. (ZWO) supported research.

Breath-holding time and alveolar P_{O_2} and P_{CO_2} were determined in eight members of a high-altitude expedition to Monte Rosa, Italy. The only well-trained subject showed a considerably longer breath-holding time than the other members at the highest altitude of 4,560 m. This might be due to his high alveolar P_{O_2} and low P_{CO_2} resulting from excessive hyperventilation. This tendency to hyperventilation, acquired during long mountaineering training and habitual even at sea level, might correlate with particular physical fitness at high altitude.

A67-80044

MUSCULAR EXERCISE IN THE HIMALAYAN HIGH-ALTITUDE RESIDENTS.

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(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13 17, 1965).
Federation Proceedings, vol. 25, Jul.-Aug. 1966, p. 1392-1396. 12 refs.
Indian Council of Med. Res. supported research.

Respiratory and circulatory determinations during climbing and during high altitude exercise on a bicycle ergometer were made on four Sherpa, residents of high altitude, and two acclimatized lowlanders. There was no difference between the two groups in oxygen consumption for a given work rate, but it was achieved by a different combination of cardiovascular and respiratory functions. The ventilation of the Sherpa was better adjusted to maintain alveolar carbon dioxide tension and arterial blood pH near normal. The Sherpa ventilated less, although their alveolar carbon dioxide tension and arterial hydrogen ion concentrations were higher than those of the lowlanders. The heart rate increased with work rate in both groups, but there was a decrease in heart rate at all levels in the Sherpa upon inhalation of oxygen. Hypoxia depressed the heart rates in both groups.

A67-80045

METABOLIC AND PHYSIOLOGICAL ASPECTS OF EXERCISE AT HIGH ALTITUDE. I. KINETICS OF BLOOD LACTATE, OXYGEN CONSUMPTION AND OXYGEN DEBT DURING EXERCISE AND RECOVERY BREATHING AIR.

Baltazar Reynafarje and Tulio Velásquez (U. Nacl. Mayor de San Marcos, Fac. de Med., Inst. de Biol. Andina, Lima, Peru).

(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13-17, 1965).
Federation Proceedings, vol. 25, Jul.-Aug. 1966, p. 1397-1399. 5 refs.
Grant NIH 10219.

Comparisons were made of oxygen consumption and blood lactate levels of exercising native subjects at an altitude of 4,500 m. and barometric pressure of 446 mm. Hg, and in Lima, Peru at 150 and 750 mm. Hg. Excess oxygen uptake during exercise was lower in the altitude natives than in the sea-level residents. The larger the workload, the more notable was the difference. Accumulation of blood lactate during exercise was lower in the high-altitude native than in the sea-level control, but the difference became larger as the workloads increased. The different physiological behavior of the altitude native is probably due in part to the different pattern of enzyme activity at the tissue level.

A67-80046

METABOLIC AND PHYSIOLOGICAL ASPECTS OF EXERCISE AT HIGH ALTITUDE. II. RESPONSE OF NATIVES TO DIFFERENT LEVELS OF WORKLOAD BREATHING AIR AND VARIOUS OXYGEN MIXTURES.

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(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13-17, 1965).
Federation Proceedings, vol. 25, Jul.-Aug. 1966, p. 1400-1402; discussion, p. 1403-1404. 6 refs.

Mechanisms involved in the process of adaptation to physical exercise in high altitudes were investigated in altitude and sea-level natives. Oxygen mixtures of 16.2%, 35.8%, and 100% were inspired and several submaximal and maximal workloads were performed. A total pulmonary ventilation of 49.0 liters/min./m.^{2} was the mean at high altitude, while at sea level the average was 49.5 liters/min./m.^{2} In the altitude natives this ventilation did not change when breathing 35.8% oxygen, but a low oxygen mixture produced a moderate increase in all but one case. The amount of ventilation required for each liter of oxygen uptake increased greatly at 16% and decreased moderately at a 35.8% mixture. Oxygen consumption of altitude natives increased 12% when a 35.8% oxygen mixture was used instead of air, and decreased 16% when breathing low-oxygen mixtures, suggesting that the subjects had some impairment of oxygen diffusion or transport when performing in air. This impairment was eliminated by higher and enhanced by lower inspired oxygen tension (P_{O_2}). For the same amount of work, lactate was much less in the altitude tests than at sea level and even lower when a high oxygen mixture was breathed; conversely, lactate rose when a mixture of low P_{O_2} was inspired.

A67-80047

ENZYMATIC AND HORMONAL RESPONSES TO EXERCISE, LOWERED PRESSURE, AND ACCELERATION IN HUMAN PLASMA AND THEIR CORRELATION TO INDIVIDUAL TOLERANCES.

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(Proc. of the Intern. Symp., on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13-17, 1965).
Federation Proceedings, vol. 25, Jul.-Aug. 1966, p. 1405-1408. 35 refs.

Twelve untrained male students were subjected uniformly to three kinds of stress: (1) exercise on an ergometer at a load of 12 k.p.m./sec. for 30 min.; (2) exposure to reduced pressure of 312 mm. Hg for 30 min.; and (3) exposure to positive acceleration of 2.5 g for 30 min. Each time the plasma levels of four enzyme activities-malic dehydrogenase (MDH), aldolase (ALD), glutamic-oxalacetic transaminase (GOT), glutamic-pyruvic transaminase (GPT) and of the free 17-hydroxy-corticosteroids (17-OH-CS) were determined prior to and at intervals during and after stress. There was a significant

rise of 17-OH-CS caused by lowered pressure and acceleration. Enzymatic responses to the three stressors were not uniform: MDH and GPT activities increased significantly in response to all stressors, GOT under exercise and lowered pressure, ALD under exercise. These findings indicate specific differences in the response to the examined stressors. The coefficients of correlation were calculated for the relationship between tolerances of the three stressors and the alterations of enzyme activities and of 17-OH-CS levels.

A67-80048
ASSESSMENT OF PHYSICAL ACTIVITY IN OXIDATIVE AND ANAEROBIC MAXIMAL EXERCISE.
Rodolfo Margaria (Milan U., Ist. di Fisiol. Umana, Italy).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1409–1412; discussion, p. 1413–1414. 10 refs.

Physiological adaptations of muscles in aerobic and anaerobic work were measured in humans running up a staircase of 10–12 steps. Nomograms are given for the circulatory and respiratory changes during the exercise: maximal oxygen consumption per kilogram body weight; oxygen consumption and carbon dioxide production, and minute volume of heart as a function of heart rate and alveolar ventilation; and arteriovenous oxygen difference in milliliters as a function of oxygen capacity of the blood in liters.

A67-80049
LIPID AND CARBOHYDRATE METABOLISM DURING EXERCISE.
B. Issekutz, Jr., H. I. Miller, and K. Rodahl (Lankenau Hosp., Div. of Res., Philadelphia, Pa.).
(Proc. of the Intern. Symp. on Metab. Adapatations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1415–1420. 22 refs.
Grant NIH HE 07687-03.

The turnover rate of plasma free fatty acids (FFA) and carbohydrate metabolism were studied in dogs running on a treadmill. It is concluded that the glucose permeability, and therefore glucose uptake, seems to be the rate-limiting factor in the glucose supply to the working muscle. The hepatic sugar output increases only to prevent a drop in the plasma sugar level. The rate-limiting factor of FFA supply seems to be the rate of release from the adipose tissue. The rate of uptake of FFA seems to exceed the rate of release only in the first few minutes of exercise.

A67-80050
INTRACELLULAR MUSCLE LIPIDS AS ENERGY SOURCES DURING MUSCULAR EXERCISE AND FASTING.
E. J. Masoro, L. B. Rowell, and R. M. McDonald (Wash. U., School of Med., Reg. Primate Res. Center and Dept. of Med., Seattle and Pa., Woman's Med. Coll., Philadelphia).
(Proc. of the Intern. Symp. on Metab. Adaptations to Temperature and Altitude, Kyoto, Japan, Sep. 13–17, 1965).
Federation Proceedings, vol. 25, Jul.–Aug. 1966, p. 1421–1424; discussion, p. 1425–1426. 12 refs.

The use of intracellular lipids as fuel for contractile activity was investigated in monkey skeletal muscle. The results of this study led to the following conclusions: Under in vivo conditions intracellular muscle lipids are not involved as a fuel for the increased energy metabolism of contracting muscle even when lipid is the prime fuel. Presumably, the lipid fuel used by skeletal muscle for contractile activity is derived from the extracellular fluid. The role of intracellular muscle lipids as an energy reserve to be used during fasting was studied with rats. It was shown that lipids do not function in such a reserve energy capacity. Rather, intracellular skeletal muscle triglyceride and free fatty acids increased during fasting while phospholipid levels remained almost unchanged.

A67-80051
A DEVICE FOR RAPID PRESENTATION OF MONOCHROMATIC STIMULI.
Daniel F. Johnson (Columbia U., New York City, N. Y.).
Journal of the Experimental Analysis of Behavior, vol. 9, Jul. 1966, p. 335–336.
Grant NIMH MH 10384-01.

A device is described and illustrated in which two-inch square interference filters are inserted into a light path for the rapid presentation of monochromatic visual stimuli. Filter access time is less than 100 msec., and uniformity of operating time can be insured for hours without overheating.

A67-80052
OBSERVING BEHAVIOR DURING INTERVAL SCHEDULES.
Derek P. Hendry (Ill. U., Chicago) and P. V. Dillow (Tenn. U., Knoxville).
Journal of the Experimental Analysis of Behavior, vol. 9, Jul. 1966, p. 337–349. 14 refs.
NASA Grant NsG 189-61, Grant PHS MH-11907-01 PMY and DSIR supported research.

Experiment I showed that the three stimuli associated with three chained fixed-interval links could be used to maintain observing behavior in pigeons. Experiment II showed that three stimuli correlated with the passage of time since the last reinforcement in a fixed-interval schedule could be used to maintain observing behavior. In both experiments most observing responses occurred midway between reinforcements. Few occurred just before or just after reinforcement. Experiment III showed that the decline in the rate of observing behavior just before reinforcement was reduced when more stimuli could be observed. The relatively high terminal rate of observing behavior that resulted was maintained even when at least 4 sec. intervened between the reinforcement and the last observed stimulus.

A67-80053
A METHOD FOR AUTOMATIC PROGRAMMING OF SPECTRAL STIMULI USING A MONOCHROMATOR.
Nancy K. Mello (Mass. Gen. Hosp., Boston).
Journal of the Experimental Analysis of Behavior, vol. 9, Jul. 1966, p. 351–355. 8 refs.
Grant AFOSR 544-64.

A technique is described for the automatic selection and sequencing of narrow-band spectral stimuli. A Bausch and Lomb, high-intensity, grating monochromator was used in which the wavelength selection knob was replaced with a timing belt pulley. An external circuit supplied pulses which turned the modified wavelength selection dial a distance equal to 1.01 mu. A schematic diagram of the total system used to program the automatic selection of spectral stimuli is shown. The stimuli can be preselected and automatically programmed according to the sequence of binary coded slides in the projector.

A67-80054
AVOIDANCE OF A RETURN TO THE FIRST COMPONENT OF A CHAIN FROM THE TERMINAL COMPONENT.
John R. Thomas (Inst. for Behavioral Res., Silver Spring, Md.).
Journal of the Experimental Analysis of Behavior, vol. 9, Jul. 1966, p. 435–441. 11 refs.
NASA NsG-450.

Three pigeons were trained on a chained fixed interval-fixed ratio schedule. Avoidance behavior which postponed a

return to the first chain component from the second component was maintained on a second response key concurrently with the second component. When the fixed interval length was increased, avoidance rates first increased and then decreased as a function of fixed interval length. As the fixed ratio requirement was increased for one subject, avoidance rates first declined and then increased at larger fixed ratio values. Avoidance behavior maintained by postponing the first chain component was similar to avoidance behavior maintained by postponing a time out period.

A67-80055
SENSORY DEPRIVATION, SUGGESTION, FIELD DEPENDENCE, AND PERCEPTUAL REGRESSION.
Daniel F. Murphy (Rochester U., N. Y.).
Journal of Personality and Social Psychology, vol. 4, Sep. 1966, p. 289–294. 23 refs.
ONR supported research.

Eight field-dependent and eight field-independent subjects were assigned to each of three conditions: Suggestion, Neutral, or Control. Experimental subjects underwent two hr. of a McGill-type sensory deprivation. Control subjects were only socially isolated. Alternate forms of a novel auditory test designed to tap structural aspects of cognition were administered shortly after subjects entered deprivation and two hr. later, before they emerged from deprivation. Cognitive decrement under social isolation was not significant. All suggestion subgroups showed decreases in mature and increases in immature functioning. The field-independent neutral subgroup did not change significantly, while the field-dependent neutral sub-group dropped in mature functioning. It was concluded that explicit suggestion augments the effects of sensory deprivation on some aspects of cognition, and that psychological development in the sense of greater cognitive differentiation helps to withstand these effects.

A67-80056
COMPARISON OF THE DRAWING AND MATCHING METHODS FOR JUDGING SHAPE.
A. H. Smith (Defence Res. Med. Labs., Toronto, Canada).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 3–15. 9 refs.

Observers judged the slant and shape of a circle, a rectangle and a triangle binocularly under reduced viewing at 0°, 15°, 30°, 45°, and 60° geometric slant. In Exp. I they drew shape with drawing size unrestricted (Draw I) and matched shape with the horizontal axes of 14 comparison shapes constant (Match I). In Exp. II, a different group drew shape by the method of Draw I and with the horizontal axis of the drawing constant (Draw II) and matched shape with the areas of 14 comparison shapes variable (Match II). Slant was underestimated. Draw I and Match I produced about the same over-all constancy in Exp. I, Draw I and Match II about the same in Exp. II. Draw II produced more constancy than Draw I and Match II in Exp. II. There was more constancy for the rectangle than for the circle and triangle. The results were contrary to the view that drawn shape is confounded with implicitly registered slant and were inconclusive for the invariance hypothesis.

A67-80057
STIMULUS CHARACTERISTICS AND EFFECTS OF FILL, DISTORTION, AND NOISE ON PATTERN PERCEPTION.
R. B. Webster (Bunker-Ramo Corp., Canoga Park, Calif.).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 19–33. 72 refs.

A review of recent research concerning the effects of fill, distortion and noise on human pattern discrimination is presented. Studies wherein dot patterns, light-point patterns and/or patterns comprised of filled squares of various dimensions serving as stimuli are considered. The problems of quantifying stimulus (pattern) parameters and measuring their effects on pattern discrimination performance and the use of information concepts are discussed. Also, important related areas of interest where investigation is required are discussed as well as methods of eliciting more specific knowledge relating to pattern discrimination.

A67-80058
PERCEPTION BIBLIOGRAPHY: XXXI. PSYCHOLOGICAL INDEX NO. 27, 1920.
C. H. Ammons and R. B. Ammons.
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 43–46. 105 refs.

This bibliography consists of 105 articles dealing with visual perception and closely related fields. The entries are listed alphabetically by author.

A67-80059
A TAXONOMIC ANALYSIS OF CONTINUOUS PERFORMANCE.
Bruce O. Bergum (Xerox, Fundamental Res. Lab., Rochester, N. Y.).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 47–54. 16 refs.

A conceptual framework is presented, based upon an expanded concept of activation level, which is designed to encompass the full range of performance task research, from vigilance to production-line type performance. Specific characteristic aberrations in performance are associated with specific extreme deviations in activation level and a matrix of task characteristics is developed for relating tasks in terms of their total stimulation value and for predicting the effects of experimental variables on the performance associated with these tasks.

A67-80060
INTRA-SUBJECT STABILITY OF ISOLATION TOLERANCE.
R. D. Francis (New South Wales U., Wollongong U. Coll., Sydney, Australia).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 89–90.

Twenty-two subjects were tested for toleration time of isolation by immersion. The intercorrelations on 12 tests were compared for the toleration time extremes. It appears that each of the two extreme groups of six subjects is internally homogeneous but unlike the other. Thus it appears that some stable individual difference factor distinguishes the high- and low-isolation tolerator.

A67-80061
EFFECT OF UNILATERAL ABOVE-THE-KNEE AMPUTATION ON PERCEPTION OF VERTICALITY.
Peter E. Comalli, Jr. (Veterans Admin. Outpatient Clin., Boston, Mass.).
(Eastern Psychol. Assn., 34th Ann. Meeting, New York City, Apr. 1963).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 91–96. 9 refs.

This study was concerned with the effect of unilateral amputation on space perception. Thirteen left above-the-knee amputees were compared with 13 right above-the-knee amputees on perception of the visual vertical under conditions of body erect, and 30° left and right body tilts. Results showed that, when the body was erect, the apparent vertical was significantly displaced in a direction opposite the side of

amputation, while under conditions of left- and right-body tilt, right above-the-knee amputees displaced the apparent vertical opposite to the body tilts to a greater extent than left above-the-knee amputees. The findings with amputees were contrasted with hemiplegic patients and discussed with reference to the sensory-tonic field theory of perception.

A67-80062
PERCEPTION BIBLIOGRAPHY: XXXII. PSYCHOLOGICAL INDEX NO. 28, 1921.
R. B. Ammons and C. H. Ammons.
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 99–102. 103 refs.

An alphabetical listing of 103 references involving perception and closely related fields for the year 1921 is presented.

A67-80063
PROGRESS DIRECTION AND PSYCHOLOGICAL TIME.
Robert D. Meade
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 115–118. 8 refs.
Grant NIMH M3193.

Earlier investigation revealed that time estimates under conditions of motivation to reach a goal are inversely related to rate of progress through a task. This investigation extended the progress variable into negative values where subject's actions on each trial took him farther from the goal. Replications for 15-, 30-, 45-, and 60-min. periods showed that longer estimates were made where subject moved neither forward nor backward (zero progress) and shorter estimates for both backward as well as forward progress. Explanation of this effect in terms of both Hindle's equation and frustration theory are rejected in favor of one utilizing sensory input as the critical variable.

A67-80064
INTEROCULAR TRANSFER OF ADAPTATION TO PRISMATIC DISTORTION.
Herbert L. Pick, Jr., Robert H. Willoughby (Minn. U., Minneapolis), and John C. Hay (Smith Coll., Northampton, Mass.).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 131–135. 6 refs.
Grant NIH MH 07588.

Eight subjects were exposed monocularly to wedge prisms for a period of three days. Substantial interocular transfer of adaptation to prismatic distortions was found for gaze contingent distortions and for curvature of vertical lines but not for chromatic fringes. Interocular transfer implies central involvement in the adaptation. Lack of such transfer for chromatic fringes is congruent with previous similar results of other investigators and in line with recent evidence from another kind of experiment suggesting a receptor mechanism for such adaptation.

A67-80065
SMITH AND SMITH'S DEVELOPMENTAL STUDIES OF SPATIAL JUDGMENTS: A NOTE.
Joachim F. Wohlwill (Clark U., Worcester, Mass.).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 137–138. 6 refs.

Smith and Smith's (1966) recently published data on age changes in distance judgments are examined. With respect to their bisection method, which yielded results opposite to those found in previous studies, the presence of a possible methodological artifact is noted; the validity of the reproduction method, preferred by the authors, for the study of distance perception is also questioned. The merits of the Smiths' distinction between depth and distance perception are discussed briefly.

A67-80066
MOTOR SKILLS BIBLIOGRAPHY: XLIX. PSYCHOLOGICAL ABSTRACTS, 1927, VOLUME 1.
C. H. Ammons and R. B. Ammons.
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 139 142. 95 refs.

An alphabetical listing of 95 selected items for the year 1927 on motor skills is presented.

A67-80067
FRAGMENTATION PHENOMENA IN LUMINOUS DESIGNS.
Morris Eagle, Leslie Bowling, and George S. Klein (N. Y. U., Res. Center for Mental Health, New York City).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 143 152. 10 refs.
Grant NIMH MH-06733.

The subjective fragmentation of luminous designs was studied. It was found that: (1) Degree of meaningfulness did not influence amount or pattern of fragmentation. (2) Angular structures showed greater fragmentation than rounded structures. (3) Fragmentation was greatest for the fixated and immediately adjacent area. (4) Whole lines tended to disappear and reappear as separate units. The interrelationship between structure and fixation as variables influencing fragmentation is discussed in the general context of Hebb's (1963) hypothesis regarding the role of perceptual "units" in the development of stimulus structure.

A67-80068
MOTOR SKILLS BIBLIOGRAPHY: L. PSYCHOLOGICAL ABSTRACTS, 1928, VOLUME 2.
R. B. Ammons and C. H. Ammons.
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 191 194. 101 refs.

An alphabetical listing of 101 articles on motor skills covering the year 1928 is presented.

A67-80069
SERIAL ORDER AS A UNIQUE SOURCE OF ERROR IN RUNNING MEMORY.
Bruce M. Ross (Catholic U. of Am., Center for Res. in Thinking and Language, Washington, D. C.).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 195 209.
Grant NIMH M-3196.

Three running memory experiments were administered to college students. Over-all error difficulty was manipulated by requiring different previously seen symbols to be recalled and varying the time allowed for recall. Results showed that errors attributable to one particular symbol serial-order did not change as a function of mean error. It is concluded that serial order can be a unique source of error in running memory because "interference" and temporal duration cannot account simultaneously for the divergent error trends. Moreover, serial order must be of special importance in determining the relative accessibility of retained items. A further conclusion is that a viewed symbol has to become part of subject's memory load if it is to be compared with a previously seen symbol.

A67-80070
SOME COMMENTS ON WOHLWILL'S CRITIQUE.
Olin W. Smith and Patricia Cain Smith (Bowling Green U., Ohio).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 221–222.

Wohlwill's criticisms of "Smith and Smith's studies of spatial judgments" are assessed in terms of basic principles of theory of measurement as applicable to problems of depth perception.

A67-80071
A NEW DYNAMIC BALANCE TESTING DEVICE: THE "DYNABALOMETER".
Kenneth A. Penman (Wash. State U., Pullman).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 232-234. 8 refs.

A device which measures dynamic balance ability was designed. The dynabalometer is basically a triaxial stabilometer which provides a balance measure for the poorly skilled as well as the highly skilled person. The apparatus is well suited for learning studies.

A67-80072
A TEST OF THE EXISTENCE OF MONOCULAR STEREOSCOPIC DEPTH PERCEPTION.
G. R. Engel (Defence Res. Med. Labs., Toronto, Canada).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 235-238. 6 refs.

Three observers, highly trained in observing visual phenomena, viewed a pair of Julesz Stereo Random Brightness Fields presented alternately to the same eye. Under no circumstance was there any report of sterescopic depth arising from this mode of presentation. This finding contradicts recent reports of monocular stereoscopy obtained by alternately presenting both halves of a stereo pair to the same eye. It is concluded that impressions of depth gained in this way are not due to stereopsis but to the presence of monocular depth cues in the stimuli. Stereoscopic stimuli, such as Random Brightness Fields, which contain no monocular depth dues, do not give rise to the perception of depth.

A67-80073
A FACTORIAL STUDY OF THE STIMULUS CONDITIONS OF HABITUATION.
James W. McDaniel (Colo. U., School of Med., Denver) and Robert K. White (Natl. Naval Med. Center, Bethesda, Md.).
Perceptual and Motor Skills, vol. 23, Aug. 1966, 0. 259-270. 19 refs.
Dept. of HEW supported research.

To examine the effects of variations in the stimulus conditions of habituation, 48 cats were conditioned under three types of habituation pre-training. The major condition of interest was different rates of nonreinforced pre-exposure to the same physical stimulus in one-hr. sessions for four days. Pretraining was followed by standard escape-avoidance with ten trials a day for 16 days. Rates of acquisition of escape-avoidance varied significantly with the type of habituation pretraining given, the periodicity of stimulus exposure, additional cue, and age. It has been inferred that habituation is an anticipatory response dependent upon the predictability of stimulus occurrence.

A67-80074
SOME EFFECTS OF LIGHT ON SOUND INTENSITY GENERALIZATION AS A FUNCTION OF NUMBER OF TRAINING TRIALS.
Donald D. Dorfman and Ralph Miller (San Diego State Coll., Calif.).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 291-294. Grant NIMH MH 10449-01.

This study determined whether the magnitude of a lateral displacement of a generalization gradient was a function of number of training trials. The results showed that: (a) when subjects were trained in the absence of a light, introduction of the light on generalization-test trials displaced the gradient toward the weaker sound intensities, and (b) the magnitude of this effect was independent of number of training trials.

A67-80075
DECODING OF ELECTROCUTANEOUS SIGNALS: EFFECTS OF DIMENSIONALITY ON RATES OF INFORMATION TRANSMISSION.
Emerson Foulke, Glynn D. Coates, and Earl A. Alluisi (Louisville U., Ky.).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 295-302. 14 refs.
Contract DA-94-193-MD-2525.

Each of four electrocutaneous codes, alike with respect to the number of code signals, but different with respect to the dimensions used in composing the signals, was learned by ten subjects. When response time (RT) was used as the index of performance after practice, the codes were ranked in order of increasing difficulty (or RT) as follows: the location code, location-by-intensity, location-by-duration, the location-by-intensity-by-duration codes. When errors were taken as the index of performance and when subjects had received a moderate amount of practice, the codes were arranged in order of increasing difficulty (or errors) as follows: the location-by-intensity-by-duration code. When the rate of information transmission (which takes into account both time and errors) was employed as the index of performance, the codes were ranked in order of increasing difficulty (or decreasing efficiency) as follows: the location-by-intensity-by-duration code.

A67-80076
EFFECTS OF LOAD-CARRYING ON PYSCHOMOTOR PERFORMANCE.
Paul S. Strauss and Jack Carlock (Picatinny Arsenal, Dover, N. J.).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 315-320. 10 refs.

Previous studies have indicated that performance after load-carrying may be related to psychological fatigue rather than physiological impairment. This study measured performance on a battery of psychomotor tests and subjective fatigue ratings after ten subjects carried loads of 14 and 34 lb. over a two-mile test course. These scores are compared with those obtained after several periods of inactivity. Subjective fatigue was significantly related to all test scores but not to time required to walk the course. Although performance was poorer after load-carrying than after inactivity, scores for load-carrying conditions were higher for the 34-lb. load than they were for the 14-lb. load when both were carried in a comfortable position. This is taken to suggest that, under some conditions, carrying greater weights may have an activation effect on psychomotor performance and may even reduce subjective fatigue.

A67-80077
MODEL FOR EFFECT OF A SECOND VISUAL STIMULUS UPON REACTION TIME TO THE FIRST.
Donald Vreuls (Bunker-Ramo Corp., Canoga Park, Calif.) and James F. Schmidt (Trinity U., San Antonio, Tex.).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 323-328. 9 refs.
Grant NIH MH 10186.

When two visual stimuli are separated by an interval of not more than 200 msec., the second stimulus delays the response to the first, primary stimulus. Reaction time was found to be lengthened (inhibited) in a curvilinear fashion; peak inhibition occurred when the second stimulus appeared 100 msec. after the onset of the primary stimulus. The results confirmed earlier work by others. A high speculative model of the underlying process was suggested.

A67-80078
FEASIBILITY OF MEASURING EYE MOVEMENTS IN REAL-WORLD AND SIMULATED DRIVING SITUATIONS.
Thomas R. Williamson and Gerald V. Barrett (Goodyear Aerospace Corp., Akron, Ohio).
Perceptual and Motor Skills, vol. 23, Aug. 1966, p. 329-330.

Preliminary investigation to determine the feasibility of utilizing the 1962 Mackworth head-mounted eye-marked camera in both a simulated and real-world driving situation indicated that: (1) the camera limits scene width to a total of 25° when subject looks straight ahead, (2) eye-marker spot drops below center as distance from original calibration location is increased, (3) an auxiliary boresight device is required to make the initial eye-spot calibration quickly and efficiently, (4) ambient light of real-world hampers initial calibration procedures, (5) interior height of automobile limits heights of subjects, and (6) film and filter selection varies from real-world to simulator.

A67-80079
DISINHIBITION OF VISUALLY MASKED STIMULI.
Daniel N. Robinson (Columbia U., Electron. Res. Labs., New York City, N. Y.).
Science, vol. 154, Oct. 7, 1966, p. 157-158. 10 refs.

Backward-masking conditions were established for a pair of circular-patch stimuli. A third stimulus was then selected so as to mask the second when the second and the third were presented in the absence of the first. When all three stimuli were presented in serial order, the first and third were reliably detected but the second was not. Apparently, by masking the second flash, the third "disinhibited" the first.

A67-80080
VISUAL ACUITY AND EXCITEMENT.
Robert D. Palmer (Veterans Admin. Hosp., Brooklyn, N. Y.). *(Am. Psychol. Assn., Philadelphia, Pa. 1963).*
Psychosomatic Medicine, vol. 28, Jul.-Aug. 1966, p. 364-374. 32 refs.

Viewed within the framework of activation theory, individuals with low visual acuity might conceivably be seen as persons with low preferred levels of activation who seek to reduce stimulus input in order to maintain activation at their preferred level. It was hypothesized, therefore, that persons with low visual acuity would demonstrate less receptivity to environmental stimulation than high-acuity individuals. In support of this hypothesis, subjects with high visual acuity gave evidence of greater responsiveness to and desire for external stimulation on questionnaire measures of stimulus acceptance and reactivity. Conversely, persons with low visual acuity described themselves as calm and unexcitable, and manifested greater use of suppression as a defense. Two alternative interpretations are an attribution of acuity differences to antecedent differences in level of activation, and an assertion of the temporal priority of autochthonous differences in visual acuity.

A67-80081
TRENDS IN THE TREATMENT OF RADIATION INJURIES [TERAPIA MEDICAMENTOSA E TERAPIA CHIRURGICA NELLE RADIODERMITI].
V. Mela and S. Raso (City Hosp., Dept. of Plastic and Maxillo-Facial Surg., Genoa-Sampierdarena, Italy).
Minerva Medica, vol. 57, Jul. 21, 1966, p. 2582-2588. 26 refs. In Italian.

After a brief discussion of the possible causes of radiation injuries, the problem of the treatment of radiodermatitis is considered. Although admittedly the fundamental procedures are surgical, aimed at replacing injured with healthy tissues, the need for a preliminary, well-defined period of treatment with a new fibrinolytic drug is stressed. This preliminary period is conditioned by certain technical requirements, and when these are satisfied, excellent results can be obtained in the preparation of the difficult surgical field. Three cases are reported which illustrate the effectiveness of medical treatment before surgery.

A67-80082
DISORDERS OF OPTICAL PERCEPTION AT HIGH SPEED [STORUNGEN DER OPTISCHEN WAHRNEHMUNG BEI HOHEN GESCHWINDIGKEITEN].
B. Gramberg-Danielsen (Allgem. Krankenhaus St. Georg, Augenabt. and Akad. für Verkehrswiss., Hamburg, West Germany).
Wehrmedizin, vol. 4, Jul. 1966, p. 119-122. 18 refs. In German.

The conduction period of a light stimulus from the retina to the area striata plays a considerable part at speeds such as occur in road and in air traffic. It depends on intensity of stimulus and the place where the stimulus is received in the retina and is to be estimated as approximately 0.1 sec. The delay in central perception causes a distance scotoma and anisochrony of the reality of the surroundings and perception. The kinetic space scotoma is, analogous to the blind spot, to be regarded as a physiological defect of the forward field of vision. The space myopia in certain circumstances causes a further delay in recognizing danger. A remedy can only be offered by technology; no compensation can be applied by the human body. We have here reached a physiological barrier.

A67-80083
HEALTH DAMAGE CAUSED BY MICROWAVES, ESPECIALLY RADAR WAVES [GESUNDHEITSSCHADEN DURCH RADAR-WELLEN].
Heinrich Dinkloh.
Wehrmedizin, vol. 4, Jul. 1966, p. 123-131. 21 refs. In German.

The input energy of microwaves is changed to heat in the organism. Organs with a decreased ability to conduct heat (eye and testicles) are especially endangered. Furthermore, certain excitor effects on the autonomic nervous system are quite probable. The patho-physiological effect of microwaves offers possibilities for health supervision. Platelet count, examination of the lens of the eye with a slit lamp, and spermatocyte count are discussed. The important protective measure is distance from the source of the rays. The critical tolerance factor is 10 mW/cm^2.

A67-80084
HUMAN ESTIMATES OF STATISTICAL RELATEDNESS
Dwight E. Erlick (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
Psychonomic Science, vol. 5, Aug. 5, 1966, p. 365-366. 14 refs.
AFSC supported research.

Degree of statistical relatedness between events is an independent variable used by many psychologists investigating concept formation, cue utilization, reinforcement theory, and decision theory. Evidence is presented which indicates there is a discrepancy between human estimates and statistical estimates of relatedness. This discrepancy seems to be a function of the variability of the states of the two events.

A67-80085
EFFECT OF SEQUENTIAL BLOCKING OF SIMILAR TRIGRAMS ON FREE AND SERIAL RECALL.

William F. Battig (Md. U., College Park).
Psychonomic Science, vol. 5, Aug. 1966, p. 369–370. 6 refs. Grant PHS HD-0162.

Recall performance on 15 item lists consisting of three letter orders of each of five three-letter anagrams was markedly facilitated if the letter orders of each set were blocked rather than unsystematically ordered during presentation and/or subjects were permitted free recall of the items in any order. The blocking effect was larger in magnitude, and also eliminated the superiority of free over serial recall.

A67-80086
HAPTIC AND KINESTHETIC ESTIMATES OF LENGTH.
Gordon Stanley (Ind. U., Bloomington).
Psychonomic Science, vol. 5, Aug. 5, 1966, p. 377–378. 7 refs.

Twenty-two students made magnitude estimates of the lengths of rods held between their index fingers (haptic condition) and also estimates of the separation of their index fingers without the rods present (kinesthetic condition). The rods ranged in length from 0.70 to 33 in. increasing in length by approximately equal logarithmic steps. The exponents of the power functions for magnitude estimates of length under haptic and kinesthetic conditions were 1.05 and 0.94 respectively.

A67-80087
FREE RECALL OF INTRA-LIST ITEMS AS A FUNCTION OF SERIAL POSITION AND ASSOCIATION VALUE.
Ian Reid, Dennis Roberts, and F. J. King (Fla. State U., Inst. of Human Learning, Tallahassee).
Psychonomic Science, vol. 5, Aug. 5, 1966, p. 383–384.

Eight lists of nonsense syllables were developed, each list containing four low and four high-association value syllables. In four lists, a L, H, L, H alternation scheme was used, while the opposite arrangement was utilized in the other four lists. The two alternation patterns produced different serial position curves. This finding was essentially in agreement with earlier work using meaningful words.

A67-80088
REACTION TIME TO "TONE-OFF".
J. Brown Grier (Northern Ill. U., De Kalb).
Psychonomic Science, vol. 5, Aug. 5, 1966, p. 385–386. Grant Northern Ill. U. 54005-118.

Fifteen college students gave reactions to both the onset and end of a 1000-c.p.s. tone. After a few initial trials in which the subjects seemed to be adjusting to the novelty of responding at a signal's end, reaction times were significantly shorter to the end of the tone than to its onset. This shorter reaction time can be accounted for by a greater cortical response.

A67-80089
SET AND WORD ABSTRACTNESS-CONCRETENESS SHIFT IN PAIRED-ASSOCIATE LEARNING.
A. Dan Yarmey and Keith A. Thomas.
Psychonomic Science, vol. 5, Aug. 5, 1966, p. 387–388. 9 refs.

Subjects learned two separate paired associate (PA) lists of abstract and concrete nouns, differing in rated imagery. Half of the subjects learned first the abstract pairs then shifted to concrete pairs then abstract. Imaginal and verbal mediational sets were also investigated. Learning was consistently superior with concrete nouns. Imaginal set facilitated concrete noun learning and verbal set interfered with abstract PA learning. The data provided further support for a mediating-imagery hypothesis.

A67-80090
ASSOCIATIVE ASYMMETRY IN PAIRED ASSOCIATES.
Eileen W. Coutu (Norwich Hosp., Conn.).
Psychonomic Science, vol. 5, Aug. 5, 1966, p. 389–390. 5 refs.

Pairs of trigrams were presented in the usual anticipatory manner, except that the second member of each pair consisted of two items, B and C. On the delayed recall test, the association tested for symmetry was that between B and C. Forward association was found to be superior to backward association, indicating that equal availability of terms may not be sufficient for symmetrical associations.

A67-80091
MEANING CHANGE AND RETROACTIVE EFFECTS FOLLOWING LOW MEANINGFUL STIMULUS AND RESPONSE SATIATION.
R. Kanungo and Lynn Ross (Dalhousie U., Halifax, Canada).
Psychonomic Science, vol. 5, Aug. 5, 1966, p. 397–398. Grants DRB, Canada 9401-22 and Dalhousie U. X-84-80.

Retroactive effects of satiation treatment were studied using nonsense verbal items. Response recall was facilitated by interpolated response satiation but was not affected by stimulus satiation. Some evidence for an interaction of instructions with regression effect was noticed in the case of subjects' semantic ratings.

A67-80092
THE EFFECTS OF COMPETITION AND NONCOMPETITION ON PERFORMANCE OF A MOTOR TASK.
Richard D. Petre and Charles Galloway (Kan. U., Med. Center, Lawrence).
Psychonomic Science, vol. 5, Aug. 5, 1966, p. 399–400. Grant PHS HD 00870-03.

Three male adults participated in a study of the effects of competition on a complex motor skill which had been acquired to a high level of proficiency. Each man served as his own control under a noncompetition condition and then competed with each of the other two men. A very significant ($<.001$) performance decrement occurred; however, certain factors other than competition could be partially responsible.

A67-80093
THE EFFECTS OF SCORE FEEDBACK AND STRATEGY OF THE OTHER ON COOPERATIVE BEHAVIOR IN A MAXIMIZING DIFFERENCES GAME.
Philip S. Gallo, Jr., Roberta Irwin, and Gerald Avery (San Diego State Coll., Calif.).
Psychonomic Science, vol. 5, Aug. 5, 1966, p. 401–402. Contract AF 49(638)-794.

Two experiments were conducted to determine the effects of information feedback on cooperative behavior in the Maximizing Differences Game. In Experiment I, 120 male undergraduates received differential information concerning the cumulative point total that they and/or their partner had obtained. Information which permitted comparisons elicited the largest amount of competitive behavior. Forty-five male undergraduates took part in Experiment II, which varied the strategy of a simulated "other". A delayed matching strategy elicited greater cooperation than either fair games or highly cooperative random strategies.

A67-80094
SHORT-TERM RETENTION OF DIGITS: A FUNCTION OF ITEM DISTRIBUTION WITH RESPECT TO TIME.

M. S. Mayzner, M. E. Tresselt, S. Adler, A. Cohen, and K. M. Schoenberg (N. Y. U., New York City).
Psychonomic Science, vol. 5, Aug. 5, 1966, p. 403–404. 5 refs.
Contract Nonr 285(56).

Twenty single digits were presented sequentially during a 40-sec. display period; and five conditions of input timing distributions were examined, employing a computer-based CRT display system. In one condition the 20 digits were distributed evenly through time at a rate of two sec. per digit. In the other four conditions the 20 digits were presented at a rate of one sec. per digit and the remaining 20 sec. was distributed in various ways throughout the total 40-sec. display period. Very significant effects were obtained as a function of varying the input timing distributions, and plots of the serial position curves revealed a highly systematic multi-bowing effect which strongly suggests that input "chunking" is time-locked to input timing distributions.

A67-80095
CHANGES IN PUPIL SIZE DURING AN IMAGERY TASK WITHOUT MOTOR RESPONSE INVOLVEMENT.
Herb M. Simpson and Allan Paivio (Western Ontario U., Canada).
Psychonomic Science, vol. 5, Aug. 5, 1966, p. 405–406.

A previous study showed that pupillary dilation is associated with attempts to generate mental images to stimulus words, image arousal being indicated by a key press. The present study revealed similar but attenuated dilation effects when the key press response was eliminated. The difference can be interpreted in terms of motivational effects of task difficulty, or arousal effects associated directly with the motor response.

A67-80096
THE INFLUENCE OF NKOR, SEX, AND TASK ON VISUAL PATTERN DISCRIMINATION.
Louise B. Miller (Louisville U., Ky.).
Psychonomic Science, vol. 5, Aug. 25, 1966, p. 459–460. 7 refs.

College students learned two visual discriminations, one designed to be easier for males, and one designed to be neutral in difficulty for the sexes. One group learned in the typical "be correct" situation, with knowledge-of-results (KOR) on each trial. The other group learned to "be consistent" with no KOR (NKOR). KOR was not helpful, and results suggested that it may be detrimental when the task is difficult and consists primarily of perceptual differentiation.

A67-80097
CONDITIONED VESTIBULAR SWAY AS A FUNCTION OF CS–UCS INTERVAL.
Jean A. Pezzoli and John W. Moore (Mass. U., Amherst).
Psychonomic Science, vol. 5, Aug. 25, 1966, p. 461–462.

Three groups of 18 human males received vestibular sway conditioning at conditioned stimulus-unconditioned stimulus intervals of .02, .5, or 2 sec. The two shorter interstimulus intervals were most effective in combating various sources of conditioned stimulus inhibition in the situation, but extinction in these groups was rapid.

A67-80098
EFFECTS OF REPORTING ASSOCIATIVE STRATEGIES ON THE RETENTION OF PAIRED-ASSOCIATES.
Frederic J. Boersma, Rodney C. Conklin, and James E. Carlson (Alberta U., Edmonton, Canada).
Psychonomic Science, vol. 5, Aug. 25, 1966, p. 463–464. 10 refs.
Grant A.A.C.E.R. 11365.

The effects on long term retention of reporting associative strategies after learning were examined. Subjects learned 10 low–high paired associate items to a criterion of two perfect, consecutive trials per item. Retention measures were collected after 20 min., 48 hr., and 7 days. Subjects reporting associative strategies had higher retention scores than those not reporting such mediational links, and this superiority increased with increments in the delay interval. The results are discussed in terms of an overlearning-postorganizer paradigm.

A67-80099
CHANNEL BY CHANNEL REPORT OF VISUALLY PRESENTED "STROOP" ITEMS.
Michael C. Corballis and Rudolph Philipp (McGill U., Montreal, Canada).
Psychonomic Science, vol. 5, Aug. 25, 1966, p. 465–466. 5 refs.
Contract Nonr-4896(00) and Grant DRB, Canada 9425-10.

Twenty subjects were tested for immediate recall of series of three color words each printed in a color different from the color it named. Ten subjects who were instructed to report all the words and then all the colors—"channel by channel" report—were more accurate in their recall than the other ten subjects who were instructed to report each word and its color in turn—"temporal" report. This supports the theory that channel by channel report depends on categorization of items at a fairly late stage in the processing of the items, and not on separation of the items at input. It also shows that efficient channel by channel report can be obtained with items presented visually.

A67-80100
PERFORMANCE FOLLOWING A NIGHT OF REDUCED SLEEP.
Robert T. Wilkinson, Robert S. Edwards, and Eric Haines (Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Psychonomic Science, vol. 5, Aug. 25, 1966, p. 471–472. 9 refs.

Six men worked a full day, mainly on vigilance and calculation tests, for two successive days in each of six successive weeks. On the preceding nights they were allowed 0, 1, 2, 3, 5, or 7-1/2 hr. sleep varying according to the week of testing. Less than 5 hr. sleep on a single night impaired vigilance; less than 3 hr. impaired calculation.

A67-80101
SKIN TEMPERATURE, THERMAL COMFORT, SWEATING, CLOTHING AND ACTIVITY OF MED SLEDGING IN ANTARCTICA.
G. M. Budd (Sydney U., School of Public Health and Trop. Med., Australia).
Journal of Physiology, vol. 186, Sep. 1966, p. 201–215. 26 refs.

Three men were studied while dog-sledging 320 km. in 12 days in Antarctica. Conventional Antarctic clothing ('sweaters and windproofs') was worn. Four hundred observations were made of medial thigh skin temperature, thermal comfort, sweating, clothing, activity, and environmental conditions. Work occupied an average of 11.0 hr./day and sleep 7.5 hr. Estimated daily energy expenditure averaged 5100 kcal. (range 2740–6660 kcal.). Skin temperature fell on exposure to cold despite the clothing worn, but was not changed by the level of activity. Sweating and thermal comfort were directly related to both skin temperature and activity. Inside the tent, the modal value of skin temperature was 33°C. (range 27–36°C.) and the men were comfortable in 94% of observations. During the 9.2 hr./day spent outdoors the

modal value of skin temperature was 27°C. (range 18–33°C.) and the men felt too cold (but did not shiver) in 11% (range 7–20%) of observations, suggesting that cold stress was not negligible. However, they also felt too hot in 20% of observations and were sweating in 23%.

A67-80102

BODY TEMPERATURE, SHIVERING, BLOOD PRESSURE AND HEART RATE DURING A STANDARD COLD STRESS IN AUSTRALIA AND ANTARCTICA.

G. M. Budd (Sydney U., School of Public Health and Trop. Med., Australia) and N. Warhaft (Dept. of External Affairs, Antarctic Div., Melbourne, Australia).

Journal of Physiology, vol. 186, Sep. 1966, p. 216–232. 45 refs.

Four men of European descent were exposed naked to an air temperature of 10°C. for two hr. in Australia, and again after 24 weeks' residence at Mawson, Antarctica. Their ability to maintain rectal temperature during the test cold exposure significantly improved at Mawson. Shivering and cold diuresis did not change. The response of skin temperature did not change significantly except for a small increase in toe temperature. Bradycardia caused by the cold exposure was significantly greater at Mawson, but the rise in blood pressure did not change. Spontaneous fluctuations in rectal temperature that occurred during the cold exposure were intensified at Mawson. The results confirm those of a previous study at Mawson, and are attributed to general acclimatization to cold. It is suggested that tissue insulation increased as a result of enhanced vasoconstriction.

A67-80103

CARDIOVASCULAR AND METABOLIC RESPONSES TO NORADRENALINE IN MAN, BEFORE AND AFTER ACCLIMATIZATION TO COLD IN ANTARCTICA.

G. M. Budd (Sydney U., School of Public Health and Trop. Med., Australia) and N. Warhaft (Dept. of External Affairs, Antarctic Div., Melbourne, Australia).

Journal of Physiology, vol. 186, Sep. 1966, p. 233–242. 15 refs.

Four men of European descent were infused with noradrenaline at rates of 0.038, 0.075, 0.150 and 0.300 μg./kg. min. in Australia, and again after 29 weeks' residence at Mawson, Antarctica. A concurrent study of their responses to whole-body cooling showed that they acclimatized to cold in Antarctica. Blood pressure rose and heart rate fell in proportion to the dose of noradrenaline infused. The response was much less after than before acclimatization in three of the four subjects. Subjective effects of the drug decreased in proportion to the decrease in the pressor effect. Finger temperature fell in proportion to the dose infused, in three subjects. The response was unchanged or increased after acclimatization. Oxygen consumption was initially unaffected by noradrenaline, but after acclimatization it apparently increased in proportion to the dose infused. The increase in pulmonary ventilation during infusion was slightly greater after acclimatization.

A67-80104

EFFECT OF EXCITATION OF THE RESPIRATORY CENTER IN ELECTRICAL ACTIVITY OF MUSCLE UNDER ISOMETRIC STRAINS [O VLIIANII VOZBUZHDENIIA DYKHATEL'NOGO TSENTRA NA ELEKTRICHESKUIU AKTIVNOST' MYSHTS PRI IZOMETRICHESKIKH NAPRIAZHENIIAKH].

Z. M. Ataev (Sklifosovskii Sec.–Res. Inst., Moscow, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 52, Aug. 1966, p. 992–995. 13 refs. In Russian.

The effect of respiratory rhythm on the electromyograph (EMG) of healthy subjects was determined during prolonged static contraction of the quadriceps femoris muscle. One leg was maintained outstretched while the subject was supine. The development of fatigue was noted in the physically inactive subjects 40–50 sec. after the start of the experiment. In subjects with physical training the fatigue occurred much later. Daily training produced a delayed reaction and the ability to hold a weight on the leg. Under normal conditions the excitation of the respiratory centers does not radiate to the motor center. However, with the development of fatigue, the electrical activity of skeletal muscles is influenced by respiration.

A67-80105

PENTAPHEN AND METAMIZYL ACTION UPON NYSTAGMUS EVOKED BY VESTIBULAR NUCLEI STIMULATION [DEISTVIE PENTAFENA I METAMIZILA NA NISTAGM, VYZVANNYI STIMULIATSIEI VESTIBULIARNYKH LADER].

E. A. Spalva (I. P. Pavlov First Leningrad Med. Inst., Dept. Pharmacol., USSR).

Farmakologiia i Toksikologiia, vol. 29, Jul.–Aug. 1966, p. 396–400. 15 refs. In Russian.

In cats with the enucleated left eye and operated optical muscles 0.02 mg./kg. metamizyl reduced considerably the induced nystagmus of the contralateral eye, and completely prevented the development of subsequent phasic, contraction of ocular muscles. Pentaphen (3–5 mg./kg.) proved less effective. Its inhibitory action on nystagmus, in contrast to metamizyl, did not act immediately after its introduction, but gradually, reached maximum effect after 10–15 minutes.

A67-80106

EVALUATION OF THE 2-MINUTE SIT-UP TEST AS A MEASURE OF MUSCULAR ENDURANCE AND STRENGTH.

Richard A. Berger (Texas Technol. Coll., Lubbock).

Journal of the Association for Physical and Mental Rehabilitation, vol. 20, Jul.–Aug. 1966, p. 140.

Forty-seven male college students were given the following three different sit-up tests for measuring abdominal muscle endurance and strength: the 2-min. sit-up; sit-ups performed at the rate of 20/min. with no time limit; and the maximum load at which only one sit-up could be performed (1-RM sit-up). For the three tests it was found that the correlation coefficient between the 2-min. and 20/min. sit-up was .712 and highly significant (P is equal to or greater than .01). This indicates that the 2-min. sit-up reflects muscular endurance. The coefficients between the 1-RM sit-up test and both the 2-min. and 20/min. sit-up tests were .508 and .518 respectively. These coefficients are not significantly different from each other and indicate that the 2-min. and 20/min. tests were similarly related to abdominal strength. The 2-min. sit-up test measures endurance of the abdominal muscles and is comparable to the sit-up test with no time limit in assessing abdominal muscle strength.

A67-80107

STRUCTURAL CHANGES IN HYPOTHALAMUS DURING FUNCTIONAL DISTURBANCES CAUSED BY STRONG AUDITORY STIMULUS [MORFOLOGICHESKIE IZMENENIIA V GIPOTALAMUSE PRI VEGETATIVNYKH NARUSHENIIAKH, VYZVANNYKH SIL'NYM ZVUKOVYM RAZDRAZHENIEM].

G. N. Krivitskaia and S. M. Nichkov (USSR, Acad. of Med. Sci., Inst. of Brain, Moscow and German Acad. of Sci., Inst. of Cortex-Visceral Pathol. and Therapy, Berlin).

Zhurnal Nevropatologii i Psikhiatrii, vol. 66, no. 8, 1966, p. 1177–1183. 7 refs. In Russian.

One group of rats was exposed to auditory stimulation of 95 db. at 500–1500 c.p.s., twice a day for five minutes, for seven months. The second group was stimulated in a similar manner for 96 hr. without interruption. The animals were

sacrificed after completion of each experiment, and hypothalamus sections were studied for histological changes. The first group showed various phases of behavior: (1) during the weeks of stress, respiration rate, pulse, and blood pressure increased at the first sound, blood picture showed eosinophilia and monocytopenia; and (2) adaptation, which lasted 12 weeks, was expressed by a permanent increase in these values and in changes of the electrocardiogram. Blood catecholamines and urea increased. Bosinopenia and monocytopenia were present. The second group of animals showed no change. A number of various changes were noted in the histological picture of thalamus sections, which indicate a stress on the nervous system during penodic auditory stimulus.

A67-80108

CLINICO-ROENTGENOLOGICAL CHANGES IN EXTREMITIES OF WORKERS ENGAGED IN FISHING INDUSTRY DUE TO THE CHILLING EFFECT OF WATER [KLINIKO-RENTGENOLOGICHESKIE IZMENENIIA V KONECHNOSTIAKH OT OKHLAZHDENIIA V VODE U RABOCHIKH RYBNOI PROMYSHLENNOSTI].

K. M. Gavrilova and S. M. P'iankov (Med. Inst., Arkhangelsk, USSR).

Gigiena Truda i Professional'nye Zabolevaniia, no. 2, Feb. 1966, p. 16–19. 16 refs. In Russian.

Unfavorable work conditions existing in departments of fish-processing plants (low temperature of the air and water, elevated humidity, and exposure to brine) tend to affect the health of employees. Medical examinations of a large group of workers at the Archangel fish-processing combine showed that many of them complained of pain in the bones and feet, accompanied by paresthesia. In a number of workers cold-induced vegetative polyneuritis was diagnosed, whereas others had obliterating endarteritis. Roentgenological examination of extremities demonstrated alterations in the bone tissue (cysts, islets of bone tissue indurations), along with periosteal changes (phalanges of hands and feet), and degenerative alterations in the tectorial joint cartilage of the foot and hand articulations (moderate deforming arthrosis). Measures designed to prevent the described afflictions are proposed.

A67-80109

SOME BIOCHEMICAL AND FUNCTIONAL CHANGES OF THE SKIN UNDER THE EFFECT OF SOLVENTS FREQUENTLY USED IN INDUSTRIAL OPERATIONS (ACETONE, GASOLINE, WHITE SPIRIT, KEROSENE AND BUTANOL) [NEKOTORYE BIOKHIMICHESKIE I FUNKTSIONAL'NYE IZMENENIIA KOZHI PRI DEISTVII CHASTO PRIMENIAEMYKH V PROIZVODSTVE RASTVORITELEI (ATSETONA, BENZINA, UAITSPIRITA, KEROSINA I BUTANOLA)].

V. I. Rogailin (USSR, Acad. of Med. Sci., Inst. of Hyg. Labor and Prof. Diseases, Moscow).

Gigiena Truda i Professional'nye Zabolevaniia, no. 2, Feb. 1966, p. 23–27. 27 refs. In Russian.

Examination of 325 workers dealing with organic solvents (acetone, gasoline, white spirit, kerosene, and butanol) showed changes occurring in the hydrogen ion concentration and lipids on the skin surface. The greatest changes in skin hydrogen ions took place following exposure to acetone, butanol, and gasoline; less marked changes occurred after white spirit. The maximum changes in hydrogen ions and lipids on the skin of hands were accompanied by clinical dermal alterations, such as dryness, desquamation, fissures, and hyperemia. These changes were recorded in 38% of the workers. After working with solvents, hands may be treated with creams and salves with chemical compositions close to that of skin oils. Washing with soap and water is not recommended, because protective lipids removed by solvents are resecreted rather slowly. In choice of solvents the less toxic should be used.

A67-80110

MATERIALS CONTRIBUTIVE TO THE EXPERIMENTAL THERAPY OF LIVER AFFECTIONS PRODUCED BY INDUSTRIAL POISONS [MATERIALY K EKSPERIMENTAL'NOI TERAPII PORAZHENII PECHENI PROMYSHLENNYMI IADAMI].

E. Ia. Arziaeva (Inst. of Hyg. Labor and Prof. Diseases, Gorki, USSR).

Gigiena Truda i Professional'nye Zabolevaniia, no. 2, Feb. 1966, p. 33–37. 6 refs. In Russian.

Application of pyrimidine stimulators of hepatic cellular growth and division, metacil, isometacil, and 4,6-dioxypyrimidine, speeded up the restoration of basic functions and morphological structure of this organ after carbon tetrachloride, trinintrotoluene, and sodium selenite poisoning, in mice and rats. The prophylactic administration of pyrimidines increased the resistance of the organism to the toxic action of poisons, and reduced lethality. The experimental data allow recommending metacil, isometacil, and 4,6-dioxypyrimidine for the treatment of toxicochemical lesions of the liver, in humans exposed to toxic substances during industrial use.

A68-80111

SOME MATERIALS FOR SUBSTANTIATING MAXIMUM PERMISSIBLE CONCENTRATION OF ETHYL CHLORIDE IN THE ATMOSPHERE OF WORK PREMISES [NEKOTORYE MATERIALY K OBSONOVANIIU PREDEL'NO DOPUSTIMOI KONTSENTRATSII KHLORISTOGO ETILA V VOZDUKHE RABOCHIKH POMESHCHENII].

M. M. Troshina (USSR, Acad. of Med. Sci., Inst. of Hyg. Labor and Prof. Diseases, Moscow).

Gigiena Truda i Professional'nye Zabolevaniia, no. 2, Feb. 1966, p. 37–42. In Russian.

The toxicity of ethyl chloride and its acute, subacute, and chronic effects are discussed for mice, rats, rabbits and cats. The clinical picture in instances of acute poisoning is shown by the development of narcosis. Histological examinations of laboratory animals disclosed dystrophic changes in nerve cells of the brain stem and marked vascular disturbances. CL_{84} (lethal concentration) for ethyl chloride was 172 mg./l.; for CL_{16} 141 mg./l.; and for CL_{50}, 160 (160–169.6) mg./l., with threshold concentration of 1.2 mg./l. Under chronic exposure to ethyl chloride vapor (concentration of 0.57 ± 0.24 mg./l.) the animals demonstrated an upset hepatic function, reduced arterial pressure, and inhibition of the leukocyte phagocytic activity. All the animals exhibited fine-globular fatty degeneration of hepatic cells, and thickening of alveolar septa in the lungs, occurring at the expense of an increased number of histiocytes. Ethyl chloride concentration of 0.06 ± 0.009 mg./l. in the same conditions of exposure was practically inactive. A maximum permissible concentration of ethyl chloride of 0.05 mg./l. has been approved by a special commission.

A67-80112

INFLUENCE OF HIGH-ALTITUDE AND HIGH-SPEED FLIGHTS ON THE FUNCTION OF GENITAL ORGANS IN STEWARDESSES [VLIIANIE VYSOTNYKH I SKOROSTNYKH POLETOV NA FUNKTSIIU ORGANOV POLOVOI SFERY BORTPROVODNITS].

V. F. Shmidova (S. M. Kirov Mil.-Med. Acad., Leningrad, USSR).

Gigiena Truda i Professional'nye Zabolevaniia, no. 2, Feb. 1966, p. 55–57. In Russian.

Studies conducted on air-line stewardesses of Soviet turbojets, turboprops, and cylinder-engine aircraft disclosed no adverse effect on the menstrual cycle, but a more copious flow than on the ground was noted on 20% of the cases. Subjects suffering from dysmenorrhea experienced increased discomfort and loss of energy during flight. Several pregnant stewardesses showed symptoms of early toxidoses: nausea, vomiting, irritability, and general malaise. In most cases deliveries were normal and at term. It is desirable to have constant medical supervision of the flight stewardesses. In cases of menstrual disturbance and pregnancy, stewardesses should be grounded.

A67-80113

OSSEOUS CHANGES IN THE SPINAL COLUMN OF CONCRETE PLACERS, SUBJECTED TO THE EFFECT OF TOTAL HIGH-FREQUENCY VIBRATION [K VOPROSU O KOSTNYKH IZMENENIIAKH V POZVONOCHNIKE RABOCHIKH-BETONSHCHIKOV, PODVERGAIUSHCHIKHSIA DEISTVIIU OBSHCHEI VYSOKOCHASTOTONI VIBRATSII].

G. I. Rumiantsev and K. I. Chumak (F. F. Erisman Inst. of Hyg., Moscow, USSR).

Gigiena Truda i Professional'nye Zabolevaniia, no. 4, Apr. 1966, p. 6-9. 6 refs. In Russian.

An X-ray study was carried out of the lumbar portion of the spinal column in 78 workers, subjected to vibration (frequency 50 per sec. with amplitude of 0.1-0.8 mm.) during manufacture of prefabricated reinforced concrete sections. Several cases of marked alterations in the osseous system were revealed, characterized by spondylitis deformans, intervertebral osteochondrosis, calcification of intervertebral disks, and changes in the type of cartilage nodes (Schmorle's hernias). The roentgenological investigations helped to widen the idea about the clinical picture common to vibration disease, caused by the effect of body vibration, and may also serve as a basis for working out and defining more precisely the existing vibration standards.

A67-80114

PATHOGENIC PROPERTIES OF VANADIUM, FERROVANADIUM AND VANADIUM CARBIDE DUST [O PATOGENNYKH SVOISTVAKH PROIZVODSTVENNOI PYLI VANADIIA, FERROVANADIIA I KARBIDA VANADIIA].

I. V. Roshchin, L. V. Zhidkova, A. Ia. Dushen'kina, L. A. Lutsenko, and P. V. Panov (F. F. Erisman Inst. of Hyg., Moscow, USSR).

Gigiena Truda i Professional'nye Zabolevaniia, no. 4, Apr. 1966, p. 21-25. In Russian.

An inquiry into toxic properties of vanadium, ferrovanadium, and vanadium carbide dust showed that it produced pronounced chronic local and general toxic effect in experimental animals owing to the ability of vanadium to dissolve in biological media. With its chronic action upon the organs of respiration the dust of vanadium compounds gave rise to catarrhal bronchitis, interstitial proliferative process, and mildly pronounced pneumosclerosis, while in the kidneys and and liver it produced dystrophic and infalmmatory changes. Ferrovanadium is distinguished by its relatively greater toxicity than vanadium carbide and vanadium, this being confirmed by more marked biochemical changes occurring in the blood after poisoning with ferro-vanadium. The available data on the toxicology of vanadium and its alloys were taken as a basis for establishing maximally permissible concentrations in the air of industrial premises.

A67-80115

EFFECT OF CHRONIC BENZINE POISONING ON THE SENSITIVITY OF ALBINO MICE TO THE ACTION OF CERTAIN UNFAVORABLE FACTORS [VLIIANIE KHRONICHESKOGO OTRAVLENIIA BENZINOM NA CHUVSTVITEL'NOST' BELYKH MYSHEI K DEISTVIIU NEKOTORYKH NEBLAGOPRIIATNYKH FAKTOROV].

G. M. Mykhametova and G. A. Mikhailets (Inst. of Hyg. and Prof. Diseases, Ufa, USSR).

Gigiena Truda i Professional'nye Zabolevaniia, no. 4, Apr. 1966, p. 30-34. In Russian.

The effect produced by chronic action of small benzine concentrations upon the sensitivity of albino mice to various unfavorable environmental factors, such as benzine, alcohol, benzene, and hydrogen sulfide poisonings, as well as oxygen deficiency, intensive muscular activity, and radial acceleration is discussed. Low benzine concentrations caused phasic changes in the reactivity of the organism to unfavorable environmental factors. In the first months there was a marked resistance to benzine and alcohol; but with the continuing action of these poisons the animals became sensitized. A two-month poisoning of albino mice with benzine increased the work capacity of the animals and contributed to a faster restoration of the vestibular function following application of radial acceleration. A further lengthening of benzine action affected unfavorably the functional state of the organism. Chronic action of benzine did not affect the sensitivity of mice to benzene, hydrogen sulfide, and to oxygen deficiency.

A67-80116

SOME DATA ON THE BLOOD MEDIATORS CONTENT UNDER THE EFFECT OF LOW PETROLEUM HYDROCARBON CONCENTRATIONS [NEKOTORYE DANNYE O SODERZHANII MEDIATOROV KROVI V USLOVIIAKH DEISTVIIA MALYKH KONTSENTRATSII UGLEVODORODOV NEFTI].

I. G. Samedov, A. M. Dongarova, Sh. R. Aleskerova (M. M. Efendi-Zade Inst. of Hyg. Labor and Prof. Diseases, Baku, USSR).

Gigiena Truda i Professional'nye Zabolevaniia, no. 4, Apr. 1966, p. 34-39. 11 refs. In Russian.

The effect of low hydrocarbon concentrations was studied in 150 healthy workers of basic departments at one of the Baku oil refineries exposed to the action of light fractions of saturated and unsaturated petroleum hydrocarbons. The control group included 30 persons kept away from any contact with petroleum products. The activity of acetylcholine, cholinesterase, and adrenalin-like substances, as well as electrocardiogram (ECG) recordings were studied. Low concentration of the petroleum hydrocarbons brought about a rise (true and apparent) of adrenalin-like substances, this being paralleled by the increase. The pulse was labile with some tendency towards bradycardia and declining arterial tone. The most frequent deviations on the ECG were bardycardia, the presence of "giant" T waves and also lengthening of the PQ interval. The explanations of all these phenomena should be sought in alterations occurring in the chemical blood mediators. Along with other methods, an analysis of the content of the blood of mediators transmitting nervous excitation (acetylcholine, adrenalin-like substances) and electrocardiography can serve for detecting early signs consequent to the action of small carbohydrate concentrations.

A67-80117

CLINICAL FEATURES SPECIFIC TO MANGANESE POISONING IN ELECTRIC WELDERS [O KLINICHESKIKH OSOBENNOSTIAKH INTOKSIKATSII MARGANTSEM U ELEKTROSVARSHCHIKOV].

Kh. A. Eiso (Inst. of Hyg Labor and Prof. Diseases, Leningrad, USSR).
Gigiena Truda i Professional'nye Zabolevaniia, no. 4, Apr. 1966, p. 39-41. In Russian.

During two years 32 cases of manganese poisoning were observed in electric welders working in ship-building yards, including eight cases of second degree poisoning and two cases of the third degree poisoning. Two case histories are presented. The widely held opinion about the infrequency of chronic manganese poisoning in electric welders and its mild course is contradicted by the data presented. The unfavorable work conditions in some types of electric welding, such as lack of adequate ventilation, and also the insufficient attention paid by physicians to initial manifestations of this poisoning lead to the development of chronic cases, which may develop serious conditions such as: functional disturbances of the central nervous system, gastritis, toxic encephalopathy, and various forms of cerebral injury.

A67-80118
CYTOCHEMICAL RESEARCH INTO BASOPHILIC GRANULAR ERYTHROCYTES IN LEAD POISONING [TSITOKHIMICHESKIE ISSLEDOVANIIA BAZOFIL'NOZERNISTYKH ERITROTSITOV PRI OTRAVLENII SVINTSOM].
Ian Srochinskii (Silesian Med. Acad., II Clin. of Internal Diseases, Zabrze, Poland).
Gigiena Truda i Professional'nye Zabolevaniia, no. 4, Apr. 1966, p. 41-46. 28 refs. In Russian.

To determine the chemical composition of basophilic stippling in erythrocytes during lead poisoning, cytochemical analyses were conducted of the peripheral blood and bone marrow in 18 rabbits. The results indicated that basophilic granules in erythrocytes consist of ribonucleic acids exclusively and that the basophilic stippling is formed in the cytoplasm of young erythroblasts, as a result of direct toxic effect of lead on mitochondria.

A67-80119
ROLE OF PRELIMINARY ADAPTATION TO OXYGEN DEFICIENCY IN X-RAY IRRADIATION NOT EXCEEDING 60 r [ROL' PREDVARITEL'NOI ADAPTATSII K KISLORODNOMU GOLODANIIU PRI RENTGENOOBLUCHENIIAKH NE BOLEE 60 r].
I. M. Khazen, N. N. Gurovskii, G. P. Miroliubov, and V. I. Miasnikov.
Gigiena Truda i Professional'nye Zabolevaniia, no. 4, Apr. 1966, p. 59-60. In Russian.

Various conditioned reflexes were used as the indication of the effect of a preliminary adaptation to hypoxia after exposure to X-ray radiation in albino rats. The animals were exposed to 60 r, three times, with 15-25 day intervals. There was either a delayed latent period of the conditioned reflexes, or the extinguishing of some reflexes. A second group which was subjected for one hour to a simulated altitude of 8,000 meters six successive times after the X-ray exposure suffered a complete loss of all conditioned reflexes. A third group which was repeatedly subjected to simulated high altitude hypoxia before irradiation showed stability of reflexes. The results indicate a possiblity of giving a similar type of training to humans who are to be exposed to ionizing radiation.

A67-80120
ACTIVITY OF FIBRINASE IN RATS IRRADIATED WITH GAMMA-RAYS [AKTIVNOST' FIBRINAZY U KRYS, OBLUCHENNYKH GAMMA-LUCHAMI].
V. P. Baluda, B. V. Polushkin, Zh. N. Rukazenkova, and S. S. Khnychov (USSR, Acad. of Med. Sci., Inst. of Med. Radiol., Dept. of Pathophysiol., Lab. of Exptl. Hematol., Obninsk).
Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 62, Aug. 1966, p. 30-32. In Russian.

The activity of fibrinase (Lackie-Lorand's fibrin-stabilizing factor) in acute radiation sickness was studied in rats. The radiation sickness was induced by a single total irradiation with gamma-rays from Co^{60} in a dose of 600 and 3,000 r at dose intensity of 88 r/sec. The activity of fibrinase fell, while the structure and properties of the fibrin clot became distributed. A reduction in fibrinase activity was observed as early as 24 hours after irradiation, and was most pronounced at the peak of the disease. At 3,000 r the changes were more obvious. Disturbance of the blood clot structure caused by a reduction in fibrinase activity may be important in the pathogenesis of bleeding occurring in radiation sickness.

A67-80121
INVESTIGATION OF THE OXYGEN REGIMEN IN THE BRAIN TISSUE OF ALBINO RATS AFTER INJECTION OF RADIOPROTECTIVE SUBSTANCES [ISSLEDOVANIE KISLORODNOGO REZHIMA V TKANI GOLOVNOGO MOZGA BELYKH KRYS PRI VVEDENII RADIOPROTEKTOROV].
R. B. Strelkov and O. Ia. Vorob'ev (USSR, Acad. of Med. Sci., Inst. of Exptl. Pathol. and Therapy, Sukhumi).
Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 62, Aug. 1966, p. 49-51. 18 refs. In Russian.

Experiments using the methods of polarography were used to study the influence of the sulphur-containing radioprotective substance cystamine (100 mg./kg.) and indolylalkylamine serotonin (20 mg./kg.) on oxygen tension in the functioning brain tissue of albino rats with implanted platinum electrodes. Cystamine reduced oxygen tention (pO_2) in the brain tissue by 7.3% and serotonin increased it by 15.2%. It is supposed that serotonin produces a specific effect on metabolic processes in the brain tissue, which may be of importance in radioprotection. A difference was noted in the mechanism of the action of protective preparations containing the sulphhydryl group and indolylalkylamines.

A67-80122
EFFECT OF NOISE AND SOME OTHER FACTORS ON BLOOD PRESSURE OF WORKERS IN HEAVY INDUSTRY [VLIV HLUKU A NEKTERYCH DALSICH CINITELU NA KREVNI TLAK PRACUJICICH V TEZKEM PRUMYSLU].
A. Folprechtová-Stenzlová and M. Janicek.
Ceskoslovenská Hygiena, vol. 11, Aug. 1966, p. 395-405. 31 refs. In Czech.

The effect of acoustic pressure level, exposure, and work at different shifts was observed in 944 foundry workers from three plants. The men were divided into two age groups, above and below 40 years of age. It was supposed that longer exposure and age factors were necessary to bring about certain changes in blood pressure. Statistically significant higher values of average blood pressure were observed in obese men and in men working in an environment of higher acoustic pressure. Statistically significant lower values were observed in men who worked in shifts and commuters. The relations with smoking and higher fruit consumption were not convincing. Reduction of salt and water intake did not lower the values significantly. No effect of a particular acoustic pressure was observed, if evaluated in relation to exposure and shift arrangement. Fat consumption and duration of sleep had no detectable influence on values. The results indicate that factors should not be considered individually but should be taken as a complex influence of the entire work and life environment.

A67-80123
SELECTION OF PERSONS FOR WORK WITH CRITICAL FLICKER FUSION FREQUENCY [VYBER OSOB PRO PRACI S KRITICKOU FREKVENCI SPLYVANI BLIKU].

R Miksl.
Ceskoslovenská Hygiena, vol. 11, Aug. 1966, p. 406–414. 16 refs. In Czech.

The regularity of the visual analyzer response was investigated by determining critical flicker frequency in simple optical-physical conditions. Fifteen subjects of 20 responded to increasing illumination intensity level by increasing critical frequency values. The mean value of critical flicker frequency was lower for the remaining five. Of these five, two had previously suffered from exophthalmic goiter, followed by strumectomy; and the other three were asthenics and introverts. The conclusion is reached that experiments on critical flicker frequency should be performed only on subjects who respond regularly. The importance of keeping the illumination intensity at a constant level is stressed. It is assumed that the irregularity in critical frequency values can be a consequence of mesencephalic-diencephalic relationship insufficiency.

A67-80124
SPATIAL S–S PROXIMITY IN HUMAN DISCRIMINATION LEARNING.
C. D. Standish (Sydney U., Australia).
Journal of Experimental Psychology, vol. 72, Aug. 1966, p. 173–176.

The effect of proximity of cues was studied with two pairs of visual stimuli in transfer from spatial to nonspatial discrimination learning tasks, with 225 subjects. The prediction that proximity promotes positive transfer was confirmed with both successive and simultaneous viewing of stimuli, with temporal as well as spatial proximity, and with reduced viewing time. The hypothesis that the spatial proximity effect is mediated by background stimuli was confirmed in the further finding that variation in background gives the same result as spatial nonproximity. The temporal proximity effect was ascribed to temporal stimulus-response contiguity as a variable.

A67-80125
VERBAL REPETITION, SET, AND DECISION LATENCY.
William E. Gumenik and Edward S. Perlmutter (Toledo U., Ohio).
(Midwestern Psychol. Assn., Meeting, Chicago, 1965).
Journal of Experimental Psychology, vol. 72, Aug. 1966, p. 213–215. 5 refs.

Latencies of decisions about the synonymity of pairs of words, following two-sec. prior presentation or 20-sec. verbal repetition of one of the decision words or of an unrelated control work, were investigated. Two-sec. prior presentations of a decision work as well as 20-sec. verbal repetitions of that word shortened decision latencies, and these conditions did not differ in the magnitude of their decision speeding effects. It was concluded that the decision speeding effects of verbal repetition found by Fillenbaum (1964) are completely attributable to the setting effects of prior presentation of the decision items.

A67-80126
ON THE ROLE OF INTERFERENCE IN SHORT-TERM RETENTION.
Michael I. Posner and Andrew F. Konick (Wis. U., Madison).
Journal of Experimental Psychology, vol. 72, Aug. 1966, p. 221–231. 13 refs.
Grant NSF GB2701.

In a series of experiments the similarity between items presented on a given trial (II) and on successive trials (PI) is systematically manipulated in conjunction with the difficulty of the information processing interpolated between presentation and recall. The results of the studies indicate that under conditions where forgetting proceeds independently of the effects of interpolated task similarity it depends upon similarity among stored items and upon the difficulty of the interpolated processing. The effectiveness of interference does not appear to vary directly with the difficulty of interpolated processing but is more closely related to the time material is in store. These results are compatible with the view that interfering items work spontaneously during the retention interval to disrupt the original trace (Acid Bath) rather than merely competing at the time of recall.

A67-80127
SERUM CHOLESTEROLS. PART II—SEASONAL VARIATION OF SERUM CHOLESTEROL AND CHOLESTEROL ESTER.
B. Banerjee, R. Banerjee, and N. Saha (Christian Med. Coll., Dept. of Physiol. Ludhiana, India).
Calcutta Medical Journal, vol. 63, Jul. 1966, p. 215–220. 12 refs.

Twenty-six Western subjects and 86 Indian subjects of both sexes were investigated for serum total cholesterol in summer and winter months. Twenty-three Indian students of both sexes were investigated for serum cholesterol ester level. Western subjects exhibited significantly higher values of serum total cholesterol level in summer than in winter. The higher value may be due to added stress during the summer. Indian students exhibited higher values of serum total cholesterol in winter than in summer although the variation was not statistically significant. The difference may be due to long-term adaptation to environmental temperature. Indian students of both sexes exhibited higher values of serum cholesterol ester in summer than in winter. No definite conclusion can be drawn as the subjects were too few.

A67-80128
HYPERBARIC OXYGENATION IN MEDICINE.
Glenn M. Kokame, Edward T. Krementz, and Oscar Creech, Jr. (Tulane U., School of Med., Dept. of Surg., New Orleans, La.).
(La. State Med. Soc., 86th Meeting, Alexandria, La., May 3, 1966).
Journal of the Louisiana State Medical Society, vol. 118, Sep. 1966, p. 359–364. 24 refs.
Grants PHS CA-5108-04, CA-05837-05, and CA-K6-1087-04.

Hyperbaric oxygenation in medicine is a major innovation in treatment, but its place has not yet been clearly defined. Its beneficial results in treatment of carbon monoxide poisoning, anaerobic infections, apnea neonatorum, radiotherapy, traumatic ischemia, and in cardiac surgery are described. Its use in other disorders, such as myocardial infarction, cerebral infarction, shock, intestinal obstruction, and peripheral arteriosclerotic occlusive disease, and as an adjunct in chemotherapy for cancer requires further study.

A67-80129
SACCADIC SUPPRESSION: ELEVATION OF VISUAL THRESHOLD ASSOCIATED WITH SACCADIC EYE MOVEMENTS.
B. L. Zuber and L. Stark (Ill. U., Inform. Eng. Dept., Bioeng. Lab. and Presbyterian-St. Luke's Hosp., Biomed. Eng. Dept., Chicago).
Experimental Neurology, vol. 16, Sep. 1966, p. 65–79. 20 refs.
Contracts AF-49(638), NONR-184(70), and Grants PHS NB-3055-04, NB-3090-4, and MH-06175-02.

An elevation of visual threshold was found to be associated with voluntary saccadic eye movements and with the involuntary microsaccades present during steady fixation, as well as with the involuntary saccadic fast phase of vestibular nystagmus. In all cases suppression of vision began before the actual movement of the eye, ruling out retinal smear as the cause of the suppression. For twenty-degree voluntary saccadic eye movements an elevation of visual threshold corresponding to one to two log units was observed. The time course of this suppression was a function of test flash intensity. The results are discussed from the point of view of the black box, multi-input experimental approach utilized. Based on these results a tentative localization of some of the operators of the saccadic suppression mechanism is attempted.

A67-80130
NORMAL VARIABILITY OF TONIC VIBRATION REFLEXES IN MAN.
G. Eklund and K.-E. Hagbarth (Uppsala U., Dept. of Clin. Neurophysiol., Sweden).
Experimental Neurology, vol. 16, Sep. 1966, p. 80-92. 31 refs.
Swed. Med. Res. Council supported research.

Recent studies showed that high frequency mechanical vibration of a human skeletal muscle tended to induce a tonic reflex contraction in this muscle and relaxation of its antagonists. This tonic vibration reflex, which probably depended upon excitation of primary spindle endings, was analyzed and technical and physiological factors determining the strength of the reflex were described. The vibrators used had a frequency range of about 20-200 c.p.s. and the amplitude could be varied stepwise from 0.5 to 3.3 mm. The electromyogram force and joint movements were recorded on a multichannel inkwriter. The reflex varied with the parameters of the vibration, the initial state of contraction, and the length of the muscle vibrated. A preceding muscular contraction, voluntary or induced by vibration, facilitated the reflex. Furthermore, its strength was influenced by voluntary effort, by Jendrassik's maneuver, by general postural changes, and by changes of body temperature.

A67-80131
DECOMPRESSION SICKNESS. CURRENT TRENDS IN PROPHYLAXIS AND TREATMENT.
D. J. Kidd (Inst. of Aviation Med., RCN Personnel Res. Unit, Toronto, Canada).
(Can. Forces Med. Serv., 6th Ann. Clin. Conf., Kingston, Ontario, Mar. 1-3, 1965).
Medical Services Journal Canada, vol. 22, Feb. 1966, p. 79-86. 17 refs.

A brief review is presented of the prevention and treatment of cases of decompression sickness arising from actual and simulated operational diving, and work in compressed air. Discussed are prophylactic decompression, the time of onset of symptoms, and the result of delay in treatment. The manifestations of decompression sickness are classified into two types: (1) including all cases of pain only, and those exhibiting signs and symptoms of cutaneous or lymphatic involvement; and (2) of a more serious nature with central nervous system or respiratory involvement. The choice of a therapeutic regime is considered using moderate pressures and 100% oxygen, or using oxygen-helium mixtures when pressures in excess of 60 ft. equivalent are necessary.

A67-80132
MAN AND ALTITUDE.
Alberto Hurtado (Peruvian U. "Cayetano Heredia", High Altitudes Res. Inst., Lima).
American Industrial Hygiene Association Journal, vol. 27, Jul.-Aug. 1966, p. 313-320. 6 refs.

The limitations and difficulties of life in a high-altitude environment include reduced barometric pressure and the resulting hypoxia. The mechanisms of high-altitude acclimatization, which have been studied in natives, are: (1) those operating along the oxygen tension gradient and which permit the transfer of oxygen by diffusion from blood to tissues; and (2) those which exist at tissue level which facilitate the utilization of oxygen in metabolism. It is suggested that the difference in tolerance between a native of high altitude and one acclimated to the low-pressure environment is due to physiological mechanisms at tissue level. Pathological and clinical considerations are discussed briefly, including pulmonary hypertension, chronic hypoxia, pulmonary edema, and a type of congenital heart disease.

A67-80133
TOXICITY STUDIES ON 1,1,2,2-TETRACHLORO-1,2-DIFLUOROETHANE AND 1,1,1,2-TETRACHLORO-2,2-DIFLUOROETHANE.
J. Wesley Clayton, Jr., Henry Sherman, Seoras D. Morrison, John R. Barnes, and Dorothy B. Hood (E. I. du Pont de Nemours and Co., Haskell Lab. for Toxicol. and Ind. Med., Wilmington, Del.).
American Industrial Hygiene Association Journal, vol. 27, Jul.-Aug. 1966, p. 332-340. 24 refs.

The symmetric and asymmetric isomers of tetrachlorodifluoroethane produced similar effects and low order of acute toxicity in oral, inhalation, or skin tests. The symmetric isomer was mildly irritating to rabbit eyes and guinea pig skin. It was not a sensitizer for guinea pig skin. Repeated four-hour exposures of rats to 3000 p.p.m. for ten days disclosed slight effects on weight and nervous functions, but no significant pathologic change. Thirty six-hour exposures (rats, mice, guinea pigs, and rabbits) to 1000 p.p.m. produced no toxic signs. Rat hematology revealed slight leukopenia. Slight liver changes were observed histologically in rats. Atmospheric levels of either isomer should not exceed 500 p.p.m. for hygienic purposes.

A67-80134
AUTOMATIC CARBON MONOXIDE MONITOR.
James C. Barrett, Robert Bennett, and John Buckmaster (Mich. Dept. of Public Health, Div. of Occupational Health, Ventilation Sect., Lansing).
(Am. Ind. Hyg. Assn., Meeting, Houston, Tex., May 1965).
American Industrial Hygiene Association Journal, vol. 27, Jul.-Aug. 1966, p. 402-406. 5 refs.

Michigan's Division of Occupational Health has a unique instrument for continuously monitoring and recording carbon monoxide concentrations. Maximum concentration recorded is 200 p.p.m., with a sensitivity of ± 2 p.p.m. Built in are automatic circuits allowing the instrument to purge, check zero reading, and check upscale (185 p.p.m.) calibration once every 12 hours. All components are housed in an aluminum case 13-3/4 by 31-3/4 by 17-3/4 inches, weighing 105 pounds. It is possible for one engineer to transport it and set it up. One year's field experience has shown that the instrument is reliable and will operate in the field up to 36 hours, with minimum supervision.

A67-80135
EFFECTS OF ALCOHOL ON BRAIN-TISSUE IMPEDANCE IN ANIMALS AND MAN.

Bruce MacGillivray, Raymond T. Kado, and W. Ross Adey (Calif. U., School of Med., Dept. of Anat. and Brain Res. Inst., Los Angeles).
Psychosomatic Medicine, vol. 28, Jul. Aug. 1966, p. 464–474. 24 refs.
Grants AF-AF80R 61-81 and PHS MH-03708-05, and MB-02501.

The effect of blood alcohol levels to 240 mg./100 ml. on the impedance of the amygdala, hippocampus, lateral geniculate bodies (normal and degenerated, one year after striatal cortex ablation), and the midbrain reticular formation, has been examined in cats. The characteristic response to alcohol was a fall in both the reactive and resistive components of impedance. No regional differences were found. There was no significant change in impedance in the degenerated lateral geniculate bodies. The pes hippocampus of two human subjects showed the same response to alcohol as the normal cat brain.

A67-80136
EFFECTS OF ALCOHOL ON CARBOHYDRATE METABOLISM IN MAN.

Norbert Freinkel and Ronald A. Arky (Harvard Med. School, Dept. of Med., Boston City Hosp., Diabetes Clin., and Harvard Med. Serv., Boston, Mass.).
Psychosomatic Medicine, vol. 28, Jul. Aug. 1966, p. 551–563. 42 refs.
Grants NIH 2 A-5060, A-1571, and FR-76.

Since 1960, studies in this laboratory have focused on the interactions between ethanol and carbohydrate metabolism. It has been demonstrated that alcohol has hypoglycemic properties when administered after appropriate periods of dietary deprivation. The blood-sugar-lowering action is independent of changes in insulin secretion or alterations in the peripheral utilization of glucose. It results from direct inhibition of gluconeogenesis. Ketogenesis may be interrupted at the same time coincident with hepatic "overproduction" of lactic acid. Mediation has been ascribed to the "extra-reducing equivalents" which are generated in the liver during alcohol oxidation. The diverse potentialities *in vivo* depend upon the metabolic mixture which is being utilized at the time of exposure to alcohol and upon the ongoing turnover of pyruvate and glycogen within the liver. These considerations have prompted efforts to employ the blood sugar response to standard infusion of alcohol as a new clinical tool for characterizing metabolic disorders.

A67-80137
ADRENAL HORMONES AND AMINE METABOLISM IN ALCOHOLISM.

Victor J. Schenker, Benjamin Kissin, Laurence S. Maynard, and Anne C. Schenker (N. Y. State U., Downstate Med. Center, State U. Alc. Clin., Brooklyn).
Psychosomatic Medicine, vol. 28, Jul.-Aug. 1966, p. 564–569. 13 refs.
Grants PHS MH-07219 and MH-04588.

Previous studies in alcoholic patients and normal control subjects demonstrated a characteristic increase in urinary tryptamine after acute ingestion of ethanol. This response could be attributable only in part to monoamine oxidase (MAO) inhibition, verified by *in vitro* experiments. Evidence for an amine-releasing action of ethanol (suggestive but not conclusive in man) indicated a possible mechanism to account for this discrepancy. Other studies, conducted separately on a similar population, indicated activation of adrenocortical function by acute ingestion of ethanol. Similarly, activation of the sympathoadrenal system was suggested by increased excretion of epinephrine after ethanol. Present experiments were done to explore the possibility of adrenal activation being related to increased amine excretion seen with tryptamine after ethanol. Patients injected with 100 mg. of hydrocortisone failed to show any demonstrable changes in urinary amines. Injection of epinephrine was followed by changes in urinary amines similar to those found with ethanol. These preliminary findings suggest further approach to question of amine-releasing action of ethanol.

A67-80138
BEHAVIORAL AND PHYSIOLOGICAL EFFECTS OF ALCOHOL ON MAN.

Leonard Goldberg (Karolinska Inst. Med. School, Dept. of Alc. Res., Stockholm, Sweden).
Psychosomatic Medicine, vol. 28, Jul.-Aug. 1966, p. 570–595. 23 refs.
Swed. Med. Res. Council supported research.

In 160 healthy subjects, 542 experiments were conducted to assess some behavioral and physiological effects of alcohol ingestion. Both subjective mood tests and objective performance tests were given and the results correlated with blood alcohol levels. Also analzyed were changes after interaction with CNS-active drugs (amphetamine, buclozine, chlorocyclizine, chlordiazepoxide, chlorpromazine, hydroxyzine, meclozine, meprobamate, phenoglycodole, prometazine, and tripelenamine), "hangover," adaptation, and tolerance.

A67-80139
EFFECTS OF ALCOHOL ON PERFORMANCE IN CONTINUOUS ATTENTION TASKS.

George A. Talland (Mass. Gen. Hosp., Stanely Cobb Labs. for Psychiat. Res., Boston).
Psychosomatic Medicine, vol. 28, Jul.-Aug. 1966, p. 596–604.
Grants NSF GB-1520 and NIH HD 15.418; Mass. Dept. of Health supported research.

Alcohol addicts and control subjects were tested by experimental tasks to determine the effect of moderate doses of whiskey on performance demanding continuous attention over relatively long periods. When working in isolation the two groups of subjects did not differ significantly in accuracy, nor did alcohol significantly affect their performance. Working under competitive instructions in a group setting, the addicts made more errors than the control subjects, and alcohol impaired accuracy in both types of subject. Questionnaire data revealed considerable uncertainty about the alcohol content of the beverages, little reliance on their taste, and a predominantly unfavorable evaluation of alcohol effects. An experiment in signal detection requiring rapid search showed a sizable drop in performance as a result of alcohol, and gradual improvement as the toxic effects wore off.

A67-80140
ELECTROENCEPHALOGRAPHIC CHANGES AND VIGILANCE BEHAVIOR DURING EXPERIMENTALLY INDUCED INTOXICATION WITH ALCOHOLIC SUBJECTS.

Richard F. Docter, Paul Naitoh, and James C. Smith (Calif. U., Neuropsychiat. Inst., Dept. of Psychiat., Los Angeles).
Psychosomatic Medicine, vol. 28, Jul.-Aug. 1966, p. 605–615. 30 refs.
Grant NIMH MH 08441-01 and Calif. Dept. of Public Health supported research.

Spectral analyses of occipital electroencephalograms (EEGs) acquired at increasing dosage levels during the process of intoxication in male alcoholics reveal: increased activity at eight and nine c.p.s.; reduction of 11- and 11-cycle activity; no change at 12 and 13 c.p.s.; no significant changes outside the alpha band; and marked increases in alpha abundance with maximal change induced by very light alcohol doses. Heart rate increases were highly correlated with dosage. Rapid

eye movement (REM) activity was markedly enhanced. In a separate study, 13 male alcoholics were given 0.5 ml./kg. of ethyl alcohol prior to being tested over a period of about 50 min. on an auditory vigilance task. This required detection of infrequent (2 per min.) variations in the temporal pattern of "click" stimuli. On control days, without alcohol, the expected decrement in signal detection was noted. However, with alcohol this decrement did not occur. A conceptual scheme accounting for both the EEG and vigilance results is offered.

A67-80141

SERUM CORTISOL LEVELS IN ALCOHOLIC AND NONALCOHOLIC SUBJECTS DURING EXPERIMENTALLY INDUCED ETHANOL INTOXICATION.

Jack H. Mendelson and Stefan Stein (Mass. Gen. Hosp., Stanely Cobb Labs. for Psychiat. Res. and Harvard Med. School, Boston).

Psychosomatic Medicine, vol. 25, Jul. Aug. 1966, p. 616 626. 24 refs.

Grants PHS MH-05619, MH-24,4611-01, and MH-10247 Hall-Mercer Hosp. Fund supported research.

Four alcoholic and four nonalcoholic subjects were given beverage alcohol (86-proof bourbon) every four hours, day and night, for four consecutive days. These subjects could ingest absolute alcohol up to the equivalent of 4 gm./kg. of body weight per day. Serum cortisol levels were determined in all subjects prior to, during, and following the four-day period of experimentally induced ethanol intoxication. Most of the non-alcoholic subjects developed signs and symptoms of gastrointestinal illness associated with drinking. When gastrointestinal illness such as nausea or vomiting occured, there was an associated elevation in serum cortisol levels. The alcoholic subjects did not develop gastrointestinal illness, but showed a tendency toward elevation of serum cortisol levels as a concomitant of drinking. The highest serum cortisol levels observed were correlated with the appearance of alcohol withdrawal symptoms in alcoholic subjects when they stopped drinking. Some interrelationships between serum cortisol levels, alcohol dehydrogenase activity, and ethanol metabolism are discussed.

A67-80142

MYOCARDIAL HIGH ENERGY PHOSPHATE STORES IN ACUTELY INDUCED HYPOXIC HEART FAILURE.

Peter E. Pool, James W. Covell, Charles A. Chidsey, and Eugene Braunwald (Natl. Heart Inst., Cardiol. Branch, Bethesda, Md.).

Circulation Research, vol. 19, Aug. 1966, p. 221 229. 32 refs.

In order to determine the relation between depression of myocardial function and the myocardial high energy phosphate stores during acute hypoxia, a technique for serial evaluation of these stores was developed. Acute hypxoia was induced in 18 anesthetized dogs and serial determinations of adenosine triphosphate (ATP) and creatine phosphate (CP) were made while myocardial function was continuously measured. Myocardial concentrations of ATP were maintained even in the presence of severe hypoxia and myocardial failure. There was a small depression of the average myocardial CP concentration during early heart failure. However, in more than one-third of the dogs there was no significant depression of CP concentration at this time. It is concluded that hypoxic depression of myocardial function is not initiated by a decrease in the total myocardial high energy phosphate stores. The possibility could not be excluded that a particular fraction of the high energy phosphate store is decreased when myocardial failure is induced by hypoxia.

A67-80143

CONTROL OF HEART RATE BY THE AUTONOMIC NERVOUS SYSTEM: STUDIES IN MAN ON THE INTERRELATION BETWEEN BARORECEPTOR MECHANISMS AND EXERCISE.

Brian F. Robinson, Stephen E. Epstein, G. David Beiser, and Eugene Braunwald (Natl. Heart Inst., Cardiol. Branch, Bethesda, Md.).

Circulation Research, vol. 19, Aug. 1966, p. 400 411. 18 refs.

The control of heart rate by the autonomic nervous system was investigated in conscious human subjects by observing the effects of β-adrenergic blockade with propranolol, of parasympathetic blockade with atropine, and of combined sympathetic and parasympathetic blockade. The increase in heart rate with mild exercise in supine men was mediated predominantly by a decrease in parasympathetic activity; at higher levels of work, however, sympathetic stimulation also contributed to cardiac acceleration. When the response to 80° head-up tilt was compared with the response to exercise in the same subject supine, it appeared that the attainment of an equivalent heart rate was associated with a significantly greater degree of sympathetic activity during tilting than during exercise. Although heart rate was always higher at any given pressure during exercise than it had been at rest, the changes in heart rate that followed alterations in arterial pressure were found to be of similar magnitudes at rest and during exercise; it was therefore concluded that the sensitivity of the baroreceptor system was not altered during exercise. Investigation of the efferent pathways concerned in mediating the baroreceptor-induced changes in heart rate suggested that the relative roles of the sympathetic and parasympathetic systems were nearly equal in the resting state. During exercise, on the other hand, changes in sympathetic activity appeared to be the predominant mechanism by which speeding and slowing of the heart was achieved. It thus appears that baroreceptor-induced alterations in heart rate may be mediated by increased or decreased activity of either efferent system; the ultimate balance, however, is critically dependent on the preexisting level of background autonomic activity.

A67-80144

RESPONSE OF SMALL PULMONARY ARTERIES TO UNILOBAR HYPOXIA AND HYPERCAPNIA.

Mikio Kato and Norman C. Staub (Calif. U., San Francisco Med. Center, Cardiovascular Res. Inst. and Dept. of Physiol.).

Circulation Research, vol. 19, Aug. 1966, p. 426 440. 45 refs.

Contract Nonr 222(55), Grants PHS HE-06285 and HE-5251.

We measured the internal diameters of small muscular pulmonary arteries in the right and left lower lobes of lungs rapidly frozen in the anesthetized, open-thorax cat. In every cat the right lower lobe was ventilated with the test gas and all other lobes were ventilated with O_2. In four cats, the test gas supplied to the right lower lobe was also O_2 (control experiments); in six, it was 100% N_2 and in six it was 90% N_2-10% CO_2. In the four controls, there was no difference between the internal diameters of corresponding arteries in the right and left lower lobes. In the other 12 cats, there was a highly significant decrease in the diameter of arteries in the right lower lobe that correlated well with a large decrease in blood flow to that lobe, calculated using a shunt equation. Ventilation of the right lower lobe with 10% CO_2 in air (four cats) did not affect the diameter of arteries and ligation of the pulmonary artery to the right lower lobe resulted in only a slight decrease in arterial dimensions in three of four cats. These data show that in regional alveolar hypoxia without systemic hypoxia the muscular pulmonary arteries of the terminal respiratory units in the hypoxic region actively constrict. The constriction occurs with or without alveolar hypercapnia.

A67-80145
EFFECT OF PROPRANOLOL ON SYSTEMIC AND CORONARY HEMODYNAMICS AT REST AND DURING SIMULATED EXERCISE.
David H. McKenna, Robert J. Corliss, Salvador Sialer, William C. Zarnstorff, Charles W. Crumpton, and George G. Rowe (Wis. U., Med. School, Dept. of Med., Cardiovascular Res. Lab., Madison).
Circulation Research, vol. 19, Sep. 1966, p. 520-527. 26 refs.
PHS and Edward Shovers Mem. Fund supported research.

The systemic and coronary hemodynamic effects of relatively large doses of propranolol were studied following its infusion into intact anesthetized dogs at rest and during simulated exercise. At rest, the administration of propranolol was associated with decreased cardiac output and ventricular work and increased peripheral, pulmonary, and coronary vascular resistances. Coronary blood flow and coronary sinus oxygen content decreased while myocardial oxygen consumption and the index of cardiac efficiency were unchanged. The usual hemodynamic response to mild exercise was obtained, with increased cardiac output, cardiac work, body oxygen consumption, and a modest but significant increase in coronary blood flow. When propranolol was given and the same exercise continued, body oxygen consumption, cardiac output, and left ventricular work significantly decreased. Insignificant decreases occurred in coronary blood flow, left ventricular oxygen usage, and coronary sinus oxygen content. The present observations are consistent with the thesis that beta-adrenergic blockage induced by propranolol decreases cardiac work at rest and reduces the cardiovascular response to exercise.

A67-80146
ELECTROMYOGRAPHIC GRADIENTS AS A FUNCTION OF TRACKING CUES.
Alexander K. Bartoshuk and Jon A. Kaswick (Brown U., Providence, R. I.).
Psychonomic Science, vol. 6, Sep. 5, 1966, p. 43-44. 5 refs.
Grants PHS HD-01814 and K3-MH-21,837.

Malmo's (1965) arousal gradient hypothesis apparently required heart rate (HR) gradients during tracking of somesthetic cues in the absence of electromyogram (EMG) gradients. A pressure tracking task was performed by 14 undergraduates with visual cues (VT) and while blindfolded. HR gradients occurred concomitantly with EMG gradients during VT, but not during blindfolded tracking when significant intratrial changes in EMGs were performed.

A67-80147
FIGURAL AFTER-EFFECTS, RATE OF "FIGURE-GROUND" REVERSAL, AND FIELD DEPENDENCE.
Ludwig Immergluck (San Francisco State Coll., Calif.).
Psychonomic Science, vol. 6, Sep. 15, 1966, p. 45-46. 5 refs.
NSF supported research.

Field-independent subjects showed greater figural after-effects on a specific perceptual task and also higher reversal rates on a series of reversible figure tasks than did field-dependent subjects. The present data reveal a significant linkage between figural after-effect performance and diverse other perceptual response styles and suggest strongly, as did the results of a previously reported related study, that the elemental processes underlying these effects are related to broader and more complex behavior variables.

A67-80148
INDIVIDUAL DIFFERENCES IN SUSCEPTIBILITY TO VISUAL BACKWARD MASKING.
William N. Dember and Alan Neiberg (Cincinnati U., Ohio).
Psychonomic Science, vol. 6, Sep. 15, 1966, p. 49-50.

This study investigated the reliability of individual differences in susceptibility to visual backward masking. Seventeen college students were assigned "maskability" measures derived from data collected two days apart. Depending on the measures used, the rank order correlation between the two sets of measures varied from 79 to 92 indicating highly reliable individual differences.

A67-80149
TACHISTOSCOPIC RECOGNITION THRESHOLDS AND MEANINGFULNESS.
Walter Schutte and Neil Hildebrand (Manitoba U., Winnipeg, Canada).
Psychonomic Science, vol. 6, Sep. 15, 1966, p. 53-54. 10 refs.

An inverse relationship between tachistoscopic recognition thresholds and meaningfulness (M) of nonsense syllables was demonstrated. The failure of previous studies to employ M measures standardized on the population under study and the procedure of pre-exposing test lists to subjects were suggested as reasons for the failure of previous studies to demonstrate the phenomenon.

A67-80150
BISENSORY SIGNAL DETECTION.
Milton D. Suboski (Ind. U., Bloomington).
Psychonomic Science, vol. 6, Sep. 15, 1966, p. 57-58. 12 refs.
Grant NSF GB-2843.

In an experiment comparing unimodal with bimodal signal detection, groups of subjects performed a four-alternative spatial forced-choice visual and a "yes-no" auditory task either singly or simultaneously. The results showed a significant decrement in bisensory visual discriminability and a comparable decrement in bisensory auditory performance, with little evidence for other interactions between tasks.

A67-80151
PAIRED-ASSOCIATE PERFORMANCE ON SUCCESSIVE RECALL-TEST TRIALS AS A FUNCTION OF NUMBER OF SUCCESSIVE PAIRING TRIALS AND STIMULUS ELEMENTS.
John K. Berry and William F. Battig (Md. U., College Park).
Psychonomic Science, vol. 6, Sep. 15, 1966, p. 67-68. 9 refs.
Grant PHS HD-01062.

Paired-association (PA) performance was significantly improved by interpolation of three successive recall-test trials between pairing trials, but did not change systematically over the three successive test trials. Increasing number of stimulus elements had only slight deleterious effects on initial PA performance. The results indicate that the principal effect produced by interpolated test trials is to facilitate PA learning during subsequent pairing trials.

A67-80152
SOME PHYSIOLOGICAL CORRELATES OF VERBAL LEARNING TASK DIFFICULTY.
John L. Andreassi (U.S. Naval Training Device Center, Port Washington, N. Y.).
Psychonomic Science, vol. 6, Sep. 15, 1966, p. 69-70. 5 refs.

Eight subjects learned three lists of nonsense syllables (0%, 53% and 100% association value) on three successive days while several physiological variables were recorded. Subjects showed significant increases in both palmar skin conductance and heart rate with the 100% list as compared with the 53% and 0% lists. These findings were interpreted in terms of greater degrees of physiological arousal during periods of superior performance.

A67-80153
AN INFORMATION PROCESSING ANALYSIS OF MENTAL MULTIPLICATION.
Donald F. Dansereau and Lee W. Gregg (Carnegie Inst. of Technol., Pittsburgh, Pa.).
Psychonomic Science, vol. 6, Sep. 15, 1966, p. 71 72. 5 refs.
Grant PHS M-07722.

A difficulty factor based on a count of the subprocesses normally involved in "paper and pencil" multiplication (e.g., "multiply," "add," "carry," and "hold") was found to be highly correlated with the solution times of problems solved mentally. Time for solution appeared to be independent of whether the subject did the problems silently or aloud.

A67-80154
RECOGNITION OPERATING CHARACTERISTICS AS A FUNCTION OF PRIOR RECALL CONFIDENCE.
Bruce A. Pappas and Milton D. Suboski (Queen's U., Kingston, Ontario, Canada).
Psychonomic Science, vol. 6, Sep. 15, 1966, p. 83-84. 7 refs.

Subjects rated their confidence in the correctness of their response in a recall-recognition RTT paired-associates paradigm. For items correct on recall test (T_1), recognition test (T_2) recognition operating characteristics showed increasing recognition accuracy as a function of T_1 confidence. Items incorrect on recall produced a recognition operating characteristic (ROC) indicating nonrandom performance on T_2. The results are interpreted as opposing an all-or-none theory of paired-associates learning.

A67-80155
CROSS-MODAL CORRELATIONS OF THE PERCEIVED DURATIONS OF AUDITORY AND VISUAL STIMULI.
M. Loeb and I. Behar (U.S. Army Med. Res. Lab., Fort Knox, Ky.), and J. S. Warm (Louisville U., Ky.).
Psychonomic Science, vol. 6, Sep. 15, 1966, p. 87. 8 refs.

Ratings of duration were obtained for auditory and visual signals ranging from one to five sec. The inter-modal correlations were moderately large and of an order of magnitude comparable to the intra-modal correlations. Results were considered to support the notion of mechanisms for judgment of time common to various sensory modalities.

A67-80156
THE APPLICATION OF EXERCISE TESTS IN EVALUATION OF PULMONARY FUNCTION.
Geoffrey L. Brinkman (Henry Ford Hosp., Pulmonary Div., Detroit, Mich.).
Journal of Occupational Medicine, vol. 8, Oct. 1966, p. 507-510.

To determine whether a simple step test with the examiner grading the degree of shortness of breath would be as useful as Gandevia's elaborate measurement of ventilation during exercise and recovery, a series of 24 men are studied. Six are normal individuals studied on three separate occasions, giving a total of 18 measurements from which normal values are established, and the other 18 are disabled because of shortness of breath. The following studies are made on each individual: spirogram, pulmonary diffusion capacity, residual volume, arterial blood before and after exercise, ventilatory equivalent for oxygen during exercise, and adjusted standard ventilation. Of the 18 men applying for disability, there are 6 in whom all function tests including both exercise tests were normal. In the remaining 12 men, some pulmonary function abnormality is demonstrated. On the basis of tabulated results it appears that the simple step test is as reliable an index of pulmonary insufficiency as is Gandevia's more elaborate test, although neither exercise test is infallible.

A67-80157
TREATMENT OF RADIATION INJURY.
G. A. Andrews (Oak Ridge Inst. of Nucl. Studies, Med. Div., Tenn.).
(Miss. State Med. Assn., Symp. on Nucl. Med., 98th Ann. Session, Jackson, May 11, 1966).
Journal of the Mississippi State Medical Association, vol. 7, Oct. 1966, p. 534 538.
AEC supported research.

At doses of 1,000 rads or less, the chief manifestations of radiation injury are related to the hematological system. A profound depression of bone marrow results in hemorrhage and infection, and these are the most likely causes of death. Hematological damage appears to be most common in humans, and it is probable that radiation accidents, and experience in outer space would involve these dose levels. If the patient can live through the period of greatest leukopenia and thrombocytopenia, then spontaneous recovery will occur. In addition to rest and adequate nutrition, effective therapy includes the use of antibiotics or some of the newer plastic isolators. If it appears that the patient has been exposed to a lethal amount of irradiation and that supportive treatment with antibiotics and platelets is of no value, then a bone marrow graft may be considered. The latter is a highly experimental form of therapy and has not been successful in humans to date. Included is a brief review of the development of bone marrow-graft studies in relation to radiation.

A67-80158
TEMPORAL FACTOR IN COLOR-DIFFERENCE JUDGMENTS.
Hilton Wright (Natl. Res. Council, Div. of Appl. Phys., Ottawa, Canada).
Journal of the Optical Society of America, vol. 56, Sep. 1966, p. 1264 1265.

Eight pairs of colors were viewed by one observer in two-pair combinations through a shutter mechanism; and judgment was made of the sizes of color differences exhibited by the color pair. The observation time was generally not controlled, and observations lasted 1 or 2 seconds, or perhaps only a fraction of a second. Scale values representing the observed sizes of the color differences were computed from the ratio judgments and tabulated. Color-difference judgments were not found to be significantly affected for exposure times of one second or longer, but a dependence on both exposure time and hue was found for shorter exposure times.

A67-80159
DECOMPRESSION SICKNESS: PARADOXICAL RESPONSE TO RECOMPRESSION THERAPY.
E. E. P. Barnard and D. H. Elliott (Roy. Naval Physiological Lab., Alverstoke, Great Britain).
British Medical Journal, vol. 2, Oct. 1, 1966, p. 809 810.

A case history is reported of decompression sickness in a young deep-sea diver who developed pain in previously unaffected sites, swelling of bruises, and worsening of the neurological manifestations of decompression sickness during recompression to 6 atmospheres absolute. This is the first case reported in the literature in which recompression therapy is associated with serious paradoxical responses and rapid deterioration of the patient's condition. Although no single explanation is sufficient for the manifestations, the patients complete recovery indicates that the essential treatment of decompression sickness remains adequate recompression.

A67-80160
DITERMINAL OXIDATION OF N-DECANE BY A STRAIN CANDIDA RUGOSA ISOLATED FROM THE AIRCRAFT FUEL.

Hiroshi Iizuka, Mitsugi Iida, and Shuji Toyoda (Tokyo U., Inst. of Appl. Microbiol., Japan).
Zeitschirft für Allgemeine Mikrobiologie, vol. 6, no. 4, 1966, p. 335-338.

The procedure is described for the isolation and purification of acid and alcohol products of *Candida rugosa* JF 101 isolated from aircraft fuel. Two dioic acid crystals were obtained by partition chromatography. One of the acids was in agreement with decanedioic acid, based on elementary analysis; and the other in agreement with octanedioic acid, based on thin-layer and gas chromatographic analyses. Candidal acids and alcohol produced from n-decane by thin-layer chromatography included 3,5-dinitrobenzoate of decanol-1, decanoic acid, octanedioic acid, hexanedioic acid, and butanedioic acid. One of the possible mechanisms for conversion of decane to decanol may be due to hydroxylation by activated oxygen. It is postulated that decanedioic acid is accumulated and probably carried out to shorter chain-length dioic acid by a beta oxidation mechanism. The detection of succinic acid suggests that the substrate was catabolized via the conventional respiratory pathway involving the citric acid cycle. Included is a scheme, not previously demonstrated in microorganisms, of the degradation pathway in n-decane by *C. rugosa* JF 101.

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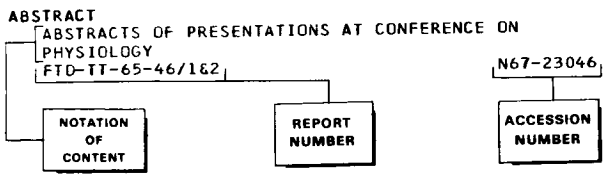

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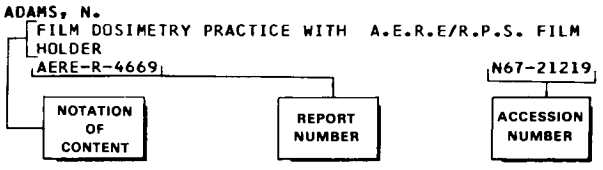

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