

NASA SP-7011 (60)



# AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY  
WITH INDEXES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (60)

# 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, 1969



*Scientific and Technical Information Division*

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

WASHINGTON, D.C. FEBRUARY, 1969

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# 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 (N69-10000 series);
- b. AIAA entries identified by their *IAA* accession numbers (A69-10000 series); and
- c. LC entries identified by a number in the A69-80000 series.

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

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Please refer to the accession number, e.g., A69-13193, when requesting documents. Address all inquiries and requests to:

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

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

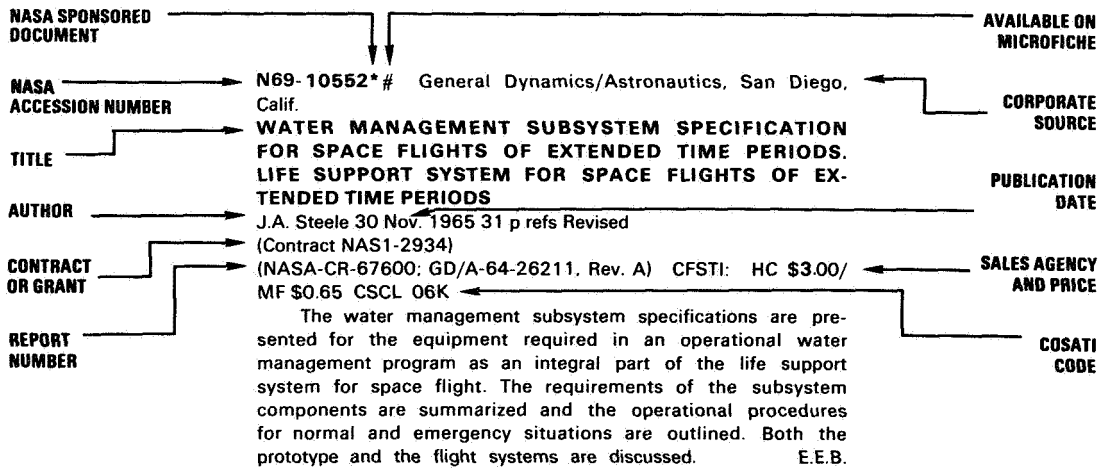
#### **LC Entries**

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

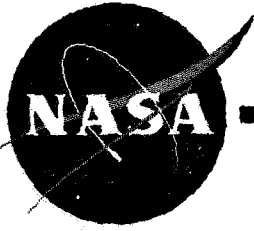
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## TYPICAL CITATION AND ABSTRACT







# AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography FEBRUARY 1969

## STAR ENTRIES

**N69-10020** Maine Univ., Orono.  
**A NOVEL POLYMER SUPPORT METHOD FOR PEPTIDE SYNTHESIS**

Lorrin Ray Garson (Ph.D. Thesis) 1967 117 p  
Avail: Univ. Microfilms: HC \$5.80/Microfilm \$3.00 Order No. 68-2120

A method for the synthesis of peptides employs a low molecular weight polystyrene as a soluble polymer support. This synthetic technique involves (1) attachment of the N-protected C-terminal amino acid of the peptide to the polymer support by a covalent bond; (2) removal of the N-protecting moiety to produce a free amino group; (3) addition of a second N-protected amino acid to form a "peptide bond" and, after repetitive addition to obtain the desired peptide chain; (4) cleavage of the peptide from the polymer support followed by purification of the peptide. Purification after steps 1-3 is accomplished by precipitation of the substituted polymer, which is soluble in most common organic solvents, by pouring the solution of polymer and reactants into aqueous solutions. Because all the reactants, except the amino acid or peptide substituted polymer are water soluble, the former are easily separated from the polymeric material by filtration.

Dissert. Abstr.

**N69-10031** Connecticut Univ., Storrs.  
**A STOCHASTIC MODEL OF THE HUMAN OBSERVER AS A DETECTOR OF SIGNALS EMBEDDED IN NOISE**

Robert Michael Glorioso (Ph.D. Thesis) 1967 106 p  
Avail: Univ. Microfilms: HC \$5.40/Microfilm \$3.00 Order No. 68-1346

A functional model of the human operator in a Dynamic, Alerted-Operator, Discrete, Visual Signal Detection task where the signal-to-noise ratio is quasi-stationary combines concepts of threshold training and learning without a teacher to describe operator decision behavior. Three experiments and a digital computer simulation verify the model and find equivalent operator parameters with respect to the model. Functional modeling of operator cognitive processes was found to be feasible. The human operator can be trained to use different equivalent decision thresholds as a function of signal-to-noise ratio. The operator's decision process is equivalent to decreasing the signal-to-noise ratio of a noiseless decision process by 1.6dB. The operator can be trained to classify four distributions in a near optimum manner and equivalent classification boundaries can be found. Equivalent operator decision thresholds and signal classification boundaries are affected little by the presence of

absence of feedback. If the signal-to-noise ratio is quasi-stationary, the operator can recognize a change in signal-to-noise ratio and he uses four of five of the past observations as well as the present observation to estimate the system's apparent signal-to-noise ratio.  
Dissert. Abstr.

**N69-10112\*** Pennsylvania State Univ., University Park. Physiology Labs.

**DNA-CYTOPHOTOMETRY AND HISTOLOGY OF LYMPHATIC ORGANS IN RELATION TO THE SKIN HOMOGRAFT REACTION IN HYPOXIC MICE**

John M. Kmetz and Adam Anthony Sep. 1968 82 p refs  
(Grants NGR-38-009-015; NIH-GM-05112)  
(NASA-CR-97474) Avail: CFSTI CSCL 06P

Histologic and Feulgen-DNA cytophotometric analyses were made on lymphatic organs of 132 A/J and 132 C57BL/6J strain male mice exposed to reduce barometric pressure (380 mm Hg) for one, two, or three weeks. Erythropoietic responses were assessed using hematocrit changes during the three week experimental period. Skin homografts were used as an indication of the immune potential of mice acclimated to moderate hypoxia. The major results are as follows. After three weeks of hypoxia exposure both strains of mice exhibited a decrease in the amount of functional lymphatic tissue. DNA profiles, as determined by two wavelength cytophotometry of Feulgen stained lymphatic cells, shifted in the direction of increased DNA in all cases after one week of exposure. Restoration of control profiles occurred in all three lymphatic organs by week two of exposure. Skin homografts between acclimated animals and in cases where either the donor or recipient were acclimated were retained for a longer time than skin transplants between unacclimated mice.  
Author

**N69-10147** Texas Technological Coll., Lubbock.  
**THE QUANTIFICATION OF HUMAN EFFORT AND MOTION FOR THE UPPER LIMBS BY MEANS OF AN EXOSKELETAL KINEMATOMETER**

Jerry D. Ramsey (Ph.D. Thesis) 1967 318 p  
Avail: Univ. Microfilms: HC \$14.40/Microfilm \$4.10 Order No. 68-2621

A device for monitoring the kinematic motion of the upper limbs, the Exoskeletal Kinematometer, was developed to provide instantaneous angular displacement data. This device consists of a shoulder mount, two arm mounts upon which are fastened linkages that follow the arm movement, and potentiometers which measure the angular displacement of the joints of rotation. The angular displacement data serves as input to a series of computational procedures which were developed to evaluate various mechanical measures of human effort. The specific measures of interest were: the velocity and acceleration at the center of mass of each arm segment, the changes in mechanical energy of the entire arm system, the force and torque at each arm joint, and the linear and angular impulse at each arm joint. In addition to assessing the characteristics of the mechanical indices, these measures were

N69-10213

correlated with the physiological measures of the same task. The correlations between the mechanical and physiological measures of the task substantiate that total and shoulder angular impulse, shoulder torque, and total mechanical energy are the better of the mechanical indices of human effort. Dissert. Abstr.

**N69-10213\*#** Sandia Corp., Albuquerque, N. Mex. Planetary Quarantine Dept.  
**PLANETARY QUARANTINE PROGRAM Quarterly Report for Period Ending 30 Sep. 1968**

30 Sep. 1968 22 p ref

(NASA Order R-09-019-040; NASA Order H-13245A)  
(NASA-CR-97462; QR-10) Avail: CFSTI CSCL 06M

A preliminary copy of the NASA Contamination Control Handbook was reviewed for errors and correctness of technical content. Mathematical sampling models were developed to identify bacterial species and to quantitatively estimate microbial distribution on Apollo missions. To better understand the nature of particle behavior in controlled environments, three dissemination methods were designed: mechanical mixing, spinning, and acoustical generation of tagging inert particles with spores. A users' manual for the planetary quarantine lunar information system was written. Dry heat survival studies at three different temperature levels were conducted to aid in generating bioengineering parameters necessary for achieving planetary quarantine objectives. B.P.

**N69-10273\*#** Environmental Research Associates, Randallstown, Md.

**STUDY OF THE ASTRONAUT'S CAPABILITIES TO MAINTAIN LIFE SUPPORT SYSTEMS AND CABIN HABITABILITY IN WEIGHTLESS CONDITIONS. MOD 3. A NEW TECHNIQUE FOR INVESTIGATING CARGO TRANSFER IN SIMULATED WEIGHTLESS ENVIRONMENTS**

Harry L. Loats, Jr. and G. Samuel Mattingly [1968] 33 p  
(Contract NAS1-7887)

(NASA-CR-66708; ERA-68-2) Avail: CFSTI CSCL 22A

The technique utilizes the water immersion simulation technique validated by Environmental Research Associates in the Gemini extravehicular simulation program to provide a neutrally buoyant medium for the subject. A series of 18 evaluation runs was performed on the final version of the simulator, comprising 3 cargo package configurations and 3 package masses. A continuous 16 mm motion picture record at 24 fps was made to provide evaluation data. The cargo variations included package masses of 2, 6, and 10 slugs and cubical packages of 12, 17, and 21 in. linear dimension. Two series of 9 runs were accomplished to determine learning characteristics. Author

**N69-10300\*#** National Communicable Disease Center, Atlanta, Ga. Biophysics Section.

**REDUCTION OF MICROBIAL DISSEMINATION GERMICIDAL ACTIVITY OF ETHYLENE OXIDE Summary Report**

Sep. 1968 12 p

(NASA Order R-137)

(NASA-CR-97457; SR-10) Avail: CFSTI CSCL 06M

Studies dealing with the germicidal activity of ethylene oxide were concerned with effectiveness against spores of *Bacillus globigii* at selected concentrations and times of exposure. Comparison made of the static and dynamic chambers for use in spore exposure indicated no significant differences for periods of 2.4, and 18 hours. Details of the experimental apparatus are included, as is the procedure for taking the gas and spore samples. M.W.R.

**N69-10306#** Federal Aviation Administration, Washington, D. C. Office of Aviation Medicine.

**ADAPTATION TO VESTIBULAR DISORIENTATION: 9: INFLUENCE OF HEAD POSITION ON THE HABITUATION OF VERTICAL NYSTAGMUS**

William E. Collins Mar. 1968 9 p refs

(AM-68-2) Avail: Issuing Activity

Interactions of linear and angular accelerations indicated that the otoliths (detectors of linear acceleration) may influence responses of the semicircular canals. To obtain some clearer evidence of such possible effects, a laboratory situation was designed to provide a minimally complex test of otolith-semicircular canal interactions. Because cats show very rapid habituation of the eye-movement response to rotatory stimulation, eight such animals were repeatedly stimulated by angular accelerations. For all habituation trials, the saggital plane of the head and body of each animal was in the plane of rotation. A clear reduction of vertical nystagmus was obtained. By changing the position of the animals 180° after the adaptation trials, the same set of semicircular canals was stimulated but the orientation of the otoliths was changed. Habituation was specific to the practiced direction of nystagmus and to the practiced head (otolith) position. Author

**N69-10307#** National Environmental Satellite Center, Washington, D. C.

**OPERATION UTILIZATION OF UPPER TROPOSPHERIC WIND ESTIMATES BASED ON METEOROLOGICAL SATELLITE PHOTOGRAPHS**

Gilbert Jager, Walton A. Follansbee, and Vincent J. Oliver Oct. 1968 27 p refs

(NESCTM-8) Avail: CFSTI

A technique of estimating upper tropospheric winds over the tropics and subtropics utilizing the appearance of cirriform clouds in meteorological satellite photographs is described. Specifically, the appearance of cirrus cumulonimbogenitus, cirrus spissatus, and the edges of cirrostratus shields is used to furnish clues to the wind direction and speed in their immediate proximity. Known relationships are used to estimate large-scale wind flow at the 200 and 300 millibar levels of the atmosphere. The National Meteorological Center now routinely incorporates such wind estimates into operational numerical map analyses. The data are also transmitted in both analog and digital form to a number of weather centers for use in both conventional and numerical analyses. An objective method for verifying these wind estimates is described, and the results of a six-month test of the data are given. Author

**N69-10308** Texas Technological Coll., Lubbock.

**A COMPARATIVE STUDY OF SOME PHYSIOLOGICAL PARAMETERS OF STATIC AND DYNAMIC WORK PERFORMED BY THE UPPER LIMB**

Jerry Lee Purswell (Ph.D. Thesis) 1967 222 p

Avail: Univ. Microfilms: HC \$10.15/Microfilm \$3.00 Order No. 68-2620

An attempt was made to quantitatively relate static and dynamic work by using physiological measures. The basis of comparing static and dynamic work was through a static work task and a dynamic work task each having the same static component of work. The variables of weight carried by the hand, angle of abduction and distance of reach were studied for their effect on static and dynamic work. An attempt was made to correlate the physiological response measures of work obtained from this research with some mechanical measures of work obtained by another investigator in a parallel experiment. Four subjects performed two work tasks, one static work and the other dynamic work. The dependent variables measured were increase in ventilation rate divided by body surface area, increase in heart rate, and increase in oxygen consumption divided by body surface area, all measured as the increase from resting to working levels of the variable. Dissert. Abstr.

**N69-10374\*#** Scripta Technica, Inc., Washington, D. C.  
**ENVIRONMENT AND BODY STATURE [LEBENSRAUM  
 UND KOERPERGROESSE]**

W. Goetsch NASA Nov. 1968 32 p refs Transl. into ENGLISH  
 from Biol. Zentr. (Leipzig), v. 44, no. 10, 1924 p 529 560  
 (Contract NASw-1694)

(NASA-TT-F-11946) Avail: CFSTI CSCL 06F

Body size and growth rate of hydrae, planaria and tadpoles  
 were examined as a function of the space and quantity of water  
 available to each animal, attempting to exclude the effect of growth  
 inhibiting substances (such as excreta), and equalizing feeding  
 conditions. Several disturbing tactics were found, but no definite  
 conclusions could be reached. Author

**N69-10442\*#** Sandia Corp., Albuquerque, N. Mex.  
**AN IMPROVED MODEL OF THE VACUUM PROBE**

M. E. Morris, L. W. Hughes (New Mex. Univ., Albuquerque), A  
 Parisi, J. W. Beakley (New Mex. Univ., Albuquerque), W. J. Whitfield  
 et al Sep. 1968 35 p refs Supported in part by AEC  
 (NASA Order R-09-019-040)

(NASA-CR-97481; SC-RR-68-592) Avail: CFSTI CSCL 06M

The need for a microbiological surface sampling device  
 with the capability for sampling large areas that are lightly loaded  
 with microorganisms motivated the development of the vacuum  
 probe. The intended use of the instrument is to sample clean  
 surfaces in laminar flow clean rooms, but the device could be  
 utilized for sampling surfaces in other clean environments. Such a  
 device was designed, fabricated, and tested. In these tests the  
 vacuum probe removed a mean of 89% and assayed a mean of  
 67% of bacterial spores approximately 1  $\mu$  in length settled on  
 smooth surfaces which were free of viscous films. Detailed machine  
 and assembly drawings and instructions are included. Author

**N69-10444\*#** National Aeronautics and Space Administration,  
 Washington, D. C.

**BIOLOGY OF HARD TISSUE**

Ann M. Budy, ed. 1968 399 p refs Proc. of Conf. Held at  
 Pacific Palisades, Calif., 6-9 Mar. 1966

(NASA-SP-161) Avail: SOD \$1.75; CFSTI CSCL 06C

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5. GENERAL SESSION 1 p 255-326 (See N69-10449  
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6. GENERAL SESSION 2 p 327-357 (See N69-10450  
 01-04)

**N69-10445\*#** National Aeronautics and Space Administration,  
 Washington, D. C.

**HOMEOSTASIS OF CALCIUM**

*In its Biol. of Hard Tissue* 1968 p 13-82 (See N69-10444  
 01-04)

Avail: SOD \$1.75; CFSTI

In the round table discussions, the remarkable constancy  
 of the calcium level in plasma and body fluids was noted. The  
 factors affecting the balance between calcium accretion in bone  
 formation and calcium release from bone during osteolysis are  
 defined as the concentrations of calcium and phosphate in blood, the  
 presence or absence of vitamin D, the activity of the parathyroid  
 hormone and calcitonin (or thyrocalcitonin), and diet. Several  
 experiments showing hypercalcemic symptoms in rats fed a

phosphate-deficient diet are discussed, along with the response of  
 parathyroid animals to EDTA-induced hypocalcemia. The function  
 of bone in calcium homeostasis is examined, and a diagrammatic  
 model is included to show the exchange between calcium in blood  
 and calcium on the surface of the crystals of bone mineral. A  
 water-bridge theory is offered to explain the transit of calcium ions  
 to and from the surfaces of individual apatite crystals in the  
 mineralized bone matrix masses of the skeleton. Data are also  
 presented on pH measurements of extracellular fluids, the feedback  
 control of the uptake of alpha-aminoisobutyric acid, and the amino  
 acid composition of thyrocalcitonin and parathyroid hormone.

M.G.J.

**N69-10446\*#** National Aeronautics and Space Administration,  
 Washington, D. C.

**LOCAL (NONHORMONAL) FACTORS CONTROLLING  
 BONE RECONSTRUCTION**

*In its Biol. of Hard Tissue* 1968 p 83-133 (See N69-10444  
 01-04)

Avail: CFSTI

As a focus for the discussions, two points are made: (1)  
 When remodeling occurs a space is tunneled out by osteoclasts  
 and it is only after this space is created that new haversian bone  
 is laid down within it. (2) The localization of this space and its  
 polarization in three dimensions are obviously not controlled by  
 hormones. In this context the results obtained from calcium  
 kinetic studies performed on patients with rheumatoid arthritis are  
 examined. Animal experiments, involving calcium content of the  
 bones and measurements of the uptake of radioactive calcium given  
 at varying periods prior to sacrifice, are also discussed. Metabolic  
 data on marrow and bone cells derived from the same bone sample  
 are presented. The formation of haversian systems is discussed in  
 relation to bone remodeling, and the organs used for homeostasis  
 of calcium ion from the lowest to the highest vertebrates are listed.

M.G.J.

**N69-10447\*#** National Aeronautics and Space Administration,  
 Washington, D. C.

**CELLULAR DIFFERENTIATION IN BONE**

*In its Biol. of Hard Tissue* 1968 p 135-204 (See N69-10444  
 01-04)

Avail: SOD \$1.75; CFSTI

Four kinds of activity in the cellular differentiation of bone are  
 discussed: bone cell population studies on the whole population;  
 individual cell studies; the static attributes of the population; and  
 the dynamic aspect of differentiation, involving the ideas of the  
 homogeneous becoming heterogeneous, and the transformation of  
 one mode into another mode without it necessarily being part of  
 an ontologic process. The concept of bone cell population is  
 discussed in relation to the great variation in local populations in  
 different parts of a bone, in different bones, at different ages, in  
 different species, and in different functional states. Criteria for  
 identifying cell types and giving them names are assessed, along  
 with the problem of tracing individual cell lineages through serial  
 mitoses and isolation. Consideration is also given to the controlling  
 mechanisms, such as induction and hormone action, the action of  
 the vascular system on the cell population, and the effects of  
 mechanical, nutritional, and nervous influences.

M.G.J.

**N69-10448\*#** National Aeronautics and Space Administration,  
 Washington, D. C.

**SYSTEM DISEASES OF BONE**

*In its Biol. of Hard Tissue* 1968 p 205-254 (See N69-10444  
 01-04)

Avail: SOD \$1.75; CFSTI

From the viewpoint of cell or tissue biology, bone disease  
 is described in terms of the derangement of the accretion and  
 resorption processes and the balance between them. The discussion  
 centers around matrix because it appears as the primary material

## N69-10449

which determines form; the chemical characteristics of the matrix, once they have been laid down, serve to attract the necessary mineral to provide rigidity. It is pointed out that although mineral metabolism may affect the processes of resorption and secretion of matrix in some situations, in general it tends to be a follower rather than a leader. Bone cell metabolic systems are discussed in relation to where controls for each overall process may be applied. Bone diseases are classified according to three kinds of disturbances that can occur: (1) defects in cellular machinery, (2) a deficiency in the availability of raw materials, or (3) a disturbance in the controls that regulate the rates of one or more steps, such as hormonal, local, or informational. Data obtained from biopsies and autopsies are assessed. M.G.J.

**N69-10449\*#** National Aeronautics and Space Administration, Washington, D. C.

### GENERAL SESSION 1

*In its Biol. of Hard Tissue* 1968 p 255-326 (See N69-10444 01-04)

Avail: CFSTI

To show the effect of parathyroid extract in the rat, photomicrographs are included to illustrate sections of bones taken from rats that received 1000 units of parathyroid extract. Evidence for possible parathyroid involvement in control of hypercalcemia is presented, and studies on dietary factors in homeostasis are discussed. Data are given on the pattern of RNA synthesis in vivo in the different cells of bone obtained by autoradiographic techniques, and on a system developed for studying the epiphyseal plate cartilage with respect to a fluid phase aspirated from the cartilage. Also considered are local factors involved in remodeling, such as how the bone adapts itself by growth, external remodeling, and response to unbalanced stresses that may fall on it. M.G.J.

**N69-10450\*#** National Aeronautics and Space Administration, Washington, D. C.

### GENERAL SESSION 2

*In its Biol. of Hard Tissue* 1968 p 327-357 (See N69-10444 01-04)

Avail: SOD \$1.75; CFSTI

The factors governing cellular differentiation in bone are reviewed, and the need to define the relationship of mitosis to induction is stressed. The possibilities of analyzing the action of tetracyclines on calcification in vitro are discussed, and the factors which exercise a major influence on test results are examined. Summary data are presented to indicate the kinds of information which can and cannot be expected from tissue-culture studies. Figures are included to show the total incorporation of tetracycline into embryonic bone rudiments as a function of time, and the dependence of tetracycline concentration on the incorporation of radiocalcium in embryonic ulna. Also discussed are experiments designed to demonstrate the importance of thyrocalcitonin in the responses of a rat to an excess of administered parathyroid hormone; a rat perfusion system was employed. Techniques for isolating and separating lipids are discussed in relation to a method for studying the possible mechanism of hormone action at the level of the cell membranes. An example of a neutral induction system is given, along with experimental findings on the chemical aspects of decalcified bone-matrix implants. M.G.J.

**N69-10463\*#** California Univ., Berkeley, Dept. of Nutritional Sciences.

### NUTRITIONAL REQUIREMENTS AND BREEDING BEHAVIOR OF PEROGNATHUS Final Report, 1 Jan.-1 Sep. 1968

Rosemarie Ostwald [1968] 14 p

(Grant NGR-05-003-118)

(NASA-CR-97574) Avail: CFSTI CSCL 06A

A semi-purified synthetic diet was found to maintain body weight, organ weights, and hematological parameters in *Perognathus longimembris* at the same levels as for a group of animals fed a mixed seed diet. The synthetic diet appeared to increase body fat of males but not of females. Photoperiods of 10 and 16 hr did not suppress spontaneous or induced estrus for at least 7 to 9 mos, although photoperiods did produce a lengthening of the time between estrus and permitted onset and cessation of estrus irrespective of the natural season of *Perognathus* Pe. M.W.R.

**N69-10498#** Oak Ridge National Lab., Tenn.

### DEPTH DOSES OF FISSION NEUTRONS IN TISSUE-EQUIVALENT MATERIAL

Lubomir David [1968] 12 p refs Transl. into ENGLISH from *Jad. Energ.*, no. 13, 1967 p 241-245

(ORNL-tr-1963) Avail: CFSTI

Accurate knowledge of fluence-dose relation is needed in neutron monitoring for radiological protection. In this paper, fluence-dose conversion factors for the depths of 0, 5, 10, 20, and 30 cm in an infinite slab of tissue equivalent material are given and their dependence on neutron energy over the range 0.1 keV to 10 MeV is determined. In addition, average values of these conversion factors for fission neutron spectrum as a function of its threshold energy are calculated and intercomparisons of several activation integrators as to their efficiency of measuring fast neutron tissue-doses are discussed. Author (NSA)

**N69-10504\*#** California Univ., Berkeley, Space Sciences Lab.

### INTERDISCIPLINARY RESEARCH IN THE PHYSICAL, BIOLOGICAL, ENGINEERING, and SOCIAL SCIENCES Annual Report, 1 Oct. 1967-30 Sep. 1968

Samuel Silver 30 Sep. 1968 120 p refs /ts Seri. 9, Issue 60

(Grant NsG-243)

(NASA-CR-97569) Avail: CFSTI CSCL 06

Interdisciplinary scientific research at a university is summarized under the major headings of core funding, social sciences, and nutritional sciences. The core funding component comprises activities in atmospheric and space physics, atomic physics, astronomy, biosciences, engineering science, public administration, and technology and urban management. Mention is made of a new careers program, faculty and student support in new programs, and seminars. Applications of system analysis, specific projects, a seminar, and the relation of the social science group to the external environment are reviewed. Nutritional studies dealt with maximum protein tolerance in man as well as other activities. Purposes, findings, and personnel are noted for each of the research projects. M.W.R.

**N69-10528#** National Research Council of Canada, Ottawa (Ontario).

### THE EFFECTS OF PSYCHOLOGICAL STRESS UPON DECISION PROCESSES AND THE SPEED AND PRECISION OF TRACKING MOVEMENTS. 1: A STUDY OF THE EFFECTS OF SLEEP DEPRIVATION AND DISTURBANCE

C. B. Gibbs, R. Leonardo, and G. F. Rowlands Jul. 1968 35 p refs

(NRC-10397; ML-2) Avail: CFSTI

Twelve youths were deprived of sleep for 48 hours. Each subject was tested for 15 minutes at four-hourly intervals, on each of two tasks: (a) of mirror tracing and (b) of step-input tracking, using an instrument named the stressalyzer. The same subjects were again tested one week later. They were then allowed to sleep whenever they wished, but were aroused at four-hourly intervals in the night, some 15 minutes before the times, near 1:00 a.m. and 5:00 a.m., at which they were tested during the previous study of complete sleep deprivation. The subjects' scores on the stressalyzer were compared, at the same stage of testing, in the two

conditions of sleep deprivation and disturbed sleep. Sleep deprivation of 48 hours produced little or no deterioration in the group's performance in mirror tracing, but tracking ability on the stressalyzer deteriorated sharply after 20 hours without sleep, with a further large decrease in skill at the 36-hour stage of testing. In some subjects, disturbance of sleep produced far more impairment than complete loss of sleep, at the same stage in testing. Author

**N69-10567\***# Texas Univ., Houston. Graduate School of Biomedical Sciences.

**DEVELOPMENT OF COMPUTER TECHNOLOGY FOR MEDICAL DATA ANALYSIS TO BE APPLIED TO APOLLO AND FOLLOW-ON SPACE MISSIONS** Final Report

Aug. 1968 215 p refs

(Contract NAS9-7029)

(NASA-CR-92377) Avail: CFSTI CSCL 06S

An overview is presented on the work undertaken to integrate experimental and ground-based medical data collection and analysis schemes into the medical data processing needs and capabilities of Project Apollo and follow-on space missions. Detailed data are provided on the design, construction, and preliminary evaluation of a system for automatic measurement and real-time digital display of systolic and diastolic blood pressures. The system uses analog and digital techniques in data processing and decision making. Comparisons are drawn between parametric and nonparametric analyses of bed rest data with respect to computing time, assumptions and restrictions of the statistical model, degree of sophistication in the analysis, and power of the statistical tests. Also described is a system designed to investigate the relationships that may exist between physiological variables and the depth of sleep. This involved the development of analog computer circuitry for preprocessing electrocardiogram and respiration signals in order to provide several characteristics of the cardiovascular and respiratory system pertinent to the depth of sleep. M.G.J.

**N69-10622\***# European Atomic Energy Community, Ispra (Italy). Directorate for Health and Safety.

**SAFETY PROBLEMS [I PROBLEMI DELLA SICUREZZA]**

E. Jacchia 1968 8 p In ITALIAN; ENGLISH summary Presented at Le Technologie Avanzate ed il Progr. Econ., Bologna, Italy Dec. 1-2, 1967

(EUR-3911i) Avail: CFSTI

Unlike the nuclear sector, which presents special safety problems, the new technologies do not appear to offer special safety problems. Neither electronics nor automation (with the possible exception of some psychological or social aspects) present for the workers or the population risks of a nature specifically different from those known in conventional activities. This is true also for the space sciences, with the exception of certain hazards of a ballistic nature or the hypothetical risks of a contamination of the environment in which we live. At the same time technological development and economic progress entail the gradual diffusion into the environment of a quantity of pathogenic chemical and physical agents which constitute a potential danger not only for present but also for future generations (genetic effects). An intensive study of the mutagenic effects on mammals and in particular on man has been effected only for ionizing radiations, whereas hardly anything is known of the mutagenic effects of the other physical and chemical agents on man; geneticists therefore cannot exclude the possibility that they may be significant. A vast field of research is thus open. Author

**N69-10626\***# AiResearch Mfg. Co., Los Angeles, Calif. Dept. of Life Sciences.

**OBSERVATIONS ON LUNAR GRAVITY SIMULATION**

W. G. Robertson and E. C. Wortz 30 Oct. 1968 29 p refs

(Contract NAS9-6481)

(NASA-CR-92375; LS-68-4390) Avail: CFSTI CSCL 06K

Experiments were conducted to evaluate and compare the metabolic costs of performing upper- and lower-torso work in a G-2C pressure suit and to evaluate 1/6-g six-degree-of-freedom simulators based on the metabolic costs of the exercise. Tests were performed at 1 g and at 1/6 g using a counter-balance vertical suspension simulator. Metabolic rates and other physiologic costs of self-locomotion were evaluated at 1/6 g using six subjects wearing pressurized Gemini pressure suits. The physiologic costs of upper-torso work were evaluated in both a 1 g and 1/6-g environment. Results show that metabolic rates measured at 1/6 g are significantly increased with velocity. Energy costs for carrying a 75-lb earth-equivalent-weight pack at 1/6 g increased when compared to costs obtained without additional weight; this increase approached significance. When data were normalized for the subject's lunar weight, it appeared that the subject did not perform as efficiently in simulated lunar gravity as in a 1 g environment. No significant differences were observed between metabolic cost of performing at 1 g and at 1/6 g or between different modes of accomplishing the tasks. Author

**N69-10645\***# TRW Systems Group, Redondo Beach, Calif.

**STUDY OF PASSIVE TEMPERATURE AND HUMIDITY CONTROL SYSTEMS FOR ADVANCED SPACE SUITS** Materials Research Report, 1 Jul. 1967-1 Sep. 1968

W. Woo Nov. 1968 72 p refs

(Contract NAS2-3817)

(NASA-CR-73271; TRW-06462-6007-R000) Avail: CFSTI CSCL 06K

A solution of heat pipe freeze up problems through the use of mixtures as heat pipe working fluid is presented. Data on the freezing point of mixtures of 1-propanol and water were experimentally obtained. Experimental gas emission tests of potential space suit heat pipe materials when exposed to both a vacuum environment, and a water vapor environment were performed. A literature search was conducted to select film enclosure materials suitable for flexible heat pipe application with one of the desired film selection characteristics being impermeability to noncondensable gases. To reduce the thermal gradient from the heat pipe outer surfaces to the active wick surfaces, studies of the thermal conductivity of metallic wicking materials and methods of bonding wicks to substrates were performed. Techniques are described for the fabrication of an experimental heat pipe device which was used to demonstrate techniques applicable to extravehicular space suit controllable heat pipe devices for temperature control. Author

**N69-10652\***# Entwicklungsring Sud, Munich (West Germany).

**HUMAN PERFORMANCE IN AIRCRAFT GUIDANCE AND MOTION TRACKING TASKS [DAS LEISTUNGSVERHALTEN DES MENSCHEN IN FLUGFUEHRUNGS- UND BEWEGUNGSFOLGEAUFGABEN]**

Ruediger Seifert 1966 14 p refs In GERMAN Presented at the WGLR Conf., Bad Godesberg, West Ger., 4-7 Oct. 1966

(EWR-116/66) Avail: CFSTI

Time lags for perception, simple reaction time, and attention shift are discussed. Due to these limits, man is only to a rather limited extent able to perform tracking tasks. Therefore a system can only be controlled by man, if its control characteristics are reduced, by technical controllers and other devices, and are adapted to the abilities of man. Controllability is also influenced by the display characteristics. For tracking tasks the head-up display seems to be most efficient. Author

**N69-10660\***# Joint Publications Research Service, Washington, D. C.

**AUTOMATIC RECOGNITION OF HEART RHYTHM DISORDERS MANIFESTED BY VARIATIONS OF THE RR AND PR INTERVALS OF THE EGG**

**N69-10687**

I. D. Pupko et al 1 Nov. 1968 10 p refs Transl. into ENGLISH from Med. Tekhn. (Moscow), no. 4. 1967 p 7-13 (JPRS-46790) Avail: CFSTI

Methods and equipment for automatic analysis of RR interval stability and length during ECG tracings are evaluated. An algorithm for calculating the stability of the RR interval is formed on the basis of the constantly estimated difference between two adjacent RR intervals. The developed equipment signals the presence of pathology in cases where the RR interval is less than 600 msec or above 1200 msec or the difference in the length of adjacent RR intervals exceeds 280 msec. It also permits estimating the length of the RR interval to discover tachycardia and bradycardia. A block diagram for the apparatus is included. G.G.

**N69-10687\*#** Naval Aerospace Medical Inst., Pensacola, Fla.  
**LABYRINTHINE DEFECTS AS SHOWN BY ATAXIA AND CALORIC TESTS**

Alfred R. Fregly and Ashton Graybiel 22 Aug. 1968 20 p refs (NASA Order R-93; Proj. MR005.04-0021.144) (NASA-CR-97463; NAMI-994) Avail: CFSTI CSCL 06S

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

**N69-10691\*#** Techtran Corp., Glen Burnie, Md.  
**THE INITIAL GROWTH CYCLE OF THE RANA TEMPORARIA TADPOLE [LE PREMIER CYCLE DE CROISSANCE DU TETARD DE RANA TEMPORARIA]**

E. Faure-Fremiet and J. Dragoiu Washington NASA Oct. 1968 30 p refs Transl. into ENGLISH from Arch. Intern. Physiol. (Liege), v. 21, May/Oct. 1923 p 403-437 (Contract NASw-1695) (NASA-TT-F-11948) Avail: CFSTI CSCL 06C

Attempts to determine the variations in the embryonic system between the initial and second stages of development and between the second and third stages in the development of frog eggs are detailed. In order to eliminate the difficulty resulting from the presence of the mucin bag surrounding the egg at the time of its laying in weight comparisons, the eggs were weighed and released free in the general cavity just before penetration into the uterine tubes. Then the tadpoles were weighed in stage 2 after they had separated from the mucilaginous ganglia. The frog egg is considered a closed system from the energy point of view, with protoplasmic mass quite small in comparison to reserves. During transformation from initial to second stage (tadpole at birth) a loss of energy of 1.952 calories is noted, followed by an increase in weight of no more than 10% and a loss in dry weight corresponding to combustion of some fats, glycogen and nitrogenized reserves. The transformation of the system between stages 2 and 3, marking the end of the autotrophic growth cycle corresponds to a loss of 3.306 calories and an increase in weight of 312%. The weight increase results from water absorption. Author

**N69-10709\*#** TRW Systems Group, Redondo Beach, Calif.  
**STUDY OF PASSIVE TEMPERATURE AND HUMIDITY CONTROL SYSTEMS FOR ADVANCED SPACE SUITS Final Second Phase Report, 2 Sep. 1967-1 Sep. 1968**

A. P. Shlosinger Nov. 1968 63 p refs (Contract NAS2-3817) (NASA-CR-73270; TRW-06462-6006-R000) Avail: CFSTI CSCL 06K

Techniques were developed for control of temperature in an extravehicular space suit by radiation of heat from the external space suit surface. Modified heat pipes, permitting control of heat flow were developed as means of heat transmission from the skin of an astronaut to the external suit surface. Flexible heat pipes were developed for heat removal by direct contact with the human skin. The techniques are intended to be eventually integrated with passive control of humidity in space suits. This report summarizes research activities in the area of controllable two-chamber heat pipes. The flexible heat pipes use water as working fluid and operate in a temperature range such that the internal pressure is significantly lower than the pressure of the external environment. Design and fabrication of a space suit wall prototype panel including rigid and flexible heat pipes and thermal switching capability are described. Author

**N69-10720#** Union Carbide Nuclear Corp., Oak Ridge, Tenn.  
**Y-12 Plant.**

**AIR CLEANING AT THE AEC's Y-12 PLANT**

J. C. Little 31 Jul. 1968 20 p Presented at Intern Atomic Energy Authority Joint Conf. on Air Cleaning No. 10, 26-30 Aug. 1968

(Contract W-7405-ENG-26) (Y-EF-170; CONF-680812-1) Avail: CFSTI

The air-cleaning facilities used in the nuclear production operations and biological research activities at Y-12 are described, using schematic flow diagrams. The clean room facilities are also described. Problem areas are considered with emphasis on filter failures. Results of filter testing are summarized, and some problems in the mounting of high-efficiency filters are discussed. The design of a contamination control facility is discussed briefly. NSA

**N69-10751\*#** General Technical Servies, Inc., Upper Darby, Pa.  
**A STUDY OF THE GENERAL DYNAMICS OF THE PHYSICAL-CHEMICAL SYSTEMS IN MAMMALS Final Report**

Arthur S. Iberall 1968 31 p refs (Contract NASw-1066) (NASA-CR-97663) Avail: CFSTI CSCL 06A

Summarized are results of the dynamics of mammalian bio-systems which were undertaken in an attempt to explain: (1) temperature regulation starting at the level of the microcirculation where the monitoring of oxygen supplies to tissue and the governing of heat production takes place; (2) overall control and transmission characteristics in the cardiovascular system; (3) hormonal regulation through interactions of the products of the endocrine system with regulated parameters and blood constituents; and (4) the behavioral system for consistency of orienting physical views of the dynamics of a complex computer control network with psychological and physiological overtones. A new definition of life was made in an attempt to guide the physical search for explanations of the operation of the biological system; and to bring the physical scientist close to a physical base from which he could model, build, or assess systems that resemble naturally living systems by suitable operational definitions. Applications of dynamic analyses of biological systems to practical problems of monitoring and clinical diagnosis, as for example, the use of the concepts in the spectral analyzer approach to analysis of living systems are discussed; and potential applications for specific NASA studies of extra-terrestrial life are indicated. S.C.W.

**N69-10786#** Japan Atomic Energy Research Inst., Tokyo.  
**SURVEY OF THE LITERATURE ON THE CHARACTERISTICS OF AIR SAMPLING FILTER PAPER**

Yoshikazu Yoshida and Yoshio Ikezawa Jun. 1968 29 p refs  
In JAPANESE  
(JAERI-4046) Avail: Issuing Activity

The important characteristics of air sampling filters are collection efficiency, flow resistance and surface collection efficiency. These characteristics depend not only on the kind of filter medium, but also on the properties of an aerosol for sampling, and on the sampling conditions. A survey was made of the literature for air sampling filters used in operational health physics, and the important data are given. Author

**N69-10813\*#** California Univ., San Diego.  
**EXPERIMENTS ON VISUAL ACUITY AND THE VISIBILITY OF MARKINGS ON THE GROUND IN LONG-DURATION EARTH-ORBITAL SPACE FLIGHT**

S. Q. Duntley, R. W. Austin, J. L. Harris, and J. H. Taylor  
Washington NASA Nov. 1968 231 p refs  
(Contract NAS9-5095)  
(NASA-CR-1134; SIO-Ref-68-6) Avail: CFSTI CSCL 06S

Visual acuity experiments conducted during the Gemini program are discussed. The report sets forth the evolution of the experimental design, the preparatory experiments, the equipments constructed, the training of flight crews and teams of experimenters, the selection of ground sites, their preparation and operation, the inflight experiments on Gemini 5 and Gemini 7, the resulting data and their interpretation, the conclusions and their meaning in terms of the Apollo mission and other future spaceflights, as well as certain suggestions for future inflight tests of human visual capabilities in space. Author

**N69-10907** Polish Academy of Sciences, Lodz.  
**HUMAN REACTIONS TO STRESS CONDITIONS SIMILAR TO THOSE ENCOUNTERED DURING LONG-DURATION SPACEFLIGHT [ZACHOWANIE SIE CZLOWIEKA W SYTUACJI STRESSOWEJ PODOBNEJ DO WARUNKOW DLUGOTRWALEGO LOTU KOSMICZNEGO /WYPRAWA SPELEOLOGICZNA/]**

Krystyna Galubinska *In its Progr. in Astronautics* 1967 p 89-102  
refs In POLISH (See N69-10903 01-30)  
Avail: CFSTI

Experiments are described in which the behavior of two groups was observed under stress while isolated for 14 days in mountain caves. The groups included males as well as females. The individuals were required to perform a number of tasks. Perceptual functioning, psychomotor performance, and psychometric tests are evaluated in this paper. The reactions of the individuals are assessed in terms of motivation, emotional stability, educational level, and similar personal traits. Transl. by K.W.

**N69-10950#** Milan Univ. (Italy). Istituto di Scienze Botaniche.  
**THE SYNTHESIS OF 3 PGA-1-C-14 AND DIHYDROXYACETONE-PHOSPHATE-1-C-14 FOR THE PREPARATION OF GLUCOSE-3-C-14 AND GLUCOSE-4-C-14 [SINTESI DELL'ACIDO 3-FOSFOGLICERICO-1-C-14 E DI DEIDROSSIACETONFOSFATO-1-C-14 AI FINI DELLA PREPARAZIONE DI GLUCOSIO-3-C-14 E DI GLUCOSIO-4-C-14]**

E. Sturani 1968 19 p In ITALIAN; ENGLISH summary  
(Contract EURATOM-083-64-11 RISI)  
(EUR-4044i) Avail: CFSTI

High specific activity 3 PGA-1-14C obtained by means of the ribulose diphosphate carboxylase reaction is used for the preparation of DHAP-1-14C and fructose-3-14C with the aid of the following enzymes: 3 PGA kinase, GAP dehydrogenase and triosephosphate isomerase. The fructose 3-14C, which is obtained from FDP by the action of acidic phosphatase, is transformed into glucose-3-14C in the presence of hexokinase and phosphoisomerase. Author

**N69-10967#** Japan Atomic Energy Research Inst., Tokyo.  
**SURFACE CHEMICAL STUDIES ON RADIOACTIVE CONTAMINATION AND DECONTAMINATION OF SOLID SURFACES**

Yoshiki Wadachi 1968 35 p refs In JAPANESE; ENGLISH summary  
(JAERI-1165) Avail: CFSTI

The mechanisms of RI aqueous solution contamination, and its decontamination of solid surfaces were studied surface chemically. Solid surfaces were classified into permeable (cotton cloth) and impermeable (metal, paint, plastic) surfaces, concerning RI aqueous contamination, and the mechanisms of contamination were classified considering also their decontamination. The mechanisms of decontamination were classified according to the actions of decontaminants. Based on these classifications, the mechanisms of solid surface radioactive contamination and decontamination were studied systematically by means of the washing of RI contaminated surfaces with water, surfactants and decontaminants. In addition, studies were carried out on the mechanisms of the contamination and decontamination of solid surface (active carbon powder) which is difficult to classify into permeable or impermeable surface. Author

**N69-10970\*#** Howard Univ., Washington, D. C. Dept. of Physiology.

**NEUROHUMORAL CONTROL SYSTEMS OPERATION IN ADJUSTMENT OF VENTRICULAR PERFORMANCE Semiannual Technical Report, Period Ending 14 Jul. 1968**

Edward Wm. Hawthorne Oct. 1968 12 p  
(Grant NGL-09-011-017)  
(NASA-CR-97625) Avail: CFSTI CSCL 06C

Results of studies on the effects of carotid sinus hypotension on cardiac function and aortic pressure in awake, intact dogs are reported. Dogs were instrumented for study using cuffs and measurements were made of the simultaneous changes occurring in brachiocephalic artery pressure (above the point of cuff constriction), aortic pressure, ventricular pressure, and left ventricular external circumference changes. The left subclavian was ligated so that all head pressure and blood flow was via the brachiocephalic artery. Primary results of these preliminary experiments are as follows: (1) a significant fall in head pressure and therefore carotid sinus pressure bilaterally can be easily produced by temporarily occluding a cuff placed about the brachiocephalic artery in awake instrumented dogs that have left subclavian artery ligation; (2) carotid sinus hypotension induced in awake dogs well past their recuperative period following surgery for instrumentation can be carried out without pain or discomfort to the animal; (3) sudden and temporary carotid sinus hypotension in awake dogs typically increases heart rate, aortic pressure, left ventricular end-diastolic pressure and heart size, both end-diastolic and end-systolic; (4) in awake dogs with complete beta adrenergic receptor blockade after propanolol infusion, temporary carotid sinus hypotension caused a reversal of the bradycardia induced by phenylephrine infusion; and (5) carotid sinus hypotension can increase heart rate significantly by either inhibiting cardiac vagal activity or by increasing sympathetic activity, or both. S. C. W.

**N69-10981\*#** Aztec School of Languages, Inc., Acton, Mass.  
**MORPHOLOGICAL AND PHYSIOLOGICAL INVESTIGATIONS OF FERN PROTHALLIA [MORPHOLOGISCHE UND PHYSIOLOGISCHE UNTERSUCHUNGEN AN FARNPROTHALLIEN]**  
Reinhard Orth Washington NASA Nov. 1968 50 p refs Transl. into ENGLISH from *Planta* (Berlin), v. 25, 1936 p 104-150  
(Contract NASw-1692)  
(NASA-TT-F-11970) Avail: CFSTI CSCL 06C

The spores of homosporous ferns are found to be pigmented yellow or green by the same pigments as occur in the leaves. The tentative results of quantitative analyses for chlorophyll, carotin, carotinoids, and xanthophyll are reported. On the basis of

## N69-10987

morphogenetic and morphological investigations, the need for a clear distinction between protonema and prothallium is demonstrated and taxonomical inferences are advanced. A morphogenetic sequence is derived from a classification by prothallium geometries starting with *Trichomanes* and ending with *Osmunda*. Author

**N69-10987#** University of Southern Calif., Los Angeles. Electronic Sciences Lab.

### **OPTIMUM QUADRUPED CREEPING GAITS Scientific Interim Report**

R. B. McGee and A. A. Frank Jul. 1968 38 p refs  
(Grant AF-AFOSR-67-1018A)  
(AD-675256; USCEE-294; AFOSR-68-1846) Avail: CFSTI CSCL 6/3

This paper examines all of the theoretically possible quadruped gaits. Only six gaits can be executed while three feet are on the ground at all times. These six, called creeping gaits, permit a quadruped to remain statically stable during most of a locomotion cycle. The gaits were analyzed by means of a  $2n-1$  parameter model with extensions that account for basic kinematic parameters associated with geometric aspects of a quadruped machine or animal. The model considers only steady state, constant speed locomotion in a straight line over a horizontal plane supporting surface with the legs of the system cycling periodically in both space and time. Only three of the six gaits enable the quadruped to be statically stable at all times. Of the three, one is a unique optimum gait with maximum static stability. The gait corresponds to the normal quadruped crawl favored by most animals for very low speed locomotion. The model, though idealized, appears sufficiently close to reality to permit qualitative extrapolation to real locomotion systems. Stability analysis of biped gaits requires the use of dynamic models that will necessarily be more complex than the kinematic model. Author (TAB)

**N69-11042\*#** Space Sciences, Inc., Chicago, Ill. Biosystems Div.  
**VISION DURING MANNED BOOSTER OPERATION Final Report**

Arne Troelstra, William O'Neill, and Lawrence Stark Waltham, Mass. Apr. 1968 160 p refs  
(Contract NAS8-20381)  
(NASA-CR-98078) Avail: CFSTI CSCL 06S

The literature concerning the human eye lens is reviewed, and the relevant characteristics of the various elements of the accommodation feedback control system are indicated. Information on the anatomy, physiology, and functional experimental procedures relative to the accommodative process is presented emphasizing quantitative aspects. Methods of measuring accommodation are also stressed. Image formation is studied from the classical and the spatial transformation viewpoints. A survey of dynamic optometers points out the requirements for experimental instrumentation. Possible clinical and mission oriented applications of a proposed optical status tester are outlined for monitoring the ocular near-reflex under various environmental conditions. K.W.

**N69-11056\*#** National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

### **A MICRO LAGOON TECHNIQUE FOR THE CULTURE AND OBSERVATION OF ISOLATED MAMMALIAN CELLS**

Clarence D. Cone, Jr. and Kathryn M. Peddrew Washington Nov. 1968 26 p refs  
(NASA-TN-D-4906) Avail: CFSTI CSCL 06A

A technique for physically partitioning a monolayer of cells into micro regions on a culturing surface is described. The method consists of forming a thin grease layer into a field of tiny ponds or lagoons in which small numbers of cells or other microbiological specimens can be confined for purposes of growth, manipulation, and microscopic observation. Special instruments and procedures which have been developed for lagoon-field formation are described

in detail, as are the characteristics of various formation materials which have been evaluated. Factors and problems affecting various aspects of lagoon-field suitability for cytological purposes are discussed, and the details of special culturing vessels and lagoon-inoculation procedures which have been developed by the authors for particular types of experiments are presented. A number of cytological applications, particularly in the field of time-lapse cinemography, in which the technique has proven to be exceptionally valuable are outlined. The basic micro lagooning techniques described have considerable flexibility for adaptation and should thus prove to be useful for a wide range of cytological applications where simple micro isolation is a prime requirement. Author

**N69-11098#** Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.

### **INDUCED RADIONUCLIDES IN ASTRONAUTS Quarterly Activity Report, 1 Jan.-1 Apr. 1968**

R. L. Brodzinski, N. A. Wogman, and R. W. Perkins 17 Apr. 1968 32 p refs  
(Contract AT(45-1)-1830)  
(BNWL-531-3) Avail: CFSTI

The absolute and relative production rates of  $^7\text{Be}$ ,  $^{22}\text{Na}$ , and  $^{24}\text{Na}$  were measured in tissue and tissue equivalent solutions exposed to high energy proton beams. The production rate of  $^7\text{Be}$  was shown to be in reasonably good agreement with calculated production rates based on cross sections. The induced  $^7\text{Be}$  as a function of radiation dose and energy were also in good agreement with the theoretical values. Of particular significance in this work, was the observation that the ratio of  $^7\text{Be}$  to  $^{24}\text{Na}$  increased smoothly as a function of increasing proton energy. The ratio of these radionuclides, therefore, allows one to determine the effective bombarding energy of the protons. Once this energy is known the irradiation dose can be determined directly from the experimental and theoretical curves that define activity per unit dose as a function of energy. The second significant observation was the high levels of  $^{11}\text{C}$  produced in human patients on proton bombardment. Author (NSA)

**N69-11135**  
**BIOLOGICAL INVESTIGATIONS IN SPACE**

O. Gzenko et al [1968] 4 p Transl. into ENGLISH from Pravda (Moscow), no. 320(18367), 15 Nov. 1968 3 p  
Avail: CFSTI

Biological experiments conducted by the Zond 5 lunar probe and during other space missions as well as laboratory studies simulating space flight conditions are summarized in terms of some accomplishments and their possible significance. Mention is made of difficulties in simulating prolonged weightlessness and the continuous study of the effects of cosmic radiation. Changes in hereditary structures of some lower forms of life are noted, as in the experiment with lysogenic bacteria aboard Zond 5. M.W.R.

**N69-11170#** Los Alamos Scientific Lab., N. Mex.  
**AIR SAMPLING WITH PLASTIC BAGS**

B. C. Eutsler and E. E. Campbell [1968] 9 p refs Presented at Am. Ind. Hyg. Assoc. of the Rocky Mt. Sect., Albuquerque, N. Mex.  
(LA-DC-9056; CONF-670937-3) Avail: CFSTI

The use of plastic bags for in-plant air sampling is investigated. Mylar bags which hold approximately 14 liters were tested. The bags were filled with air and then injected with the contaminant to be tested. The air sample was then transferred to an infrared cell or gas chromatograph and tested. Test results, including storage losses, for various compounds are presented. NSA



**N69-11189#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Aerospace Medical Research Labs.  
**HUMAN EQUILIBRIUM DURING ACOUSTIC STIMULATION BY DISCRETE FREQUENCIES** Final Report, Nov. 1966-Feb. 1967

C. Stanley Harris and Henry C. Sommer May 1968 18 p refs (AD-675172; AMRL-TR-68-7) Avail: CFSTI CSCL 6/19

The ability of subjects to balance on narrow rails was measured during exposure to pure tones of 100, 260, 590, 1500, and 2500 Hz and a control condition. One group of subjects was presented the test stimulus at intensity levels of 95 dB (re 0.0002 dvne/sq cm) in the left ear and 75 dB in the right ear (asymmetrical exposure). The other group was presented the tones at a level of 95 dB in both ears (symmetrical exposure). A decrement in rail performance occurred at 1500 Hz for the asymmetrical exposure group and at 590 Hz for the symmetrical exposure group. The decrement determined with symmetrical exposure was less than the decrement found with asymmetrical exposure. Author (TAB)

**N69-11207#** Wisconsin Univ., Madison. Dept. of Radiology.  
**CONSTRUCTION OF AN I-125 PHOTON SOURCE USING AN IMPROVED SOURCE HOLDER**

R. M. Witt, J. A. Sorenson, and J. R. Cameron 22 Jul. 1968 6 p refs

(Contract AT(11-1)-1422)  
 (COO-1422-36) Avail: CFSTI

The procedure used to construct an I<sup>125</sup> photon source for bone mineral scanning is described. The anion exchange technique is used. Details on the design and materials of the special I<sup>125</sup> resin bead source holder are given. NSA

**N69-11228#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**PHYSIOLOGICAL ASPECTS OF WEIGHTLESSNESS**

I. I. Kas'yan and V. I. Kopanev 29 Mar. 1968 27 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow) (AD-675455; FTD-MT-24-36-68) Avail: CFSTI CSCL 6/19

A comprehensive review of literature published in 1964 and 1965 on all aspects of the physiological effects of weightlessness, particularly during manned space flight, is presented. Results of Soviet research in the area are emphasized, though reference is made to American data as well. The most significant works are summarized briefly and concisely and appropriate graphics are included. A bibliography of Soviet and Western references is provided. TAB

**N69-11235#** Oklahoma Univ., Norman.  
**FAST NEUTRON DOSIMETRY OF CF-252**

George Davis Oliver, Jr. (Ph.D. Thesis) 1968 75 p refs Supported by AEC (TID-24609) Avail: CFSTI

An investigation of the fast neutron dose rate in millirad per hour around a linear californium-252 source in a simulated tissue environment using a practical dosimetry system is described. Two methods of measurement were used to determine the dose rate decrease with increasing tissue depth: silicon diode dosimeters and activation threshold foils. Also, the diode dosimeters were used to measure the fast neutron dose distribution in a single plane around the californium-252 source. Based on this distribution, an isodose chart was established. This investigation is aimed toward the practical use of californium-252 for radiotherapy. NSA

**N69-11254#** RAND Corp., Santa Monica, Calif.  
**NEW DIRECTIONS IN ORGANIZATION THEORY**

Timothy Hallinan Sep. 1968 15 p refs (AD-675167; P-3936) Avail: CFSTI CSCL 5/1

A summary is given of the historical development of organization theory. Organization theory draws heavily on many

fields: psychology, sociology, anthropology, industrial management, business and public administration, economics and political science, among others. Five schools or approaches were identified within the field. They are: closed system or machine model derived from administrative management; relationship of morale to productivity; internal dynamics of organizational behavior; open ended system of informal organizations; and organization in its environment as a unit of observation and analysis. B.P.

**N69-11291\*#** Franklin Inst., Philadelphia, Pa. Biodynamics Lab.  
**[RESEARCH IN LIFE SCIENCES INSTRUMENTATION PERTINENT TO STUDIES IN SPACE BIOLOGY] Quarterly Progress Report, 1 Jul.-30 Sep. 1968**

R. M. Goodman Sep. 1968 8 p (Contract NSR-39-005-018)

(NASA-CR-97745; Q-B2299-14) Avail: CFSTI CSCL 06B

Subcarrier oscillators (SCO) with center frequencies of 1.7 Kc/S, 3.0 Kc/S and 5.4 Kc/S have been developed for temperature sensing. Preparation of electrodes for use in telemeters is continuing. Epoxies, waxes, shellacs, pure and modified with fillers have been tested for sealing metal electrodes to glass. Epoxies have been determined to be the best for this purpose and are being used in the fabrication of electrodes. Silver-silver chloride electrodes made of commercially pure silver wire have been sealed into glass and chlorided. Tests indicate that most pairs show less than two or three millivolts inter-electrode potential when freshly made and after shorting and ageing in a conductive solution show only a fraction of a millivolt between pairs. Some of these electrodes, coated with a transparent silastic, are permeable to water and show no difference from uncoated ones with respect to potential and stabilize quite rapidly. A method of obtaining a long lasting intervening film of KCl between the AgCl and silastic is being developed and, if successful, will be used as the reference electrode against other types, especially the pH electrode. A.L.

**N69-11350** California Univ., Los Angeles.  
**PERCEPTION OF REAL AND APPARENT MOTION OF TWO OBJECTS IN A STRUCTURELESS VISUAL FIELD**

John Nixon Fox (Ph.D. Thesis) 1967 139 p

Avail: Univ. Microfilms: HC \$6.60/Microfilm \$3.00 Order No. 68-4460

A history of visual perception of real and apparent motion is presented. An experiment was performed to investigate factors that influence the visual perception of movement and its direction of two targets in a dark and otherwise structureless visual field. Two circular targets were projected onto a screen in a dark room. Either target could move to the left or right, or could remain motionless. Subjects viewed the targets for two seconds, and then used hand controllers to indicate their impression of target movement between the two targets. In addition to the speed and direction of the movement of the targets, other independent variables were presence of a reference frame versus no reference, area ratio of the two targets, and the initial position relative to each other. For the velocities investigated, subjects were much better in perception of relative motion than for absolute motion. Dissert. Abstr.

**N69-11387#** National Science Foundation, Washington, D. C.  
**CONTRIBUTIONS OF GEOGRAPHICAL ANALYSIS TO THE STUDY OF HUMAN RESPONSE TO WEATHER AND CLIMATE**

W. R. Derrick Sewell (Victoria Univ., Brit. Columbia) and Robert W. Kates (Clark Univ., Worcester, Mass.) *In its Human Dimensions of the Atmosphere* Feb. 1968 p 29-41 refs (See N69-11384 02-20)

Avail: SOD \$1.50; CFSTI

Questions relating to human adjustment to weather and climate are identified, and past contributions to geographical literature which have attempted to answer the following questions are reviewed: (1) To what extent are various human activities sensitive to changes in weather? (2) What is the impact of weather and climate on choice of location (e.g., for industry)? (3) How does weather affect the decision-making process? (4) How do human activities affect the weather? Also outlined are directions which future research on human adjustment to the atmosphere should take. Four main lines of inquiry are recommended, corresponding to the four major questions posed. S.C.W.

**N69-11389#** National Science Foundation, Washington, D. C.  
**SOCIOLOGICAL ASPECTS OF HUMAN DIMENSIONS OF THE ATMOSPHERE**

J. Eugene Haas (Colorado Univ., Boulder) *In its Human Dimensions of the Atmosphere* Feb. 1968 p 53-57 (See N69-11384 02-20)

Avail: SOD \$1.50; CFSTI

Major questions concerning sociological aspects of the relation between specific dimensions of normal weather variation and the various human activities in a community or region are discussed, and a proposed outline is given as a possible approach to research in this area. Considered are the incidence of illness and the use of health facilities and personnel; the incidence of crime, and law enforcement efforts; the nature of major recreational and leisure time activities; the incidence of racial disturbances; the demand for and use of welfare services; and questions regarding man's perception of the adaptation to extreme weather events, such as hurricanes, blizzards, tornadoes, and floods. To accomplish a better understanding of the relationships between man and the atmosphere it is recommended that: (1) research proposals dealing with the social, political, and economic aspects of planned weather modification be given high priority in order to reduce ignorance about the short and long term consequences of modification activities; (2) a multidisciplinary approach to the study of human dimensions of the atmosphere be adopted since it offers distinct advantages in areas such as urban and regional planning, rehabilitation of persons with medical disabilities, war on poverty efforts, organizational analysis, and criminology; (3) a center be established preferably on a university campus for collecting and disseminating information about activities and opportunities related to both basic and applied research on human dimensions of the atmosphere; and (4) symposia be planned to consider international aspects of the problem and an active exchange be established to provide opportunities for teaching and consultation activities and intensive research. S.C.W.

**N69-11390#** National Science Foundation, Washington, D. C.  
**ECONOMIC RESEARCH ASPECTS OF HUMAN ADJUSTMENT TO WEATHER AND CLIMATE**

James A. Crutchfield (Washington Univ., Seattle) and W. R. Derrick Sewell (Victoria Univ., Brit. Columbia) *In its Human Dimensions of the Atmosphere* Feb. 1968 p 59-69 refs (See N69-11384 02-20)

Avail: SOD \$1.50; CFSTI

Economic aspects of scientific weather and climate modifications on human activities are discussed. It is shown that there are three major alternative adjustments to the weather: (1) reducing uncertainty through improvement of weather information; (2) devising techniques to offset the impact of weather; and (3) developing means to alter the weather. Assessed are major questions involved in determining what factors need to be considered to determine which approach is economically most efficient. Major questions include the following: (1) Which activities are sensitive to weather variations and in what degree? (2) To what extent are the various adjustments technically feasible? (3) What are the gains and costs of each of the alternatives? Progress in economic

research relating to the human use of the atmosphere; economic impacts of weather variations; techniques of evaluation; and manpower requirements are considered. Priorities for future research are also discussed which focus on the following major topics: (1) the relationships between weather variations and output and income in different economic activities; (2) the evaluation of alternative adjustments to the weather; (3) opportunities where scientific knowledge and efforts are still in the embryonic stage; and (4) economics of information. S.C.W.

**N69-11391#** National Science Foundation, Washington, D. C.  
**NEEDS FOR RESEARCH ON THE POLITICAL ASPECTS OF THE HUMAN USE OF THE ATMOSPHERE**

Vincent Ostrom (Indiana Univ., Bloomington) *In its Human Dimensions of the Atmosphere* Feb. 1968 p 71-79 (See N69-11384 02-20)

Avail: SOD \$1.50; CFSTI

Major questions on the political aspects of the human use of the atmosphere are discussed. Considered are the following: (1) How will human welfare be affected by efforts to modify atmospheric conditions? (2) What are the essential characteristics of atmosphere as a resource system which must be taken into account in the organization of an appropriate enterprise and management system? (3) What enterprise-management systems are appropriate for the development of atmospheric resources? (4) What institutional arrangements are already available to facilitate new experimental and operational programs concerned with the development of atmospheric resources? (5) What effects will decision making arrangements in the American political system have upon the organization and regulation of a predominantly public enterprise-management system which does not function in an open competitive market economy? S.C.W.

**N69-11392#** National Science Foundation, Washington, D. C.  
**HUMAN DIMENSIONS OF THE ATMOSPHERE FROM THE PERSPECTIVE OF A POLITICAL SCIENTIST**

Dean E. Mann (California Univ., Santa Barbara) *In its Human Dimensions of the Atmosphere* Feb. 1968 p 81-86 (See N69-11384 02-20)

Avail: SOD \$1.50; CFSTI

Political, economic, and strategic implications of the human use of the atmosphere or human reactions to atmospheric change are discussed; and research needs of political scientists in their studies of public policy and decision making processes which have potential value understanding human reactions to atmospheric change are examined. S.C.W.

**N69-11401** Duke Univ., Durham, N. C.  
**SOLAR ULTRAVIOLET RADIATION AND PLANT PROCESSES ON THE ALPINE TUNDRA**

Martyn Mathews Caldwell (Ph.D. Thesis) 1967 239 p

Avail: Univ. Microfilms: HC \$10.80/Microfilm \$3.10 Order No. 68-5214

Solar ultraviolet radiation was considered as an ecological factor in respect to alpine plants growing on the east slope of the Colorado Front Range. This study had a threefold objective: (1) to characterize the alpine ultraviolet radiation environment in terms of biologically effective wavelengths, (2) to evaluate the effect of excluding solar UV from the natural alpine plant community, (3) to investigate possible adaptive mechanisms of alpine plants to relatively intense UV. At several elevations from 125 m to 4350 m above sea level, UV-B irradiance (2800 to 3150 Å) was measured with a phototube which possessed a relative quantum spectral sensitivity approximating the action spectra of several plant reactions to UV-B which are linked to protein or nucleic acid chromatophores. Absolute units of UV-B irradiance are defined to account for this relative photon effectiveness at each wavelength in terms of these biological reactions. These measurements of

global (direct sun + sky) UV-B were taken over a range of solar zenith angles, atmospheric ozone concentrations, cloud conditions, and atmospheric turbidity levels. Multiple regression analyses can account for 96% of the variability in these measurements.  
Dissert. Abstr.

**N69-11476#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.  
**THE PHYSIOLOGY OF MAN AND ANIMALS**  
8 Mar. 1968 168 p refs Transl. into ENGLISH from Akad. Nauk SSSR, Inst. Nauchnoy Inform., 1964 p 5-124  
(AD-675383; FTD-MT-24-95-67) Avail: CFSTI

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**N69-11477#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.  
**DEVELOPMENT OF BASIC DIRECTIONS OF SPACE BIOLOGY AND MEDICINE**  
A. D. Voskresenskiy *In its* The Physiol. of Man and Animals 8 Mar. 1968 p 1-50 refs (See N69-11476 02-04)  
Avail: CFSTI

Problems of life support in space flight are reviewed. The physiological requirements for a system of support of the gaseous environment of the cabin, clothing, food supply, and special equipment for the astronaut are indicated and the effects of acceleration and vibration on the body's physiology are summarized. The influence of weightlessness on the cardiovascular system is mentioned. Radiation hazards to astronauts are cited as well as problems of obtaining an analysis of biological information from on-board the spaceship. The selection and training of astronauts is also discussed.  
Author

**N69-11478#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.  
**PHYSIOLOGY OF LABOR UNDER CONDITIONS OF THE NEW TECHNOLOGY**  
M. I. Vinogradov *In its* The Physiol. of Man and Animals 8 Mar. 1968 p 51-80 refs (See N69-11476 02-04)  
Avail: CFSTI

The basic content of the labor process is becoming a complicated mixture of mental activity with elements of motor activity (work on control panels, computers, remote and automatic control equipment, etc.). Hence a new approach to the analysis of the labor process is necessary. Now the problem of the relationship and interdependence between man and the tools of production arises as a problem of man-machine or, more particularly, of man-matomatic-machine system. At the same time there arises the question of the means of studying the new forms of labor under conditions of new technology. It was found that the concept of the "physiology of labor" in the direct and narrow sense becomes insufficient for an exhaustive appraisal of the labor process. There appears to be an imperative need to combine its methods with the

methods and means of investigation of other scientific disciplines: psychology, technology, mathematics, physics, biophysics, economics, sociology, and others.  
Author

**N69-11479#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.  
**CONTEMPORARY CONCEPTS ON THE ROLE OF THE KIDNEYS IN THE PATHOGENESIS OF HYPERTONIA**  
S. M. Shenderov *In its* The Physiol. of Man and Animals 8 Mar. 1968 p 81-115 refs (See N69-11476 02-04)  
Avail: CFSTI

Some of the main questions concerning the pathogenesis of hypertonic disease are discussed. The leading etiological factor of hypertonic disease is disturbance of the nervous regulation of the vascular tonus, which causes the secondary inclusion of the remaining sections of the pathogenetic mechanism of the disease. It is understandable that during lesion of the kidneys their inclusion in the pathogenesis of hypertonia occurs considerably easier, and the disturbances of nervous regulation of the tonus of the blood vessels in the clinical picture of the sickness is relegated to a secondary role.  
Author

**N69-11480#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.  
**THE ELECTROENCEPHALOGRAPHIC EXPRESSION OF THE CONDITIONED REFLEX**  
Yu. A. Kholodov *In its* The Physiol. of Man and Animals 8 Mar. 1968 p 116-133 refs (See N69-11476 02-04)  
Avail: CFSTI

Application of the microelectrode technology of investigation, the use of electronic computers and automatic devices in the processing of results, and the clarification of the role of the glial formations in the flow of nervous processes are discussed.  
Author

**N69-11481#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.  
**MECHANISMS OF THE FORMATION OPERANT REACTIONS**  
M. I. Lisina *In its* The Physiol. of Man and Animals 8 Mar. 1968 p 134-154 refs (See N69-11476 02-04)  
Avail: CFSTI

The influence of the character of reinforcement in animals on the formation and functioning of instrumental reactions is discussed emphasizing forms of reinforcing agents; the influence of the dimension and the intensity of reinforcement on instrumental reactions, the influence of the interval between the conditioned and the unconditioned stimulus, conditions of reinforcement, and secondary reinforcement.  
Author

**N69-11528\*#** Medical Coll. of Virginia, Richmond. Dept. of Radiology.  
**INVESTIGATION OF TOTAL ENERGY ABSORPTION IN OMNI-DIRECTIONAL GAMMA-RAY, BREMSSTRAHLUNG AND NEUTRON FLUXES Status Report for Period Through 1 Oct. 1968**  
Fearghus T. O'Foghludha 1 Nov. 1968 43 p refs  
(Grant NGR-47-002-004)  
(NASA-CR-66720) Avail: CFSTI CSCL 06R

Reports on investigation in radiology, dosimetry, and related topics are presented. Details are given on a method of producing variable-energy gamma rays by Compton scattering. Scintillation dosimetry with low-Z phosphors and the use of the dosimeters to study percentage depth doses in monoenergetic beams are discussed. Preliminary investigations on using a combination of heavy water and sodium 24 to obtain a neutron source are described. Beta ray extracorporeal irradiators and multi-radioactive tracer uptake analysis are reported. Several valuable spin-offs in clinical

## N69-11574

areas are indicated relating to blood irradiation, bone calcium determinations, radioactive isotope telemetry, and scatter radius function. N.E.N.

**N69-11574\*#** Stanford Research Inst., Menlo Park, Calif.

### **PREDICTION OF EFFECTS OF NOISE ON MAN**

Karl D. Kryter *In* NASA Progr. of NASA Res. Relating to Noise Alleviation of Large Subsonic Jet Aircraft 1968 p 547-560 refs (See N69-11542 02-02)

Avail: CFSTI

The major basic deleterious effects of noise on man are (1) masking of speech, (2) damage to hearing, and (3) perceived noisiness or unwantedness. Present knowledge permits accurate quantitative prediction from spectral measures of a noise and the effects of the noise on the understandability of speech and on temporary and permanent deafness. Methods for the quantitative prediction from spectral measures of noise and the basic effects of noise on perceived noisiness and behavior of people have been developed to the point that standardization of these methods is perhaps possible. Author

**N69-11575\*#** North Carolina State Coll., Raleigh.

### **STUDIES RELATING THE INDIVIDUAL CHARACTERISTICS OF PEOPLE WITH THEIR RESPONSES TO NOISE**

Richard G. Pearson and Franklin D. Hart *In* NASA Progr. of NASA Res. Relating to Noise Alleviation of Large Subsonic Jet Aircraft 1968 p 561-572 (See N69-11542 02-02)

Avail: CFSTI

One hundred sixty-six male and female adult subjects varying in age, occupation, educational level, race, and area of residence were exposed to and rated the annoyance of aviation and industrial noise stimuli under two "psychologically different" indoor room environments. This followed assessment of personality and of attitudes toward community, transportation, and noise. Mean annoyance ratings of the subjects exposed to several acoustic stimuli varied considerably despite the fact that the stimuli levels in the test room were held constant at 82 dB (sound pressure). Ratings did not vary with psychological environment but did vary extensively among subjects. Factor analysis of the personality-attitude data resulted in identification of several useful factors for multiple regression prediction of annoyance—for example noise sensitivity, imperturbable personality, antiaviation and isolationist attitudes, and anxiety. Author

**N69-11578\*#** National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala.

### **PERCEIVED SOUND AND THE FREQUENCY RESPONSE CHARACTERISTICS OF THE HUMAN AUDITORY SYSTEM**

Jess H. Jones *In* its Progr. of NASA Res. Relating to Noise Alleviation of Large Subsonic Jet Aircraft 1968 p 601-635 refs (See N69-11542 02-02)

Avail: CFSTI

A simple model of the human auditory system is presented from a dynamic response point of view—that is, input-output. The output of a human auditory system, which is defined as the perceived sound, is determined by multiplying the input acoustic stimulus by the square of the complex frequency response function of the auditory system. It is shown that, in terms of this model, the inverse equal noisiness (or equal loudness) contours are in effect the transfer function for the human auditory system. Perceived sound estimates obtained through the use of this model are presented and it is shown that these estimates agree with judgment test results as well as or better than the predictions obtained by presently accepted methods. Arguments are presented which show that the results obtained through the use of this approach for input sound pressure level values in excess of 60 dB (re: 0.00002 N/m<sup>2</sup>) can be considered valid. The so-called critical bandwidth phenomenon is also interpreted within the framework of the proposed

model; however, the resulting critical bandwidths are greater than the presently accepted values. In the frequency region near the peak in the response curve, this model clearly predicts that the perceived sound level will decrease instead of increase for bandwidths greater than the critical band. Author

**N69-11610\*#** Techtran Corp., Glen Burnie, Md.

### **THE BASIC FORM OF THE ARTERIAL PULSE. FIRST TREATISE. MATHEMATICAL ANALYSIS [DIE GRUNDFORM DES ARTERIELLEN PULSES. ERSTE ABHANDLUNG. MATHEMATISCHE ANALYSE]**

O. Frank Washington NASA Oct. 1968 33 p refs Transl. into ENGLISH from Z. Biol. (Munich), v. 37, no. 511, 1898 p 483-526

(Contract NASw-1695)

(NASA-TT-F-11969) Avail: CFSTI CSCL 06P

Mechanical relationships of arteries are compared quantitatively with those in a fire engine air chamber. Physically both are pressurized systems dependent on tubular flow. Circulatory data were provided by a frog's heart. The diastolic pulse curve cannot be represented exponentially in a simple way, but the systolic can. A number of possible methods of expanding mechanical understanding of the arterial system are suggested with mathematical proposals for their solution. Author

**N69-11614#** School of Aerospace Medicine, Brooks AFB, Tex.

### **EFFECTS OF ACCELERATION ON HUMAN PERFORMANCE AND PHYSIOLOGY, WITH SPECIAL REFERENCE TO TRANSVERSE G**

Vija Z. Little, Bryce O. Hartman, and Sidney D. Leverett, Jr. Jun. 1968 24 p refs *Its* Aeromed. Rev. 4-68 Submitted for publication

(AD-676209; SAM-TR-68-60) Avail: CFSTI CSCL 6/19

A review is presented of the literature on the psychomotor and physiologic effects of acceleration, emphasizing primarily +Gx. Among the topics reviewed are terminology, cardiovascular effects, mechanical loading effects, performance changes, and tolerance limits. Author (TAB)

**N69-11623#** Naval Research Lab., Washington, D. C. Nuclear Physics Div.

### **THERMOLUMINESCENT DOSIMETERS FOR PERSONNEL MONITORING**

F. H. Attix, E. J. West, A. E. Nash, S. G. Gorbics, and T. L. Johnson *In* its Rept. of NRL Progr., Mar. 1968 p 1-11 refs (See N69-11622 02-34) Presented at Congr. on Nucl. Electron. and Radioprotect., Toulouse, France, 4-8 Mar. 1968 Supported in part by AEC

Avail: CFSTI

A number of thermoluminescent phosphors are suitable for application in personnel radiation monitoring. The principal characteristics of six of them are summarized: LiF(TLD-100), CaF<sub>2</sub>:Mn, CaF<sub>2</sub> (fluorite), Li<sub>2</sub>B<sub>4</sub>O<sub>7</sub>:Mn, CaSO<sub>4</sub>:Mn, and BeO. Some useful dosimeter configurations are also discussed, including a new dual-phosphor design that is capable of measuring the X- or gamma-ray effective energy as well as the exposure or dose. Relative performance results for CaF<sub>2</sub>:Mn dosimeters versus film badges are also included. Author

**N69-11675\*#** Case Western Reserve Univ., Cleveland, Ohio.

### **A LUNAR GRAVITY SIMULATOR. VOLUME 1**

Washington NASA Nov. 1968 34 p

(Contract NAS1-7459)

(NASA-CR-1233-vol-1) Avail: CFSTI CSCL 14B

A prototype lunar gravity simulator using magnetic air bearing supports with constant force spring motors, and specially designed harness is described. The system is suspended from a steel ceiling. The subject, wearing a crash helmet and boots, rides in a three

axis gimballed harness. The harness system is suspended from the center of a spider ring which is supported by cables that wind and unwind by constant force spring motors. The system supports approximately 5/6 of the subject's weight, and permits freedom of movement. The simulator is designed to accommodate subjects weighing from 168 to 264 pounds. Testing results, precautions regarding operation, and details of the harness are presented. F.O.S.

**N69-11695\*#** National Aeronautics and Space Administration, Washington, D. C.

**AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES**

Oct. 1968 83 p refs

(NASA-SP-7011(55) Avail: CFSTI CSCL 06

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

**N69-11701#** Joint Publications Research Service, Washington, D. C.

**SELECTED TRANSLATIONS FROM AEROSPACE MEDICINE**

V. V. Parin, ed. and I. M. Khazen, ed. 28 Oct. 1968 259 p refs Transl. into ENGLISH from the Book "Aviakosmicheskaya Meditsina" Moscow, no. 1, 1967 p 11-18, 30-64, 89-92, 97-101, 105-173, 177-189, 216-225, 261-264, 282-306, 309-327, 341-352, 356-376

(JPRS-46751) Avail: SOD/CFSTI

Various aspects of aerospace medicine are discussed such as physiological and psychological testing, effects of space flight stress on the cardiovascular, respiratory, and central nervous systems, and acceleration and altitude tolerances. For individual titles, see N69-11701 through N69-11740.

**N69-11702#** Joint Publications Research Service, Washington, D. C.

**SOME EFFECTS OF ACCELERATION ON THE ORGANISM**

D. Ye. Rozenblyum *In its* Selected Transl. from *Aerospace Med.* 28 Oct. 1968 p 1-8 Presented at Conf. on Space Med., Moscow, Nov. 1963 (See N69-11701 02-04)

Avail: SOD/CFSTI

Two main phases of radial accelerations are defined: (1) a phase of relative, limited compensation when some vital functions are intensified, while others are temporarily suppressed as a means of adaptation and still others are somewhat impaired; and (2) a phase of decompensation which sets in when the accelerations exceed the thresholds of individual tolerance. The relative compensation phase is considered important from the viewpoint of revealing the physiological mechanisms of adaptation. The point is made that the physiological systems responsible for adaptation to gravity bear the burden of coping with the increased gravitation caused by radial accelerations. In the decompensation phase, a circulatory form of brain hypoxia is considered the main mechanism responsible for incipient functional disturbances. Other mechanisms participating in the pathogenesis of disturbances in the decompensation phase are discussed. The view is offered that antigavity drugs, used to minimize the adverse effects of radial accelerations, may be modified and used to increase resistance to other forms of acceleration. M.G.J.

**N69-11703#** Joint Publications Research Service, Washington, D. C.

**PHYSIOLOGICAL REACTIONS OF THE HUMAN ORGANISM TO TRANSVERSE ACCELERATIONS AND SOME WAYS OF INCREASING RESISTANCE TO THEM**

A. S. Barer et al *In its* Selected Transl. from *Aerospace Med.* 28 Oct. 1968 p 9-20 (See N69-11701 02-04)

Avail: SOD/CFSTI

Some 500 experiments on 70 subjects were conducted to study (1) the limits of human tolerance to prolonged accelerations in a back-chest direction at an angle of 65° to the longitudinal axis of the body; (2) different ways of increasing resistance to transverse accelerations; and (3) the tolerance of accelerations over a period of time under selected conditions. A centrifuge with a large radius was used, and recordings were made of the EKG, arterial pressure, volume indices of external respiration, EMG, EEG, and acuity and field of view; in some experiments, the thoracic organs were X-rayed and the exhaled air was analyzed for its gaseous composition. A detailed analysis is presented on the changes observed in the cardiovascular and respiratory systems, and in the functional level of the central nervous system. The stage-by-stage development of the responses of the body is biologically evaluated. M.G.J.

**N69-11704#** Joint Publications Research Service, Washington, D. C.

**PHYSIOLOGICAL STUDIES ON CORIOLIS ACCELERATION**

V. P. Baranova et al *In its* Selected Transl. from *Aerospace Med.* 28 Oct. 1968 p 21-28 (See N69-11701 02-04)

Avail: SOD/CFSTI

A Barany chair equipped to record nystagmus, the cardiac rate, and an arterial oscillogram was used in experiments on 24 people to determine their tolerance of repeated, graduated Coriolis acceleration. A comparison of the clinical data with the observed changes in oculomotor reactions and hemodynamic indices reveals that most individuals with good tolerance of accelerations showed minimum changes in arterial pressure, minute volume, and vascular tone. The duration of the nystagmic reaction decreased as the rotation increased. Findings suggest that compensation of the effects is based on coordinated activity of the vestibular centers whereby the numerous afferent impulses entering the brain do not impair the normal functioning of the autonomic centers. Also revealed is a definite connection between the clinical indices of resistance, nature and degree of hemodynamic changes, and character of the alterations in the vestibulo-oculomotor (according to nystagmus) reactions. M.G.J.

**N69-11705#** Joint Publications Research Service, Washington, D. C.

**EFFECT OF LANDING OVERLOADS AND METHODS OF PROTECTION AGAINST THEM**

G. P. Mirolyubov *In its* Selected Transl. from *Aerospace Med.* 28 Oct. 1968 p 29-35 (See N69-11701 02-04)

Avail: SOD/CFSTI

To assess the effects of landing impacts and ways of protecting the body against them, three series of experiments were conducted on 350 mice and rats, and 54 dogs. The first series studied the animals' resistance to landing impact in relation to its duration and rate of fall of the cage; the second examined the dynamics of pulse and respiration rates, EKG, and arterial pressure. The results showed that landing overloads with a rate of fall of more than 8 m/sec may become intense enough to impair the activity of organs and systems and cause morphological damage and even death. When the rate of fall was less than 8 m/sec, no injuries were received even with overloads of up to 1000 units. The third series of experiments on protection methods involved immersing animals in fluid, and the use of a hard shell conforming to the shape of the animal. Both techniques were found to greatly increase the landing overloads that animals can tolerate. M.G.J.

## N69-11706

**N69-11706#** Joint Publications Research Service, Washington, D. C.

### **CONDITIONING THE VESTIBULAR ANALYSOR TO CORIOLIS ACCELERATION**

Ye. M. Yuganov et al *In its* Selected Transl. from *Aerospace Med.* 28 Oct. 1968 p 36-42 (See N69-11701 02-04)

Avail: SOD/CFSTI

A training program is proposed which combines both the passive action of adequate stimuli and the active movements of the subject. The degree of vestibular conditioning was determined from the change in duration of post-rotation nystagmus, the time the illusion of swinging appeared, and the intensity of the autonomic reactions. Results show that systematic exposure to Coriolis acceleration caused a fairly marked change in the sensitivity of the vestibular apparatus. It was also found: (1) The duration of post-rotation nystagmus gradually decreased in the course of conditioning. (2) The illusion of swinging appeared in conditioned individuals only after the prolonged cumulative effect of the stimulus. (3) The intensity of the autonomic reactions gradually decreased and after 5 to 7 days they disappeared completely. M.G.J.

**N69-11707#** Joint Publications Research Service, Washington, D. C.

### **CHANGE IN HEART SOUNDS IN EXPERIMENTAL CATAPULTING OF MAN**

V. A. Degtyarev *In its* Selected Transl. from *Aerospace Med.* 28 Oct. 1968 p 43-46 (See N69-11701 02-04)

Avail: SOD/CFSTI

A portable magnetic-electrical sensor with a natural oscillation frequency of 200 to 300 Hz was used to record the changes in heart sounds during catapulting. The findings show: (1) Under the influence of emotional excitement, pulse acceleration, intensified cardiac contractions, elevated arterial pressure, and accelerated pulse wave, the amplitude of the first and second heart sounds increases 3- to 4-fold. Saturation of the sounds grows and the intervals between them become shorter. (2) Immediately after catapulting, the amplitude of the first sound generally continues to increase (sometimes to 8 to 10 times the original value) against a background of a quick pulse and accelerated cardiac rate, while the amplitude of the second sound decreases relatively. In some cases, the first and second sounds are split. (3) Immediately before and after catapulting, there is a shortening of the mechanical systole as compared with the electric systole, and there are instances where the low frequency third and fourth sounds are transformed into high frequency sounds. It is suggested that these three phenomena may be caused both by intensification of cardiac activity and by change in the venous flow to the heart. Author

**N69-11708#** Joint Publications Research Service, Washington, D. C.

### **TOLERANCE OF ACCELERATION UNDER UNUSUAL CONDITIONS**

V. V. Usachev *In its* Selected Transl. from *Aerospace Med.* 28 Oct. 1968 p 47-49 (See N69-11701 02-05)

Avail: SOD/CFSTI

Summary data are presented on the results of over 300 centrifuge and flight experiments conducted to determine the physiological capabilities of pilots exposed to accelerations under complicated conditions of oxygen deficiency, breathing at excessive pressures, and flight stress. The oxygen deficiency studies showed that the subjects' resistance to accelerations decreased about 0.5 to 1.5 g. During the accelerations, there was an increase in ventilation, maximum arterial pressure, and pulse pressure; as a rule, the cardiac rate also increased sharply. Under the conditions of acceleration and oxygen breathing at excessive pressure, pilot resistance to accelerations was found to increase by 1 g on the average. Less pronounced changes were noted in external respiration and cardiovascular function than when oxygen was inhaled at

ordinary pressure. In assessing the effects of overloads during low altitude flights, marked functional changes were observed in cardiac activity and respiration during evolutions near the earth. M.G.J.

**N69-11709#** Joint Publications Research Service, Washington, D. C.

### **SOME MATERIALS ON THE HISTORY OF THE STUDY OF THE EFFECTS OF ACCELERATION ON THE BODY**

D. Ye. Rozenblyum *In its* Selected Transl. from *Aerospace Med.* 28 Oct. 1968 p 50-51 refs (See N69-11701 02-04)

Avail: SOD/CFSTI

Capsule information is presented on the centripetal acceleration data published in the late 18th and 19th centuries. These relate to the use of a centrifuge as a means of affecting blood circulation, the mechanism of vertigo during rotation, and the effects of centripetal acceleration on animals in relation to rocket flight problems. M.G.J.

**N69-11710#** Joint Publications Research Service, Washington, D. C.

### **EFFECTS OF DIFFERENT WORK AND REST ROUTINES ON SUBJECTS KEPT IN RELATIVE ISOLATION**

N. I. Andrezheyuk et al *In its* Selected Transl. from *Aerospace Med.* 28 Oct. 1968 p 52-63 (See N69-11701 02-04)

Avail: SOD/CFSTI

Two 15-day experiments were conducted on three subjects in an airtight chamber. The first experiment assessed the reactions produced by a routine involving 8 hours of sleep and 16 hours of wakefulness for each person. One month after its completion, the second experiment with the same subjects was conducted. The men slept for 6 hours, stayed on watch for the same length of time, and spent the same number of hours in rest and self-service. The results show: (1) In general, the 24-hour routine was favorable. The main physiological functions underwent shallow changes characteristically found in people confined to a small, airtight place. (2) More significant changes occurred with the 18-hour cycle where the routines were much different both in duration and in alternation of work and rest periods. The after-effects were more persistent than those which followed the first experiment. (3) The biochemical tests and saliva lysozyme activity signified an endocrine and immunoreactive reconstruction of functions and the development of nervous and emotion strain, especially in the 18-hour cycle experiment. M.G.J.

**N69-11711#** Joint Publications Research Service, Washington, D. C.

### **FUNCTIONAL CHANGES IN MAN IN CHAMBER TESTS**

B. A. Dushkov et al *In its* Selected Transl. from *Aerospace Med.* 28 Oct. 1968 p 64-72 (See N69-11701 02-04)

Avail: SOD/CFSTI

To assess the affects of simulated spaceflight conditions on nervous activity, motor, force and autonomic reactions, and emotional state, small airtight chambers were used in experiments on 80 males lasting from 12 hours to 70 days. Ordinary and altered daily routines were followed. The main objective was to detect deviations in the state of the functional systems and fluids, psychic functions, and efficiency. It was concluded: (1) Relative social isolation and sensory deprivation affected the nervous system, emotions, memory, and physical efficiency. No pathological changes were detected in mental activity. (2) As hypodynamia is indicated as one of the principal situational factors, careful attention should be paid to the physiology of activity in devising suitable motor tasks for the subjects. (3) Deep changes in the mental and physiological functions due to altered work and rest routines make it necessary to consider the question of biological rhythms in designing experiments of this kind. M.G.J.

**N69-11712#** Joint Publications Research Service, Washington, D. C.

**CIRCADIAN RHYTHM OF PHYSIOLOGICAL FUNCTIONS IN MAN UNDER CONDITIONS OF ISOLATION**

V. N. Myasnikov *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 73-78 (See N69-11701 02-04)

Avail: SOD/CFSTI

To determine the effect of different daily routines (normal, inverted, and split) on the circadian rhythm of heart rate, respiration, and temperature, isolation chamber experiments were conducted on healthy young males. An analysis of the results shows: (1) Functional changes were caused by the simultaneous action of isolation, restricted motor activity, and change in normal alternation of periods of wakefulness and sleep. (2) Distortion of normal living routines changed the circadian rhythm of some physiological functions. The reconstruction of respiration in accordance with the split routine occurred as early as the sixth day of the experiment. (3) Prolonged hypodynamia (15 days) gave rise to signs of poor physical condition with a corresponding increase in the heart rate (by 10 to 20 beats) toward the end of the experiment, and to a decrease in functional adaptability to physical exercise thereafter.

M.G.J.

**N69-11713#** Joint Publications Research Service, Washington, D. C.

**EFFECTS OF INCREASED AND DECREASED AFFERENT IMPULSES ON MAN FROM THE STANDPOINT OF SPACE PSYCHOPHYSIOLOGY**

F. D. Gorbo et al *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 79-80 (See N69-11701 02-04)

Avail: SOD/CFSTI

Abstracted data are presented on laboratory experiments involving the formation of body systems, man-spacecraft systems, and man-spacecraft-surrounding space systems. It is pointed out that research is based on the principle of reproducing known or hypothetical space flight factors in order to identify and evaluate environmental influences, and to elucidate the characteristics of the difficult states that arise under these conditions for the purpose of preventing them and predicting tolerance.

Author

**N69-11714#** Joint Publications Research Service, Washington, D. C.

**CHANGES IN CARDIOVASCULAR ACTIVITY AND EXTERNAL RESPIRATION RESULTING FROM PROLONGED MUSCULAR INACTIVITY (HYPODYNAMIA)**

P. V. Buyanov *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 81-85 refs (See N69-11701 02-04)

Avail: SOD/CFSTI

Studies were made of changes in blood circulation, external respiration, and gas exchange immediately after the subject shifted from hypodynamic to normal conditions; the persistence of these changes was also observed. One experiment involved drastic restriction of movements; the other, only partial restriction. The data show that hemodynamic changes occurred in all subjects, gas exchange changes in most. The cardiac rate often was 120% to 150% of the initial rate. Changes in arterial pressure were apparently related not only to the degree and duration of the hypodynamia but also to the personality traits of the subjects. Persistent changes in the external respiratory function were not detected.

M.G.J.

**N69-11715#** Joint Publications Research Service, Washington, D. C.

**PHYSIOLOGICAL REACTIONS DURING A PROLONGED STAY IN AN ARTIFICIAL ATMOSPHERE**

A. G. Kuznetsov et al *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 86-94 refs (See N69-11701 02-04)

Avail: SOD/CFSTI

Two subjects were monitored closely to assess the effects of spending 62 days in a pressure chamber under conditions of normal and low (308 mm Hg) atmospheric pressure and normal partial oxygen pressure. Higher nervous activity, brain bioelectrical activity, EKG, electromyogram, blood pressure, external respiratory and cardiovascular functions, and peripheral blood were measured. Physical exercises were used for a dynamic study of the subjects' respiratory and cardiovascular functions and to prevent hypokinesia. The data analyses show: (1) Prolonged confinement results in protective inhibition and decreased mobility of the nervous processes, and in the functional sluggishness of these processes. (2) Although the changes noted in bioelectrical activity were within normal physiological limits, they pointed to a decrease in cortical tone, and to a weakening of the excitatory and an intensification of the inhibitory processes. (3) Resistance to hypodynamia and relative isolation can be increased by physical training and correct organization of the work and rest routines, thereby helping to maintain fairly high efficiency levels for long periods.

M.G.J.

**N69-11716#** Joint Publications Research Service, Washington, D. C.

**STUDIES ON HUMAN MOTOR ACTIVITY UNDER CONDITIONS OF HYPODYNAMIA AND LOW CARBON DIOXIDE CONTENT**

L. I. Karpova *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 95-98 (See N69-11701 02-04)

Avail: SOD/CFSTI

To determine the effects of various motor routines and respiratory exercises on motion coordination, four 30-day experiments were performed on seven subjects in a pressure chamber; the CO<sub>2</sub> concentration was regulated automatically. Changes in general endurance, endurance of static stresses, strength of different muscle groups, and motion precision and power were also studied. The techniques used included electromyography, electrogoniography, vector-operation dynamography and vector stabilography, myotonometry, polydynamometry, combined dynamography, and oxymetry. The results indicate that the central nervous and cardiovascular systems retain a high level of functioning. The introduction of a special program of motor activity had a favorable effect on the physiological coordinating mechanisms responsible for maintaining the stability of motor functions. Endurance of static stresses and delicate coordinating movements were the most vulnerable, a finding consistent with other experimental data.

M.G.J.

**N69-11717#** Joint Publications Research Service, Washington, D. C.

**CHANGES IN CONDITIONED MOTOR REFLEXES AND EEG IN MAN FOLLOWING PROLONGED EXPOSURE TO A RARIFIED ATMOSPHERE WITH A HIGH CARBON DIOXIDE CONTENT**

S. G. Zharov et al *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 99-103 (See N69-11701 02-04)

Avail: SOD/CFSTI

The changes occurring in some central nervous system (CNS) functions were studied in persons exposed for 30 days to an atmosphere with a high partial pressure of CO<sub>2</sub>, and normal and low barometric pressures corresponding to an altitude of 7000 m. The CNS function was evaluated by the method of complex conditioned motor reflexes which involved drawing geometric figures or solving arithmetic problems. Also studied was the rate of formation of a simple motor reaction to a stereotype of photic and acoustic stimuli. The data, obtained from an investigation of conditioned activity and EEGs and observations of the subjects' behavior, show that prolonged exposure to an atmosphere with a high CO<sub>2</sub> content slightly reduces the functional activity of the CNS. These changes were believed to be caused mainly by the monotony of the experiment and the restricted physical activity. Increasing the partial CO<sub>2</sub> in inhaled air to 14.9 to 17.7 mm Hg

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brought about specific EEG changes and decreased the efficiency of some individual at normal barometric pressure. However, efficiency scarcely changed in a rarefied atmosphere with partial CO<sub>2</sub> of 17.7 mm Hg. M.G.J.

**N69-11718#** Joint Publications Research Service, Washington, D. C.

### **DURATION OF PHASES OF CARDIAC ACTIVITY UNDER CONDITIONS OF LOW PARTIAL PRESSURE OF OXYGEN IN INHALED AIR**

V. M. Murayenko *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 104-108 (See N69-11701 02-04)

Avail: SOD/CFSTI

Recordings were made of the changes in phases and periods of cardiac activity in healthy persons and in persons with the initial stages of cardiovascular disease, under conditions of low partial pressure of oxygen in inhaled air. The results indicate: (1) Changes in the phases and periods of the cardiac cycle in healthy persons subjected to hypoxia consisted of a shortening of their duration in the systole and diastole. Contraction of the entire ejection phase was characteristic of all groups of healthy persons examined. (2) Persons with hypertension exhibited an increase in the phase of isometric relaxation from 0.059 to 0.072 sec during hypoxia. Those with atherosclerosis of the coronary arteries exhibited an increase in the phase of rapid filling of the ventricles from 0.071 to 0.084 sec, and of the atrial systole from 0.081 to 0.095 sec. (3) In general, the individual phases of the diastolic complex lengthened in the persons suffering impaired cardiovascular function, with a shortening of the time of the diastole. M.G.J.

**N69-11719#** Joint Publications Research Service, Washington, D. C.

### **HUMAN ACOUSTIC FUNCTION AFTER MANY DAYS' EXPOSURE TO LOW BAROMETRIC PRESSURE**

I. Ya. Borshchevskiy et al *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 109-110 (See N69-11701 02-04)

Avail: SOD/CFSTI

Determinations were made of the auditory thresholds of two subjects with air conduction at frequencies of 125, 250, 500, 1000, 3000, 4000, and 6000 Hz, and the time of the reverse adaptation at a frequency of 1000 Hz after 3-minute exposures to white noise of 50 db. The two men were subjected for several days to low barometric pressure corresponding to an altitude of 7000 m, with partial oxygen pressure of 150 to 170 mm Hg. A comparison is drawn between the first and second part of the experiment. The greatest values appeared during the first half; later against a background of constant spread of threshold values of acoustic sensitivity, there was a tendency toward relative sensitization. This sensitization is regarded as the effect of intensification of the compensatory reactions of the body in general, and of the acoustic analyzer in particular. It was concluded that prolonged exposure to low barometric pressure (308 mm Hg) with normal partial oxygen pressure (150 to 160 mm Hg) does not significantly influence acoustic function. M.G.J.

**N69-11720#** Joint Publications Research Service, Washington, D. C.

### **CIRCADIAN RHYTHM OF HEARING IN HUMANS AFTER PROLONGED EXPOSURE TO NOISE**

Yu. V. Krylov *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 111-114 (See N69-11701 02-04)

Avail: SOD/CFSTI

To trace acoustic sensitivity fluctuations in relation to the circadian rhythm, auditory thresholds at frequencies of 125, 250, 500, 1000, 3000, and 4000 Hz were measured four times a day in five persons who stayed in a small room for 9 to 11 days. Experimental conditions involved continuous noise masking of 75

db, with the bulk of the sound energy in the 800 to 2000 Hz range. This is equivalent to the acoustic conditions prevailing in the orbital phase of spaceflight. In most subjects, the auditory thresholds varied with the time of day. This apparently results from functional changes in the human body and reflect the biological rhythm. The increased fluctuations in the auditory thresholds during noise interference are felt to indicate that adequate stimulation causes a reconstruction in the acoustic analyzer and a mobilization of nervous elements at different levels. The activation of new adaptation mechanisms is evidently due to the change in mobility and disruption of the balance between the basic nervous processes, as reflected in the greater degree of fluctuation in the thresholds of acoustic sensitivity compared with that under conditions of silence. M.G.J.

**N69-11721#** Joint Publications Research Service, Washington, D. C.

### **SOME PROBLEMS IN AVIATION PHYSIOLOGY**

F. P. Kosmolinskiy *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 115-120 (See N69-11701 02-04)

Avail: SOD/CFSTI

An overview is presented on the practical objectives which should be considered in aviation physiology research. These are identified as (1) the adaptation and compensatory physiological-biochemical mechanisms; (2) the development of scientifically sound methods of preventing the injurious effects of external stimuli, and of improving the tolerance of these effects if they cannot be avoided; (3) external factors which reduce productivity and lower human efficiency; (4) the efficiency and fatigue processes in flying personnel; (5) properly planned flight training; and (6) increasing physiological reserves through physical conditioning, and proper work, rest, and eating schedules. The Soviet approach to fatigue studies is defined as one which used an integral evaluation of the changes in several functions. Because of the intense cardiovascular reactions that occur in pilots, stress is placed on the necessity of devising methods of increasing endurance and efficiency while decreasing nervous and emotional strain. M.G.J.

**N69-11722#** Joint Publications Research Service, Washington, D. C.

### **SOME RESULTS OF A STUDY OF PHYSIOLOGICAL FUNCTIONS DURING FLIGHT**

D. V. Abayev et al *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 121-123 (See N69-11701 02-05)

Avail: SOD/CFSTI

Cardiovascular and respiratory system data were obtained on crew members of single-seater and multiple-crew aircraft as they performed flight tasks of varying complexity. In experiments on pilots of single-seater planes, the cardiac rate was highest at the most difficult stages of the flight; however, if the flight plan involved many difficult elements the fluctuations were less pronounced. In the other experiments, the presence of several crew members subjected to different function pressures during flight made it possible to compare the changes in relation to duties, flying experience, and flight conditions. It was noted that at critical stages in the flight, the captain's cardiac rate was 145 to 160 beats a minute, respiration rate 40 to 45 a minute. In the other crew members, the cardiac and respiration rates were no higher than 120 and 30 per minute, respectively. The cardiac rate in the veteran fliers rose by 90% and in the trainees by 125% over the original level. M.G.J.

**N69-11723#** Joint Publications Research Service, Washington, D. C.

### **EMOTIONS AND NEURO-ENDOCRINE REGULATION OF FUNCTIONS DURING FLIGHT**

F. P. Kosmolinskiy *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 124-126 (See N69-11701 02-04)

Avail: SOD/CFSTI

The intense excitation of autonomic functions noted in flying personnel is discussed. It is pointed out that such excitation is not



caused by any vital need to maintain the energy balance at a high level; rather it is a hyperreactivity of the nervous system at the time when the adaptation syndrome is developing. However, with abrupt excitation the adaptation system seems to collapse, evidently due to the phase-like nature of some biochemical processes such as hormone and vitamin metabolism. The view is offered that this hyperreactivity, which is inconsistent with the action of the physical flight factors, gives rise under conditions of excess information to unusual changes in neurohumoral regulation of the functions involved in intensification of the subcortical processes, and in inhibition of cortical functions by induction. M.G.J.

**N69-11724#** Joint Publications Research Service, Washington, D. C.

**PHYSIOLOGICAL MECHANISMS OF ADAPTATION TO FLYING UNDER CONDITIONS OF MODERATE HYPEROXIA AND HYPERVENTILATION OF EMOTIONAL ORIGIN**

F. P. Kosmolinskiy et al *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 127-131 (See N69-11701 02-04)  
 Avail: SOD/CFSTI

Analyses were made of the acid-alkaline equilibrium in human beings after breathing pure oxygen in the laboratory, and after the completion of flights of varying complexity and duration. Urinalyses revealed changes in the acid-alkaline equilibrium, following the development of hypocapnia in subjects after breathing pure oxygen in the laboratory, and in fliers using an oxygen respirator. The sharp ejection of ascorbic acid with urine is regarded as a precursor of a breakdown in the adaptation mechanisms due to the complex effects of such flight factors as hyperoxia, hyperventilation, and high nervous and emotional strain, which leads to hyperfunction of the endocrine and the adrenal systems. M.G.J.

**N69-11725#** Joint Publications Research Service, Washington, D. C.

**SOME ASPECTS OF THE THEORY OF FLYING ABILITY**

B. S. Alyakrinskiy *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 132-135 (See N69-11701 02-04)  
 Avail: SOD/CFSTI

The fundamental considerations involved in the matter of flying ability is discussed from the viewpoint of aviation psychology. It is pointed out that young men coming to flying schools differ in inherent range of abilities and, although potentially each can learn to fly, the effort and time spent on such instruction will vary with the individual range of abilities. In studying specific aptitudes, stress is placed on the need for a preliminary analysis of the structure of the profession in order to break it down into its individual components, units, and operations. Analysis of certain characteristics of flying, particularly the instrument signal system from the psychological standpoint, supports the claim that an aptitude for indirect and generalized reflection of reality can be regarded as a specific aptitude for flying ability. M.G.J.

**N69-11726#** Joint Publications Research Service, Washington, D. C.

**SPECIAL FUNCTIONAL DIAGNOSIS, AN IMPORTANT ASPECT OF MEDICAL EVALUATION OF FLIGHT PERSONNEL**

G. L. Komendantov et al *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 136-138 (See N69-11701 02-04)  
 Avail: SOD/CFSTI

The value of special functional diagnosis is cited as the type of tests used to detect impairments of systems responsible for the main integrative functions in the body, to detect the incompetence of regulatory and adaptive mechanisms, and to determine minimum, preclinical deviations in health. Three requirements for satisfying these diagnostic methods are listed: (1) adequacy to the nature of the functional deviations being investigated; (2) duplication of the main occupational conditions;

and (3) simulation of some important flight activity during the examination. In the first stage of the procedure, an attempt is made to discover any latent functional impairment, state of the regulatory mechanisms, and development of adaptive-compensatory reactions under complicated environmental conditions. The second stage involves a determination of how any defect discovered influences the person's efficiency. This examination is made under actual flying conditions or in flight simulators. The point is stressed that special functional diagnosis is one of the most effective means available for protecting the health of pilots. M.G.J.

**N69-11727#** Joint Publications Research Service, Washington, D. C.

**CHANGE IN MYOCARDIAL BIOELECTRICAL ACTIVITY IN HEALTHY AND SICK PERSONS ACCORDING TO THE DATA OF VECTOROMETRIC ANALYSIS OF THE EKG UPON BREATHING OXYGEN AT EXCESSIVE PRESSURE**

V. N. Alifanov et al *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 139-142 (See N69-11701 02-04)  
 Avail: SOD/CFSTI

In the experiments described, the subjects breathed oxygen for 10 minutes under conditions of high intrapulmonary pressure. The EKGs were recorded before and during the examination after five to seven minutes of the loads. Of the 15 leads used, three standard and three amplified unipolar leads from the extremities made it possible to plot the vectors of the heart in a frontal plane; six chest leads permitted the myocardial potentials to be recorded in a horizontal plane; and three leads made it possible to analyze the EKG in a sagittal plane. The vector analysis data show: (1) A graduated load equal to 200 mm H<sub>2</sub>O causes positional shifts in the vectors and produces some changes in myocardial bioelectrical activity, mainly in the repolarization process. (2) A coordinated positional turn of all vectors to the right, mainly in the frontal plane, occurs in healthy persons. A simultaneous decrease in the values of the AT vectors and ventricular gradient in both planes is indicative of difficulty in the repolarization processes in the ventricles. (3) In persons with cardiovascular disease, vector changes are in the same direction but are more distinct in cases where cardiac rhythm and conduction are impaired. M.G.J.

**N69-11728#** Joint Publications Research Service, Washington, D. C.

**EFFECT OF "ALTITUDE" AND ACCELERATION ON MAN (X-RAY STUDIES)**

A. R. Mansurov *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 143-146 (See N69-11701 02-04)  
 Avail: SOD/CFSTI

The thoracic organs were X-rayed of individuals repeatedly exposed to altitude and acceleration tests over a period of one to seven years. Dynamic observations showed that prolonged and systematic exposure to altitude may cause more or less permanent changes in the respiratory organs and blood circulation. The degree of development of the observed changes are related to the duration of the tests. It was also found that exposure to intense and prolonged transverse acceleration may cause significant impairment of the circulatory system, particularly of the pulmonary circulation, resulting in stagnation followed by edema of the lungs and atelectasis. In persons exposed to these factors less than three or four years, the changes in lung markings were insignificant and reversible. However, systematic exposure to altitude for four or more years resulted in perceptible changes in lung tissue characteristic of pneumosclerosis and emphysema. M.G.J.

**N69-11729#** Joint Publications Research Service, Washington, D. C.

**HEALTH OF CIVIL AVIATION SPECIALISTS. REPORT 2: RESULTS OF PHYSIOLOGICAL STUDIES ON CENTRAL NERVOUS SYSTEM FUNCTION**

## N69-11730

A. Ya. Loshak *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 147-151 (See N69-11701 02-04)  
Avail: SOD/CFSTI

Physiological tests, given to 296 radar operators, were analyzed in relation to their length of service, and the range and intensity of ultrahigh frequency radiation encountered. The results were compared with similar tests given to 151 persons acting as a control group. Higher nervous activity and fatigue were evaluated from the electrical sensitivity of the eye (ESE), duration of the after-image and its latency period, and from psychological tests designed to determine the extent, persistence, distribution, and switching of attention. Of greatest significance were the ESE changes, the mean values of which differed markedly between the experimental and control groups. The overall results show that most persons occupationally exposed to ultrahigh frequency energy suffer functional changes in the central nervous system apparently because of exhaustion and prevailing inhibition against a background of vagotonia. The intensity of these processes, which determine the functional state of the entire body, varies with the nature of the microwave emissions and with the individual characteristics of the persons exposed. M.G.J.

**N69-11730#** Joint Publications Research Service, Washington, D. C.

### **SOME CLINICAL CONSIDERATIONS IN SELECTING ASTRONAUTS FOR LONG FLIGHTS**

P. B. Buyanov et al *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 152-157 (See N69-11701 02-04)  
Avail: SOD/CFSTI

Consideration is given to the necessity for careful medical selections and clinical-physiological examinations of candidate astronauts both at rest and after load tests simulating space flight stress. Based on space flight experience and experimental data, basic health requirements are formulated for selecting astronauts to be trained for long duration flights. These include: (1) A thorough examination is necessary to diagnose any latent endocrine insufficiency. (2) Disturbances of fat metabolism of endocrine-humoral origin are an absolute contraindication for flights. (3) Individuals with persistent low arterial pressure (below 100/55 Hg) should not be accepted, nor should individuals with a hypotensive type of reaction to stress tests. (4) Candidates diagnosed as having neurocirculatory dystonia of the hypertensive type are unsuitable. (5) Attention should be paid to the weight-bearing motor apparatus in order to rule out hidden deformities, myotonia, myasthenia, and degenerative neuromuscular diseases. (6) No one with any nervous disorder is qualified to take part in long flights. M.G.J.

**N69-11731#** Joint Publications Research Service, Washington, D. C.

### **NYSTAGMIC REACTIONS TO CONTINUOUS CORIOLIS ACCELERATION**

S. S. Markaryan et al *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 158-162 (See N69-11701 02-04)  
Avail: SOD/CFSTI

With the chair rotating evenly at a speed of 180°/sec, the subjects continuously (1) bent the head forward at an angle of 30° 30 times a minute; (2) bent the head and trunk forward at an angle of 90° 15 times a minute; (3) bent the head to the right and left shoulder at an angle of 30° 30 times a minute; and (4) bent the head forward at an angle of 30° 30 times a minute but with the chair rotating at a speed of 60°/sec. Exposure to Coriolis acceleration (CA) lasted 20 minutes. Control experiments were run without rotation. The following factors were found to affect the frequency of nystagmic movements in response to CA: speed of rotation, duration of exposure to CA in the plane of each pair of semicircular canals, coincidence of the direction of the vector of CA with the plane of the frontal or sagittal canal, sensitivity of the receptors of each canal, and primary action on the saccular or utricular part of the otolithic apparatus. It was concluded that

nystagmic curves can be used as a criterion in judging vestibular resistance during continuous exposure to CA. M.G.J.

**N69-11732#** Joint Publications Research Service, Washington, D. C.

### **A METHOD OF INVESTIGATING THE EFFECT OF SPEED OF MOVEMENT OF AN INDICATOR ON READING ACCURACY**

P. Ya. Nurdygin *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 163-166 (See N69-11701 02-04)  
Avail: SOD/CFSTI

In order to qualitatively study the effects which the motion rate of a needle indicator on an aircraft instrument has on pilot reading time and accuracy, an apparatus was designed whose action is synchronized with a tachistoscope. The device permits the instrument to impart to the dynamic indicator the necessary rate of movement at the beginning of exposure and to stop it at the end. The accuracy of the subject's readings is determined from the position of the indicator before the instrument is shown and at the end. M.G.J.

**N69-11733** Joint Publications Research Service, Washington, D. C.

### **A METHOD OF EVALUATING THE ACCURACY AND STABILITY OF TIME-STRENGTH REACTIONS IN MAN**

B. A. Dushkov *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 167-171 (See N69-11701 02-04)  
Avail: SOD/CFSTI

Two tests were devised to provide fairly rapid and complete information on the accuracy and stability of time-strength reactions in the course of a day and in the circadian rhythms under conditions that simulate some spaceflight factors (limited motor activity, unusual position, altered circadian rhythms, etc.). The first tests the accuracy and stability of time-strength relations against a background of rest. The second tests the same qualities when problems are to be solved in accordance with a set program. The accuracy and stability of time-strength relations are investigated with a specially designed manual dynamometer. The subject is required to make a small or big exertion with his hand without looking at the indicator of the dynamometer. Newly developed controlled exertions are consolidated in preliminary experiments. The biocurrents of the flexors and extensors of the hand are recorded at the same time along with the respiration and cardiac rates. Author

**N69-11734#** Joint Publications Research Service, Washington, D. C.

### **STUDIES ON THE PSYCHOPHYSIOLOGICAL CAPABILITY OF THE VISUAL ANALYSOR FROM THE DISCRIMINATION OF SIGNALS BY PERIPHERAL VISION**

P. Ya. Nurdygin *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 172-179 (See N69-11701 02-04)  
Avail: SOD/CFSTI

To investigate peripheral vision in operators of control systems, an apparatus was designed which makes it possible for objects to be moved along the arc of a perimeter from two opposite directions at the same time. It also permits the subject's gaze to be fixed on stationary and moving geometric figures, letters, and numbers with different degrees of brightness. An ink-writing device records the time in seconds, and the place of objects on the right and left arcs of the perimeter in angular degrees. Two timers record the moment when the subject discerns the object. Experiments were conducted to detect the widest possible boundaries of the binocular visual field using objects of different sizes; to determine the relationship of the boundaries of the field and the nature of the fixation; and to investigate the relationship between these boundaries and the size and shape of the object. The data indicate that the boundaries of signal discrimination by peripheral vision depend on

the size and shape of the object, the fixation nature of central vision, and the speed of moving objects along the arc of the perimeter.  
M.G.J.

**N69-11735#** Joint Publications Research Service, Washington, D. C.

**METHODS AND SOME RESULTS OF EXPERIMENTS ON THE LEVEL OF THE CRITICAL FREQUENCY OF FLASHES**

P. Ya. Nurdygin *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 180-182 (See N69-11701 02-05)

Avail: SOD/CFSTI

The level of the critical frequency of flashes (CFF) was determined after 5 to 8 minutes of adaptation to diffuse light. This was done several times: in one case, with gradual change from occasional alternation of light and darkness to more frequent change; in another case, the reverse, from more to less frequent change until the results were the same. The CFF was then measured with the presentation of intermittent sound. To compare the results, the CFF of the subject's better eye was studied. The sound was supplied to both headphones. In processing the results, an increase or decrease in the CFF in response to the sound was expressed as a percentage of the original level, which served as an index of the background-level and was taken as 100%. Author

**N69-11736#** Joint Publications Research Service, Washington, D. C.

**A THEORY OF VAPOR FORMATION IN THE BODY AT HIGH ALTITUDES**

D. Ye. Rozenblyum *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 183-191 Presented at Moscow Soc. of Physiologists Meeting on Aeromed., 1957 (See N69-11701 02-04)

Avail: SOD/CFSTI

An overview is presented on the research pertaining to the phenomenon of body tissue fluids changing into a vaporous state during exposure to rarefied atmospheres of less than 47 mm Hg. Stress is placed on the need for experiments to determine the qualitative characteristics of these processes as compared with a physical model, to assess the capacity of protective physiological mechanisms to limit vapor formation, and to investigate the part played by vapor formation in the functioning of the body. The recommendation is made that safety engineers design backup equipment for the most vulnerable parts of aircraft cabins and protective suits.  
M.G.J.

**N69-11737#** Joint Publications Research Service, Washington, D. C.

**EFFECTS OF GENERAL VIBRATION ON MAN**

A. A. Koreshkov *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 192-194 refs (See N69-11701 02-04)

Avail: SOD/CFSTI

Industrial research on local vibrations are discussed in relation to the effects of general vibrations, occurring in virtually every type of aircraft and spacecraft, on pilots and astronauts. The arbitrariness of differentiating between local and general vibrations is stressed, and the point is made that in any case of vibration a smaller or larger area of the body comes in contact with the vibrating object. Examples are cited to show that the effects of local and general vibrations on human physiological functions are essentially the same.  
M.G.J.

**N69-11738#** Joint Publications Research Service, Washington, D. C.

**INCREASING RESISTANCE TO CRANIOCEREBRAL TRAUMAS BY USING CENTRAL NERVOUS SYSTEM STIMULANTS**

Ye. Ya. Kaplan et al *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 195-201 (See N69-11701 02-04)

Avail: SOD/CFSTI

To investigate the possibility of using prickly eleutherococcus and pipradrol to increase resistance to acute craniocerebral trauma, experiments were performed in which the parietal regions of white mice and rats were injured by a free-falling lead ball. The data show that the pharmacological agents used have a positive effect on brain injuries. There was increased resistance of the animals to acute craniocerebral trauma, as demonstrated by a lower mortality rate and milder post-traumatic course than was observed in the control group. The rapid normalization of some physiological and biochemical indices was also observed. It was concluded that the mechanisms of the protective action of the two drugs are related to their normalizing influence on nerve center functioning, as reflected in improved subordination relations in the central nervous system (CNS); restoration of interneuronal propagation of excitation impaired by the trauma; prevention of parabiosis from developing in the CNS; and normalization of the metabolism of neurohumors responsible for mediating excitation in the synapses.  
M.G.J.

**N69-11739#** Joint Publications Research Service, Washington, D. C.

**SOME CHARACTERISTICS OF THE ORIENTING REACTION TO SOUND PRESSURE PULSES**

V. S. Kuznetsov *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 202-205 (See N69-11701 02-04)

Avail: SOD/CFSTI

Laboratory experiments were performed to determine the degree of discomfort caused by acoustic shocks simulating supersonic booms. Measurements were made of the cortical electrical activity, autonomic reactions, pulse and respiration rates, and cutaneous galvanic reflex (CGR). The stimulus was a sound pressure pulse of 2.5, 5, 7.5, and 9.5 kg/m<sup>2</sup> lasting 150 msec. The experiments show: (1) A single acoustic shock provoked a distinct depression of the alpha rhythm and appearance of higher frequency components on the EEG. (2) Presentation of the same stimulus six times in the course of a three-hour experiment resulted in regular extinction of the alpha rhythm depression reaction. This same pattern of extinction of the reflex was noted when measuring phase decreases in skin resistance to acoustic stimulation. (3) The data on EEG and CGR changes suggest that a sound pulse simulating supersonic aircraft boom elicits a pronounced orienting reaction characterized by increased systemic tone and greater readiness to perceive the stimulus.  
M.G.J.

**N69-11740#** Joint Publications Research Service, Washington, D. C.

**ANALYSIS OF MOVEMENTS AT DIFFERENT ORGANIZATIONAL LEVELS OF LIFE**

D. Ye. Rozenblyum *In its Selected Transl. from Aerospace Med.* 28 Oct. 1968 p 206-213 Presented at the 2d All-Union Conf. on Aerospace Med., Moscow, May 1966 (See N69-11701 02-04)

Avail: SOD/CFSTI

Questions related to the evolution of movements at different organizational levels of life are discussed in relation to the problem of hypodynamia during prolonged space flight and to unsupported movement and spatial analysis in weightlessness. Some movements at different organizational levels of life are analyzed: molecular motion at the subcellular and cellular levels, movements at the systemic level, and motor functions at the organism level. Implications pertaining to hypodynamia and motor coordination in prolonged weightlessness are: (1) Special physical exercises can partially correct hypodynamia which is caused by the size of the spacecraft, relative confinement to the work area, and a decrease in muscular tone resulting from disruption of the myotactic mechanism. (2) It is more difficult to reorganize the internal structure of movements during prolonged weightlessness. Such reorganization especially affects leg movements and, to a lesser degree, arm movements which are freed under terrestrial conditions from commonplace support tasks.  
M.G.J.

N69-11764

**N69-11764\*#** 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. 1968**

Francis B. Gordon and James D. Gillmore 30 Sep. 1968 8 p  
(NASA ORDER R-21-010-010)  
(NASA-CR-97764; QSR-13) Avail: CFSTI CSCL 06S

Experiments with mice in pressure chambers have been performed. Increasing difficulty has been encountered in monitoring mice in He-O<sub>2</sub> mixtures, attributable to increased loss of body heat. New chambers with temperature controls, now on order, are expected to remove this difficulty. Attention was called previously to the greater mortality in mice held at simulated altitude with an ambient normal pO<sub>2</sub> (160 mm Hg) following aerosol exposure to the mouse pneumonitis strain of *Chlamydia*. If the Bohr equation for estimating alveolar pO<sub>2</sub> for man is used, it is clear that an alveolar hypoxia occurs under these conditions, raising the question whether hypoxia can account for the observed results. An experiment (Mopn 36) in which this hypothesis was tested directly by holding mice in air at 7.3 psia (pO<sub>2</sub>, 80 mm Hg) after aerosol exposure to the mouse pneumonitis agent provided evidence that hypoxia per se does not account for the greater mortality observed at simulated altitude. The increased mortality observed previously in influenza virus-infected mice held at simulated altitude with 100% ambient O<sub>2</sub> might be due to increased multiplication of virus, an increase in inflammatory reaction in the host, or to a reduced ability of the mouse at altitude to tolerate normal levels of the two preceding factors. Two experiments were performed in which mice were held at simulated altitude (37,000 ft) with normal ambient pO<sub>2</sub>, following intraperitoneal inoculation of *Chlamydia psittaci*.

Author

**N69-11776#** National Academy of Sciences—National Research Council, Washington, D. C.

**CURRENT DEVELOPMENTS IN OPTICS AND VISION**

William Benson, ed. and Milton A. Whitcomb, ed. 1968 141 p  
refs Presented at the Meeting of Comm. on Vision, 1967  
(Contract Nonr-2300(05))  
(AD-673425) Avail: CFSTI

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W. P. Tanner, Jr., D. B. Main, and T. E. Cohn p 122-128 (See N69-11787 02-04)

**N69-11777#** Sperry Rand Corp., Great Neck, N. Y.

**DYNAMIC VISUAL CUES IN FLYING**

Aaron Hyman and Theodore Gold /In NAS-NRC Current Develop. in Optics and Vision 1968 p 3-21 (See N69-11776 02-05)  
(Contracts Nonr-4801(000); N00014-66-C-0114)

Avail: CFSTI

Two experimental studies in which dynamic visual cues are presented to subjects (flying personnel) are reported. In the first study, characteristic findings obtained in the first phase of a study of visual perception in carrier landing which was designed to determine quantitatively the visual judgements of position and flight path angle (aim point) made by pilots during carrier landing when there is a calm sea condition and no ancillary visual aids on the carrier; are reviewed. In the second study, the program planned in a study of visual requirements for optical projection displays is described. The overall aim of the research program is the establishment of quantitative perception tolerances for optical design parameters. Specific areas of research which are designed to aid in developing optimal designs for virtual image optical projection systems are as follows: (1) binocular disparity; (2) tolerance for differing convergence requirements (i.e., focusing); (3) permissible disparity at boundaries of viewing region; (4) alleviation of retinal rivalry; (5) minimum desired exit pupil size; and (6) axial head position.

S.C.W.

**N69-11778#** National Academy of Sciences—National Research Council, Washington, D. C.

**VISION AND DRIVING**

Albert Burg /In its Current Develop. in Optics and Vision 1968 p 22-32 refs (See N69-11776 02-05)  
Avail: CFSTI

The initiation of a long range research program designed to investigate the relationship between vision test scores and driving records is reported. In the first phase of the program, 17,500 volunteer driver's license applicants were interviewed and tested over a 32 month period. The subjects, of both sexes and ranging in age from 16 to 92, constituted what appeared to be a relatively representative sample of the California driving population. Vision tests used included: dynamic visual acuity, static (or standard) visual acuity, lateral visual field, lateral phoria, vision at low levels of illumination, glare recovery, and sighting dominance. Several computer analyses of the data were made and preliminary findings indicated that: (1) the two driving record variables being considered, i.e., accidents and convictions for traffic violations in a three year period, correlated most highly with each other and next most highly with quantitative exposure (i.e., average annual mileage) and with age and age-related variables such as marital status and driving experience; (2) of the vision tests investigated, only dynamic visual acuity and static visual acuity consistently appeared to be related to driving record; (3) considerable variation in the vision-driving relationship was found as a function of the sex and age of the group being studied. A second phase of the program was initiated which was designed to evaluate driving performance over a longer period of time (up to 12 years), and to determine the relative to short-term (two to three years) deterioration of visual capabilities of original subjects through retesting. It is postulated that results of the overall program will indicate what aspects of vision seem important in driving and therefore what vision tests may be of greatest value in screening future driver's license applicants; and will enable the accumulation of a very large amount of normative data describing the visual, personal and driving characteristics of a large sample of drivers.

S.C.W.

**N69-11782#** National Academy of Sciences—National Research Council, Washington, D. C.

**THE ELASTIC SURFACE TRANSFORMATION**

Robert J. Hall and William F. Dossett *In its* Current Develop. in Optics and Vision 1968 p 69-77 refs (See N69-11776 02-05)  
Avail: CFSTI

Described are studies focusing on the development and implementation of a display processing technique, designated the elastic surface transformation (EST), that will permit the observer to manipulate and enhance marginal signals. The ESP process as developed to date consists of photographically transferring the information from some sensor to a uniformly prestretched surface. The surface is then relaxed in a continuous fashion, producing a uniform spatial compression. During compression the element size remains constant. The shrinking changes the spatial dispersion, which increases the density of elements per unit area. This increases the image contrast and enhances the dim edges and gradients. Optical magnification maintains the enhanced image at its original size. Since a major problem of this research effort has been the development of a reliable, high resolution, photographic transfer to the elastic surface, studies were undertaken to develop a reliable research procedure for implementing the elastic surface transformation. Reported are results of experiments on the enhancement of photographic information and sonar grams when the acoustic information was originally recorded on electro-sensitive paper. Black and white silver halide implementation was used in these studies. S.C.W.

**N69-11783#** National Academy of Sciences—National Research Council, Washington, D. C.

**IMAGE PROCESSING AS IT RELATES TO THE HUMAN SYSTEM**

James L. Harris, Sr. *In its* Current Develop. in Optics and Vision 1968 p 78-88 refs (See N69-11776 02-05)  
Avail: CFSTI

Basic principles, operations, applications, and developmental trends of image processing are discussed. The term image processing refers to operations performed on a degraded image to correct or compensate the image for its defects. The result of such processing is an image which is called a restored image. The combined use of image processing techniques, digital computer techniques, and numerical approximation methods for studying the characteristics of the human visual system is emphasized. S.C.W.

**N69-11785#** National Academy of Sciences—National Research Council, Washington, D. C.

**VISUAL FACTORS RELATED TO THE DESIGN AND USE OF DIRECT-VIEW ELECTRO-OPTICAL DEVICES**

H. Richard Blackwell *In its* Current Develop. in Optics and Vision 1968 p 93-108 refs (See N69-11776 02-05)  
Avail: CFSTI

Opportunities arising from the possibility of learning something of the processes underlying normal, unaided vision by studying the characteristics of the visual system when its optical input is altered in describable ways using direct-view electro-optical devices, are discussed. Emphasized are parameters available to the designer of direct view electro-optical devices among which are cited the usual optical parameters of visual telescopes, magnification and field of view, and the electro-optical parameters gain and noise. It is speculated that the spatial frequency response need not be uniform over the field of view but may be graduated for some such purpose as to match the variable spatial frequency response of the visual field of the unaided eye. Parameters of the visual system which are obviously related to the selection of an optimum electro-optical design are cited as being the trade-off of noise and gain, the spatial frequency response of different portions of the visual field, ocular scanning patterns for different target and background situations, and the interactions of these variables. Results of experimental and analytical studies which consider the above

parameters are examined. It is surmised that theoretical questions which should be elucidated by study of vision with electro-optical devices include the basic decision processes for various target-background situations and the relevance of noise to these decision processes. S.C.W.

**N11786#** National Academy of Sciences—National Research Council, Washington, D. C.

**THE INFLUENCE OF SPATIAL AND TEMPORAL BANDWIDTH ON THRESHOLD CONTRAST SENSITIVITY OF THE EYE**

Russell H. Morgan *In its* Current Develop. in Optics and Vision 1968 p 109-121 refs (See N69-11776 02-05)  
Avail: CFSTI

Proposed is a method for calculating the noise levels of visual signals. The method is based upon statistical principles frequently used to calculate noise in physical systems (e.g., electronic amplifiers) which transmit or respond to modulated signals which are in a quantized energy state of flux. It is surmised that: (1) because visual systems and their elements characteristically fall into such a class of systems (i.e., they transmit or respond to quantized signal that are modulated in time and space) it should be generally useful; and (2) the method has considerable value in the development of models of visual perception in which predicted and measured data are closely similar. S.C.W.

**N69-11787#** National Academy of Sciences—National Research Council, Washington, D. C.

**VISUAL DETECTION OF OSCILLOSCOPIC TRACINGS**

Wilson P. Tanner, Jr., Danna B. Main, and Theodore E. Cohn *In its* Current Develop. in Optics and Vision 1968 p 122-128 (See N69-11776 02-05)

(Contract DA-49-193-MD-2585)  
Avail: CFSTI

Psychophysical experiments employing a human observer combined with computer-averaging techniques were performed in an attempt to illustrate problems involved in reading physiological records for purposes of describing the response in the record to some physical event. In an attempt to illustrate visually the nature of the averaging procedure, a polaroid camera on an oscilloscope face and six hundred traces on the same film, thus simulating the response with a well defined signal and adding to this random noise. The observer viewed an oscilloscope face in a dimly lighted room and was told that on each trial one of two events would occur: (1) noise alone might be present, of (2) signal-plus-noise might be present. He was instructed to press one of two buttons corresponding to each of the two conditions. He was told nothing about the signal characteristics. After each response, he was informed by lights which of the two events had occurred. The actual event and the observer's response on each trial were recorded on counters and also punched onto IBM cards. The events, signal-plus-noise (S + N) and noise alone (N), occurred randomly with an a priori probability of 0.5. Results illustrate the human/computer's usefulness in determining not only a lower bound of detectability of a response in a record but also give an indication of the uncertainty in the parameters of the response. S.C.W.

**N69-11796#** School of Aerospace Medicine, Brooks AFB, Tex.

**ENDOCRINE-METABOLIC RESPONSE TO SEQUENTIAL DECOMPRESSION DURING SIMULATED ORBITAL FLIGHT**

Henry B. Hale and Edgar W. Williams Jun. 1968 12 p refs (AD-676144; SAM-TR-68-63) Avail: CFSTI CSDL 6/19

Urinary catecholamines, 17-hydroxycorticosteroids, various electrolytes, and certain nitrogenous metabolites were measured to assess the physiologic effects of exposure to hypobaric conditions similar to some that have been or may be used in orbiting spacecraft or during extravehicular activity. Nineteen volunteer human subjects were studied during sequential exposure to the following gaseous

## N69-11800

environments and pressures: (a) oxygen at 14.5 p.s.i.a., 4 hours; (b) oxygen at 5 p.s.i.a., 2.5 hours; (c) oxygen at 3.5 p.s.i.a., 15 minutes; (d) 46% oxygen/50% nitrogen, at 7 p.s.i.a., 4 hours; and (e) oxygen at 3.5 p.s.i.a., 1.25 hours. Nonspecific stress was evidenced by decompression-induced elevations (which were progressive with time) in creatinine, urine volume, sodium, norepinephrine, and urea. Epinephrine was also elevated, but the peak effect came at an early time. As a late effect, 17-OHCS excretion became elevated. These findings confirm previous observations. Author (TAB)

### **N69-11800#** School of Aerospace Medicine, Brooks AFB, Tex. **METABOLIC EFFECTS OF LONG-TERM EXPOSURE OF DOGS TO A PARTIAL PRESSURE OF 60 mm. Hg CO<sub>2</sub>** Final Report, Sep. 1966–May 1967

William E. Pepelko Jun. 1968 12 p refs

(AD-676143; SAM-TR-68-61) Avail: CFSTI CSCL 06/19

Six male mongrel dogs implanted with either arterial or venous catheters were exposed to a partial pressure of 60 mm. Hg CO<sub>2</sub> for 10 days. Daily fasting plasma glucose and free fatty acid (FFA) levels did not differ significantly from control levels. Glucose tolerance after intravenous injection of 1 gm. of glucose/kg. body weight was decreased below that of controls on the first day of exposure to high CO<sub>2</sub>. After 7 to 8 days of exposure, glucose tolerance increased to that of controls. Weight loss averaged 1.7 lb. during the 10-day exposure to high CO<sub>2</sub> and 0.6 lb. during a 10-day control period. The dogs ate normally throughout the experimental period. In general, they appeared to adapt quite well, with the measurements of plasma FFA and glucose indicating a minimum of stress. Author (TAB)

### **N69-11830\*#** Volt Technical Corp., Washington, D. C. **BIOLOGICAL INVESTIGATIONS IN OUTER SPACE, (ZOND-5)**

O. Gazenko, P. Saksonov, and V. Antipov Greenbelt, Md. NASA, Goddard Space Center 19 Nov. 1968 4 p Transl. into ENGLISH from Pravda, (Moscow), no. 320, 15 Nov. 1968 (Contract NAS5-12487)

(NASA-CR-97775; ST-PR-SB-10773) Avail: CFSTI CSCL 06S

The authors give a preliminary account of the results obtained aboard ZOND-5 after its successful flight around the Moon, splash down in the Indian Ocean and recovery of the containers with scientific apparatus. The main interest of the experiment centers on the effects of circumlunar flight on turtles. These lost 10% in weight, were particularly active upon return and have shown a great appetite. Other biological observations are given, which bear an essentially preliminary character, since the study of the container content is not completed. Author

### **N69-11871#** Biorad, Inc., New Hyde Park, N. Y. **LASER PARAMETERS FOR HUMAN VIEWING. 1: AN ANALYSIS OF VIEWING DIRECT AND SCATTERED LASER RADIATION** Final Report, 22 Mar.–30 Dec. 1967

Leonard R. Solon and Donald S. Sims Orlando, Fla. Naval Training Device Center Aug. 1968 95 p refs (Contract N61339-67-C-0096)

(AD-675803; BIORAD-102-1; NAVTRADEVCE-67-C-0096-1) Avail: CFSTI CSCL 6/5

A general analysis is furnished of the physiological optics of directly transmitted, reflected, and scattered laser radiation. Parameters determining the retinal irradiance for continuous lasers (or radiant exposure for pulsed sources) are treated in detail. Particular attention is directed to optimization of laser systems where visual observation is required, or can occur inadvertently. Among factors considered are the influence of auxiliary optics, environmental illumination, and the Stiles-Crawford effect. Author (TAB)

### **N69-11974#** School of Aerospace Medicine, Brooks AFB, Tex. **HIGH-IMPEDANCE ELECTROCARDIOGRAM AMPLIFIER-TRANSMITTER FOR USE WITH DRY ELECTRODES**

Jack B. Johnson and James E. Allred Jun. 1968 13 p refs (AD-676142; SAM-TR-68-55) Avail: CFSTI CSCL 6/2

An electrocardiogram amplifier-transmitter was designed for use with dry electrodes for long-term heart rate monitoring on unrestrained subjects in orbiting laboratories. Extremely high input impedance compatible with dry electrodes and low power consumption was achieved by use of field-effect semiconductors in the amplifier input and in the transmitter. This device is being used on an experimental basis in space environmental laboratories. Author (TAB)

### **N69-12082#** Ohio State Univ., Columbus. **STUDY TO DETERMINE THE FLIGHT PROFILE AND MISSION OF THE CERTIFICATED PRIVATE PILOT** Final Report

J. J. Eggspuehler and G. S. Weislogei Jul. 1968 86 p refs (Contract FA-67-WA-1760)

(AD-675818; FAA-DS-68-15) Avail: CFSTI CSCL 1/2

The results of a survey to produce information on the profile and mission of the private pilot are reported. Based upon an analysis of the data produced by the survey, three operational flight profiles were developed: simple, medium-complex, and complex. The profiles were then used to describe the minimum qualifications required of private pilots to operate within each profile. The implications of these findings are directed toward providing knowledge useful in designing a private pilot certification program based upon a standard of operational competence, although the data will be useful in other research relating to the activities of the private pilot. Author (TAB)

### **N69-12084\*#** Case Western Reserve Univ., Cleveland, Ohio. Solid State Electronics Lab.

#### **[INVESTIGATION OF IMPLANTABLE MULTICHANNEL BIOTELEMETRY] Semiannual Report, Mar.–Aug. 1968**

W. H. Ko, E. Yon, and D. Ramseth Aug. 1968 22 p (Contract NGR-36-003-079)

(NASA-CR-97832; SAR-5) Avail: CFSTI CSCL 06B

A system design and fabrication technique for multi-channel, physiologically implantable telemetering systems for biological measurements is being developed. The design is to be flexible, allowing several channels of information to be handled simultaneously, and to be able to telemeter a wide range of physiological signals. The four-channel discrete component strain-gage transmitter has been functioning satisfactorily since being implanted. A four-channel integrated circuit strain gage transmitter was constructed and tested. Improved sample and hold circuitry for the receiver-demodulator system was breadboarded and incorporated into the system. A study was started into possible improvements of the transmitter ring oscillator. The current ring oscillator exhibits a slight dependence for proper operation on the storage and delay characteristics of the output transistor which drives the "and" gate and the associated strain gage amplifier. Preliminary design and construction of transmitter and receiver-demodulator circuitry to allow subcommutation of one information channel into several lower frequency information channels was completed. Author

### **N69-11888#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

#### **A SPECTROGONIOMETER FOR DETERMINATION OF THE INDICATRICES OF REFLECTION AND TRANSMISSION OF PLANT LEAVES**

Kh. Moldau 5 Jan. 1968 10 p refs Transl. into ENGLISH from Akad. Nauk Est. SSR. Inst. Fiz. i Astron. Issled. Po Fiz. Atmosfery, (USSR), no. 6, 1964 p 92–98

(AD-676207; FTD-HT-23-1224-67) Avail: CFSTI CSCL 6/3

An apparatus for recording the spectral luminance factor of leaves in various planes in natural and polarized light is described.

The apparatus consists of a monochromator, various lenses and diaphragms, a device for goniometric scanning, photomultiplier, a preamplifier, and recording potentiometer. A luminance factor for barite plates, optical matte/black MFB, and a green leaf of corn in natural and polarized light are presented as examples of recording.

TAB

**N69-11925#** School of Aerospace Medicine, Brooks AFB, Tex.  
**GLUCOSE TOLERANCE IN DOGS EXPOSED TO ALTITUDE AND DRUG ADMINISTRATION: DIPHENHYDRAMINE**  
 Albert T. Bernardini and Martin Taub Jun. 1968 11 p refs (AD-676141; SAM-TR-68-57) Avail: CFSTI CSCL 6/19

The rate of disappearance of intravenously injected glucose from the blood of dogs exposed to a simulated altitude of 27,000 ft. was compared to similar glucose tolerance at ground level. All dogs were maintained on the same PO<sub>2</sub> in the inspired air (152 mm. Hg PO<sub>2</sub>). The blood glucose decay time was also monitored at ground level and altitude after the administration of glucose and diphenhydramine (Benadryl). A significant reduction in the decay rate was observed between drug and nondrug animals at ground level (P less than .05), and between nondrug animals at ground level compared to altitude (P less than .05). The comparison between the drug and nondrug condition at altitude, however, was not significantly different.

Author (TAB)

**N69-11939#** Joint Publications Research Service, Washington, D. C.

**THE CONNECTION BETWEEN STRUCTURE AND BIOLOGICAL FUNCTION IN PEPTIDE SYSTEMS**

Yu. A. Ovchinnikov *In its Vestn. of the USSR Acad. of Sci.*, no. 7, 1968 30 Oct. 1968 p 57-67 (See N69-11934 02-34)  
 Avail: CFSTI

To study the dependence between structure and biological function in a number of decapeptide antibiotics of the enniatin group, analogs were synthesized of those antibiotics differing in chain length or number of rings and also in the nature and configuration of the amino and hydroxy acid residues, and subjected to a topochemical analysis. It was established that the antibiotics are capable of selectively inducing active transport of potassium ions in the mitochondria, and a parallelism was detected between the antimicrobial activity of the enniatins and their ability to induce ion transport. Further investigation led to the conclusion that the biological action of the cyclodecapeptides consisted in their complementary interaction with lipoprotein receptors of the cell membranes and with the corresponding cations. The topochemical approach can be successfully applied not only to such highly symmetric systems as enniatin antibiotics, but also to any asymmetric cyclopeptides, as well as linear peptides.

B.P.

**N69-11940#** Joint Publications Research Service, Washington, D. C.

**SOME DIRECTIONS OF THE CHEMISTRY OF PLANT SUBSTANCES**

S. Yu. Yunusov *In its Vestn. of the USSR Acad. of Sci.*, no. 7, 1968 30 Oct. 1968 p 74-79 (See N69-11934 02-34)  
 Avail: CFSTI

Research activities were reviewed in the area of the chemistry of natural compounds to study the isolation, chemical structure, syntheses, reaction mechanisms, and activity of plant substances. Over 3600 species of plants were analyzed for their alkaloid content. New methods for isolating glycosides and determining their structures were accomplished. The specificity and mechanism of the pharmacological action of 50 alkaloids, 7 glycosides and over 50 synthetic substances were studied. Preparations of cardiac drugs and other medicinals were authorized for use. Investigation of fats in plants permitted characterization of the physical, chemical, and technical properties of many vegetable oils. New industrial processes were proposed for the processing of cottonseed. Numerous

investigations were devoted to finding plant growth regulators and defoliants.

B.P.

**N69-11941#** Joint Publications Research Service, Washington, D. C.

**ELECTRONIC COMPUTER TECHNIQUE IN THE STUDY OF THE BRAIN**

M. N. Livanov *In its Vestn. of the USSR Acad. of Sci.*, no. 7, 1968 30 Oct. 1968 p 80-89 (See N69-11934 02-34)  
 Avail: CFSTI

The possibility of using the electronic computer to functionally evaluate the bioelectrical phenomena of the cerebral cortex is discussed. An instrument was created to study the spatial synchronization of the bioelectric potentials and to explain their functional importance. It consisted of 24 amplifiers through which the potentials enter; they are then directed into an analog-to-digital converter and finally into a computer. Values of the cross correlation coefficients were calculated in real time. Electromyographic information from the fore and hind legs of the experimental animal (rabbit) also entered the computer. The amplitudes of the myograms were automatically compared before and after stimulation and the numerical values of the response reactions were issued immediately. The following conclusion was drawn from the stated results: high values of the cross correlation coefficients, reflecting distant synchronization of the bioelectric potentials, indicated those states of the brain substrate in which mutual influence of them is assured.

B.P.

**N69-11942#** Joint Publications Research Service, Washington, D. C.

**HEARING AND BIOLOGICAL SOUND RADIATION**

G. V. Gershuni *In its Vestn. of the USSR Acad. of Sci.*, no. 7, 1968 30 Oct. 1968 p 90-100 (See N69-11934 02-34)  
 Avail: CFSTI

Biological systems of sonic radiation are varied and embrace a wide frequency range (over 15 octaves). Certain general features are characteristic of the radiation. They are a series of pulses with varying amplitudes and spectral characteristics and recordings of these signals are depicted for some birds and mammals. The processing of sound information by the auditory system is theorized. In summary it was stated that the auditory system processes arriving information with less numerous but more varied neurons which react in a specific manner to specific complex signals characterized by combinations of a number of physical parameters. Each signal is reported according to its parameters simultaneously by different channels: first by the system of neurons arranged on a spectral scale and having different time constants and, second, by specific detector neurons which distinguish specific properties of the signal.

B.P.

**N69-12028#** Joint Publications Research Service, Washington, D. C.

**SPACE BIOLOGY AND MEDICINE, VOLUME 2, NO. 4, 1968 [KOSMICHESKAYA BIOLOGIYA I MEDITSINA]**

22 Nov. 1968 196 p refs Transl. into ENGLISH of a Russian Periodical (Moscow) p 3-93 (JPRS-46930) Avail: CFSTI

Presented are various U.S.S.R. studies on aerospace medical problems and biological effects of space environments. For individual titles see: N69-12029 through N69-12048

**N69-12029#** Joint Publications Research Service, Washington, D. C.

**FIFTY YEARS OF SOVIET PUBLIC HEALTH AND THE DEVELOPMENT OF SOVIET AVIATION AND SPACE MEDICINE**

A. I. Burnazyan et al *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 1-13 (See N69-12028 02-04)  
 Avail: CFSTI

## N69-12030

Reviewed is the development history of organized public health and medical services in the Soviet Union. The system includes not only medical assistance to the public population, implemented through the public health agencies, but also the full range of activities of the Soviet state in maintaining the nation's health. G.G.

**N69-12030#** Joint Publications Research Service, Washington, D. C.

### **DETERMINATION OF THE LIMITS OF HUMAN TOLERANCE TO THERMAL STRESSES (REVIEW OF THE LITERATURE)**

Ye. I. Kuznets et al *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 14-25 refs (See N69-12028 02-04)

Avail: CFSTI

Reviewed are various literature sources providing information on the functional capabilities of the human body when it is exposed to high temperatures and humidities. It is generally concluded that the time which a thermal stress can be endured depends on the following factors: (1) absolute air temperatures and humidities; (2) body adaptation to the temperature; and (3) general state of the body at the time preceding the exposure to heat. Approximate values of physiological indices that can be used as limiting admissible values for heat tolerance are: at a state of rest—body temperature (rectal) 38.5 to 38.6°C and pulse rate 140 to 150 per minute; at a state of physical labor 38.5 to 38.8°C and 170 to 180 pulse beats per minute, respectively. G.G.

**N69-12031#** Joint Publications Research Service, Washington, D. C.

### **CHANGE IN THE CONTENT OF DRY MATTER, SUGARS AND ASCORBIC ACID IN PLANTS AFTER EXPOSURE OF THEIR SEEDS TO SPACE FLIGHT FACTORS**

I. V. Nikitina et al *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 26-31 refs (See N69-12028 02-04)

Avail: CFSTI

This paper presents data on changes in the chemical constituents of marrow-stem kale, lettuce and onion resulting from the flight of seeds and bulbs aboard the Kosmos-110 biosatellite. The test plants differed from the controls in having a lower content of dry matter and a higher content of sugars and ascorbic acid. The authors feel that this is the combined effect of spaceflight factors on the seeds. Author

**N69-12032#** Joint Publications Research Service, Washington, D. C.

### **CHANGES IN ENZYMATIC ACTIVITY OF CELLULAR AND SUBCELLULAR STRUCTURES IN RESPONSE TO ACCELERATIONS**

A. S. Barer et al *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 32-40 refs (See N69-12028 02-04)

Avail: CFSTI

Experiments with human subjects exposed to back-to-chest accelerations of 6 g for 120 sec and 10 g for 20 sec (applied at an angle of 80° to the longitudinal axis of the body) revealed an increased aminotransferase activity in the blood which was statistically significant in the case of 10 g. Experiments on animals (rats of the Wistar line) exposed to back-to-chest accelerations of 10 and 25 g for 6 minutes (applied at an angle of 90° to the longitudinal axis of the body) revealed changes in certain hepatic enzymes. These changes in enzymatic activity detected in human and animal studies can result from a changed permeability of cellular and subcellular membrane structures. Author

**N69-12033#** Joint Publications Research Service, Washington, D. C.

### **SIGNIFICANCE OF TYPOLOGICAL PECULIARITIES OF THE NERVOUS SYSTEM IN ANIMAL SENSITIVITY TO ACCELERATIONS**

N. N. Uglova *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 41-46 refs (See N69-12028 02-04)

Avail: CFSTI

Experiments were performed on white rats to investigate the significance of excitation and inhibition processes in animal resistance to accelerations. The topological peculiarities of nervous response were defined by the Krushinskiy method. In some animals the response of the hypophyseal-adrenal system to noise excitation was evaluated. It was established that the individual sensitivity of animals to accelerations is dependent on the excitation-inhibition ratio in the central nervous system and peculiar responses of the hypophyseal-adrenal system. Author

**N69-12034#** Joint Publications Research Service, Washington, D. C.

### **EFFECT OF TRANSVERSE ACCELERATIONS ON SECRETORY ACTIVITY IN THE GASTROINTESTINAL TRACT OF DOGS**

K. V. Smirnov et al *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 47-54 refs (See N69-12028 02-04)

Avail: CFSTI

The effect of transverse accelerations of 8 g applied to dogs for three minutes on the secretory activity in their gastrointestinal tract and activity of pancreatic enzymes in the blood and intestinal enzymes in the feces were studied. The experiments included five dogs of which three had an isolated stomach (the Pavlov method was used), one had a fistula (the Basov method was used) and one was intact. The variations in gastric juice secretion and observed changes in the juice secretion curve give evidence of a contribution of the nervous system to the damages produced by accelerations. Changes in the activity of pancreatic enzymes in the blood serum and activity of intestinal enzymes in the feces after the animals are subjected to accelerations are associated with significant disorders of the secretory function of the pancreas and the small intestine. Author

**N69-12035#** Joint Publications Research Service, Washington, D. C.

### **EFFECT OF TWO-WEEK HYPOKINESIA ON THE CARDIOVASCULAR RESPONSES OF DOGS DURING ORTHOSTATIC TESTS AND EXPOSURE TO TRANSVERSE ACCELERATIONS**

B. F. Asymaolov et al *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 55-63 refs (See N69-12028 02-04)

Avail: CFSTI

Experiments were carried out on female dogs after they had been immobilized by plaster dressings for two weeks. Orthostatic tests demonstrated variations in the pulse rate and arterial pressure. Exposure to accelerations was accompanied by higher tachycardia with a more pronounced inverse relation between changes in pulse rate and arterial pressure. The absence of a distinct decrease in orthostatic tolerance and acceleration tolerance can be attributed to the fact that the immobilization does not involve a significant reduction in hydrostatic effects on hemodynamics and the cardiovascular system of dogs has certain anatomical and physiological peculiarities. Author

**N69-12036#** Joint Publications Research Service, Washington, D. C.

### **ANIMAL TOLERANCE TO IMPACT ACCELERATIONS AS EVALUATED USING ENZYMATIC BLOOD TESTS**

Ye. Ye. Simonov et al *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 64-70 refs (See N69-12028 02-04)

Avail: CFSTI



Experiments were conducted on 86 white rats subdivided into three groups which were subjected to impact accelerations during landing which were known to produce or not to produce a certain traumatic effect. After 4, 24, and 72 hours the rats were decapitated and the activity of aspartic aminotransferase, alanine aminotransferase, aldolase and lactate dehydrogenase in the blood serum was evaluated. Except for aldolase activity the changes observed from the damaging effect of impact accelerations were characterized by a rapid (during the first hours after the traumas) development of variations in the enzymatic (chiefly of aspartic aminotransferase and aldolase) activity, an increase in changes with time and an increased duration of increased activity. Author

**N69-12037#** Joint Publications Research Service, Washington, D. C.

**GLYCOLYSIS RATE AND LACTIC ACID CONTENT IN THE MYOCARDIUM OF RATS DURING THEIR ADAPTATION TO HYPOXIA**

I. V. Khavkina *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 71-75 refs (See N69-12028 02-04)

Avail: CFSTI

With the adaptation of rats to hypoxia (at altitudes from 2500 to 7600 m) their heart muscles revealed a gradually increasing rate of the glycolytic process. On the tenth day of their enclosure in the altitude chamber the average activity of the process remained unaltered while the dispersion value doubled in comparison with the controls. This seemed to indicate that the reconstruction of tissue glycolytic metabolism had begun. By the 20th day the glycolysis rate had increased noticeably (by 16%) in comparison with the controls. By the 30th day the glycolysis activity had reached a maximum, exceeding by 40% that in the controls. During the course of adaptation of animals to hypoxia no lactic acid was accumulated in the myocardium. Author

**N69-12038#** Joint Publications Research Service, Washington, D. C.

**COMPARATIVE TOXICOLOGICAL CHARACTERISTICS OF REGENERABLE CARBON DIOXIDE ABSORBERS**

K. K. Sidorov et al *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 77-84 refs (See N69-12028 02-04)

Avail: CFSTI

This paper presents data on the toxicological characteristics of some carbon dioxide absorbers belonging to the amino alcohol group: monoethanol amine (MEA), monoethanol ethylene diamine (MEEDA), diethanol amine (DEA) and triethanol amine (TEA). The capacity of these amino alcohols to absorb CO<sub>2</sub> decreased from MEA to TEA. The level of acute toxicity of the compounds was similar as evaluated from experiments on different animal species. The mean lethal dose of the amino alcohols for rats was: 2050 mg/kg of MEA, 3600 mg/kg of MEEDA, 3460 mg/kg of DEA and 8400 mg/kg of TEA. A repeated administration of the compounds produced an opposite effect on the animal body. The amino alcohols exhibited a distinct irritating effect of a local character. Author

**N69-12039#** Joint Publications Research Service, Washington, D. C.

**APPLICATION OF HEAT TREATMENT IN AN INERT GAS MEDIUM FOR UPGRADING ELASTIC FOAM POLYURETHANE FOR REDUCING THE EMANATION OF GASEOUS TOXIC PRODUCTS**

V. D. Yablochkin et al *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 85-88 refs (See N69-12028 02-04)

Avail: CFSTI

The application of heat treatment in an inert gas medium in order to upgrade elastic foam polyurethane was studied. The treatment was shown to reduce by 2 to 5 times the emanation of toxic substances from this material while its mechanical properties remained unchanged. Author

**N69-12040#** Joint Publications Research Service, Washington, D. C.

**CHARACTERISTICS OF THERMAL MINERALIZATION OF BIOCOMPLEX WASTES IN RESTRICTED SPACES**

B. G. Gusarov *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 89-98 (See N69-12028 02-04)

Avail: CFSTI

Some reactors for the thermal mineralization of biocomplex wastes in a restricted space are analyzed. Peculiarities of the wastes and their mineralization are discussed. Experimental data on the effect of air supply, mineralization temperature and fractional composition of wastes on the mineralization processes and reactor operation are presented. Author

**N69-12041#** Joint Publications Research Service, Washington, D. C.

**PRINCIPLES OF MEDICAL CONTROL DURING LONG-TERM SPACEFLIGHTS**

V. V. Parin *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 99-102 (See N69-12028 02-04)

Avail: CFSTI

Long-term manned spaceflights can be made on the basis of development of an essentially new medical control methodology. A possible application of on-board computers for the processing of medical information is discussed. The regular periodicity of the measurements made during long-term spaceflights and their program are discussed. Some new methods for physiological examinations of space-crew members are presented. The authors show that the humoral medium of the human body and space-cabin hygienic parameters must be checked. They stress the importance of study of diseases which may occur during spaceflight, training of physicians for such flights and prediction problems. Author

**N69-12042#** Joint Publications Research Service, Washington, D. C.

**SOME NEUROLOGICAL PROBLEMS IN SPACE MEDICINE**

A. G. Panov *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 103-116 refs (See N69-12028 02-04)

Avail: CFSTI

A simulation experiment was carried out to evaluate disturbances in functioning of the nervous system which may occur during different stages in manned spaceflight. Four healthy male volunteers age 22 were restricted to a recumbent position for 72 days. An analysis of clinical observations, neurological surveys and other tests revealed three stages in the development of shifts caused by prolonged bedrest. The last stage, developing after 20 days of bedrest, was characterized by the development of disturbances in the higher nervous system. All the test subjects also exhibited muscular atrophy, reduced muscular strength, development of manifestations of oral automatism and other disorders of the nervous function. Some disturbances were also observed during a tilt-table test and exposure to accelerations. The authors believe that the concept of the phasic development of nervous disorders will allow prophylactic and therapeutic measures to be predetermined. They give recommendations on how to choose sleep-inducing, sedative, anaphylactic and other drugs and also discuss their peculiar effects during spaceflight. Author

**N69-12043#** Joint Publications Research Service, Washington, D. C.

**UNIDIRECTIONAL CHANGES IN THE HUMAN OXYGEN BALANCE CAUSED BY BED CONFINEMENT AND RESTRICTION TO AN ISOLATION CHAMBER**

L. R. Iseyev *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 117-124 refs (See N69-12028 02-04)

Avail: CFSTI

Twenty-day bed confinement experiments revealed a relationship between changes in the human oxygen balance during

## N69-12044

physical work and the degree of restricted motor activity. A 120-day experiment conducted in an isolation chamber revealed similar changes in the oxygen balance although the hydrostatic pressure of body fluids remained virtually unaltered. The introduction of sanitary measures, including physical exercises, into the program of the 120-day experiment considerably improved the response of test subjects to physical loads. The similarity of oxygen balance changes in test subjects during hypokinesia and its improvement following physical exercises suggest that the changes are caused primarily by hypokinesia. Author

**N69-12044#** Joint Publications Research Service, Washington, D. C.

### **DYNAMICS OF ELIMINATION OF SOME METABOLIC PRODUCTS BY SUBJECTS WEARING INSULATED SUITS**

S. M. Gorodinskiy et al *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 p 125-131 refs (See N69-12028 02-04)

Avail: CFSTI

The rate of human elimination of toxic products of natural metabolism was studied as a function of degree of atmospheric pressure, ambient temperature, and physical labor while in a pressure chamber. Chemical microanalysis of atmospheric samples removed from human pressure suits after three to six hours showed that the mean rate of toxic elimination from the human body increased considerably during working cycles as compared with rest cycles. Elimination of oxidizable compounds increased to  $590 \pm 75$  mg/hour as compared to  $77 \pm 18.5$  mg/hour at rest. G.G.

**N69-12045#** Joint Publications Research Service, Washington, D. C.

### **SYSTEMS FOR PROCESSING PHYSIOLOGICAL DATA IN SPACE RESEARCH**

A. P. Kalinovskiy *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 132-141 refs (See N69-12028 02-04)

Avail: CFSTI

Proposed is an onboard automated data processing system for manned space flight missions that evaluates and transmits physiological crew indices and serves as medical control. Such a system must perform processing operations by: (1) separation of the required physiological indices from the entire flow of incoming information; (2) measurement of their values and conversion to analysis; (3) comparison of required with known physiological data; and (4) feedout of comparison results for further analyses. A general scheme for automatic processing of physiological data is shown that uses variable voltages and amplification instruments for registering and processing of physiological data. G.G.

**N69-12046#** Joint Publications Research Service, Washington, D. C.

### **DAILY DYNAMICS OF SOME PHYSIOLOGICAL FUNCTIONS AND HUMAN WORK CAPACITY IN ISOLATION**

A. N. Litsov *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 142-148 refs (See N69-12028 02-04)

Avail: CFSTI

*In studying the daily rhythm of man we carried out prolonged isolation-chamber experiments in which we attempted: a) to determine the possibility and time required for restructuring the basic physiological functions and indices of work capacity when there is a sudden change in the schedule of sleep and wakefulness and b) to determine the most adequate indices reflecting the process of human adaptation to changes in daily schedules. The main purpose of this study is discussion of the characteristics of the effect exerted on the daily rhythm of human physiological functions and work capacity by isolation chamber factors. Author*

**N69-12047#** Joint Publications Research Service, Washington, D. C.

### **REVIEW OF A NEW BOOK ON SPACE PHYSIOLOGY**

F. P. Kosmolinskiy *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 149-156 ref (See N69-12028 02-04)

Avail: CFSTI

The authors advance a number of new theoretical propositions directed to a clarification of the physiological mechanisms of adaptation of animals and man to space conditions. The book attempts to examine: methods physiological research during spaceflights; physiological changes in the animal and human body under the influence of orbital spaceflight; vestibular-autonomic reactions during spaceflight (motion sickness syndrome) and extralabyrinthal reactions during weightlessness; effect of spaceflight on the digestive system and its role as an indicator of reactions of the body as a whole to extremal factors. Author

**N69-12048#** Joint Publications Research Service, Washington, D. C.

### **SLEEP UNDER SPACEFLIGHT CONDITIONS**

T. N. Krupina et al *In its Space Biol. and Med.*, vol. 2, no. 4, 1968 22 Nov. 1968 p 157-163 (See N69-12028 02-04)

Avail: CFSTI

The mechanism of sleep under normal pathological conditions was studied with emphasis on the systems responsibility for initiation of sleep and the definition of the semantic problem. The complexities of the cerebral processes serving as the basis of sleep were analyzed from various viewpoints and the considerable functional nonuniformity of sleep was pointed out. G.G.

**N69-12065#** Department of Transport, Toronto (Ontario), Meteorological Branch.

### **THE HEAT BALANCE AND TEMPERATURE OF PLANTS**

Z. A. Mishchenko *In its The Planetary Boundary Layer, Selected Russ. Articles 1968* p 53-73 refs Transl. into ENGLISH from Tr. Gl. Geofiz. Observ. (Leningrad), no. 190, 1966 p 41-56 (See N69-12058 02-20)

Avail: CFSTI

Observational data from three expeditions are used in the following ways: (1) to compare experimental and computational methods in the determination of plant leaf temperature, (2) to establish a quantitative dependence of the leaf-air temperature difference on the heat balance components; and (3) to determine the nature of the relationship between the leaf and air temperatures and to evaluate the effect of the micro-climate on the plant temperature. Author

**N69-12078\*#** Volt Technical Corp., Washington, D. C.

### **"MARS" ON EARTH**

L. Lozina-Lozinskiy Greenbelt, Md. NASA, Goddard Space Center 25 Nov. 1968 4 p Transl. into ENGLISH from Pravda (Moscow), Nov. 1968

(Contract NAS5-12487)

(NASA-CR-97788; ST-PR-SB-10777) Avail: CFSTI CSDL 06M

A brief outline is presented of some considerations, methods, and data in connection with the simulation of the Martian atmosphere in the U.S.S.R. K.W.

**N69-12110\*#** Hawaii Univ., Honolulu, Dept. of Botany.

### **ROLE OF GRAVITATIONAL STRESS IN LAND PLANT EVOLUTION: THE GRAVITATIONAL FACTOR IN LIGNIFICATION Semiannual Status Report, Period Ending 31 Oct. 1968**

S. M. Siegel and C. H. Lamoureux 1 Nov. 1968 62 p *Its Botan. Sci. Paper No. 7*

(Grant NGR-12-001-053)

(NASA-CR-97762) Avail: CFSTI CSDL 06C

Information is presented which forms a basis for eventual design of an orbital experiment relating to the gravitational effects on lignification. Selected studies of exploratory and supportive ex-

periments for the basic hypothesis linking gravitational-mechanical stresses with lignification are summarized. These studies are categorized as biochemical and phylogenetic aspects of lignification and biological experiments under hyper-g conditions. Experiments with cucumber test plants under hypo-g and flight parameters are reported also. These experiments involved orientation, clinostat techniques, and bouyant media. Substratum for seeds, containers, and command module ambient conditions are considered. D.H.B.

**N69-12140#** Naval Aerospace Medical Inst., Pensacola, Fla.  
**EFFECT OF DRUGS ON OCULAR COUNTERROLLING**  
 Earl F. Miller, II and Ashton Graybiel Aug. 1968 23 p refs  
 (AD-675956; NAMI-1046) Avail: CFSTI CSCL 6/15

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

**N69-12151#** Systems Technology, Inc., Hawthorne, Calif.  
**A SYSTEMS ANALYSIS THEORY FOR DISPLAYS IN MANUAL CONTROL Final Report**  
 Duane Mrcruer, Henry R. Jex, Warren F. Clement, and Dunstan Graham Jun. 1968 194 p refs  
 (Contract N00014-66-C-0072)  
 (AD-675983; STI-TR-163-1) Avail: CFSTI CSCL 5/8

A comprehensive theory for displays used in manual control systems is developed in servo analytic terms, and the process is illustrated by a tutorial example. The display-pilot-control-vehicle combination is treated as a multiloop feedback control system, using the notion that display system synthesis is fundamentally a guidance and control problem which involves human psychomotor activity. The elements of the theory comprise: a mission-phase definition; vehicle and environmental description in system-analytic terms; compatible criteria for mission success; mathematical models for the control response of the human operator to displayed quantities (including the dominant effects of display scanning and sampling); derived closed-loop system characteristics which affect display utilization; metrics for pilot workload; and a synthesis procedure for the preferred arrangement of key displays. Control at the compensatory level of pilot adaptation is treated in detail; and suggestions for possible improvements are discussed. A detailed analysis of the manually controlled blind-landing of a jet transport using conventional ILS instruments is given, and preferred instrument panel arrangements are predicted. The results agree well with airline experience. A number of immediate applications for the theory and areas for future research are suggested. Author (TAB)

**N69-12158#** School of Aerospace Medicine, Brooks AFB, Tex.  
**DECOMPRESSION STRESS IN SIMULATED ORBITAL FLIGHT Interim Report, Mar. 1964-Jan. 1968**  
 Henry B. Hale, James P. Ellis, Jr., and Edgar W. Williams May 1968 19 p refs  
 (AD-676139; SAM-TR-68-53) Avail: CFSTI CSCL 6/19

Endocrine-metabolic appraisal was made (by means of urinalysis) of human subjects experimentally exposed to hypobaric conditions similar to those encountered in orbiting spacecraft or during extravehicular activity in space. In one test, 26 subjects were exposed sequentially (after 1.5 hours of denitrogenation) to 5 p.s.i.a. for 2.5 hours, 3.5 p.s.i.a. for 15 minutes (with standardized

exercise), 7 p.s.i.a. for 4 hours, and 3.5 p.s.i.a. for 2 hours (with standardized exercise). Nonspecific stress was evident, as there were decompression-induced elevations in urinary creatinine, urea, magnesium, sodium, Na/K, urine volume, 17-hydroxycorticosteroids, epinephrine (E), norepinephrine (NE), and the NE/E ratio. In a second test (n = 13), all conditions were the same as those in the first test except that there was a 4-hour exposure to 5 p.s.i.a. instead of 7 p.s.i.a. Subjects who suffered joint pain showed signs of stress before the appearance of symptoms. More intense and more progressive stress was evident in test 2, apparently reflecting the long exposure to 5 p.s.i.a. Reductions in urinary phosphorus occurred in both tests, but this is not a typical nonspecific response to stressors. Author (TAB)

**N69-12190#** Naval Submarine Medical Center, Groton, Conn.  
 Submarine Medical Research Lab.  
**A SURVEY OF FIRE PREVENTION PROBLEMS IN CLOSED OXYGEN-CONTAINING ENVIRONMENTS Interim Report**  
 Valentine D. Galasyn May 1968 14 p refs  
 (AD-675817; SMRL-526) Avail: CFSTI CSCL 13/12

The problem of fire ignition and flame propagation in oxygen-containing or oxygen-enriched environments is dependent upon both the percentage of oxygen, oxygen partial pressure, and presence of the diluent inert gas. Oxygen percentage is the single most important feature and its effect is most strikingly greater than 42 per cent. The diluent gas affects the initial combustion temperature and the rate of propagation. Helium requires a higher ignition temperature, but produces an increased spread; while nitrogen requires a lower ignition temperature, but shows a decreased propagation rate. The most effective extinguishment system employs a hand-held, high-pressure, water hose. However, specific prevention measures are mandatory when dealing with these environments. Author (TAB)

**N69-12192#** School of Aerospace Medicine, Brooks AFB, Tex.  
**GLUCOSE TOLERANCE IN DOGS EXPOSED TO ALTITUDE AND DRUG ADMINISTRATION: AMPHETAMINE**  
 Martin Taub and Albert T. Bernardini Jun. 1968 11 p refs  
 (AD-676146; SAM-TR-68-58) Avail: CFSTI CSCL 6/19

This study was initiated to determine the effect of altitude and drug administration on glucose tolerance at altitude. Dogs were exposed to a simulated altitude of 27,000 ft. and the rate of disappearance of intravenously injected glucose (0.5 gm./kg.) was compared with similar tests at ground level. All dogs were maintained on the same PO<sub>2</sub> in the inspired air (152 mm. Hg PO<sub>2</sub>). In addition, amphetamine (1 mg./kg. I.V.) was administered to the dogs under both atmospheric conditions. A significant increase was seen in the K-value of the nondrug dogs exposed to simulated altitude (P less than .01). Also, a significant increase in the K-value was noted in the dogs treated with amphetamine at ground level as compared with ground-level controls (P less than .01). The K-value of dogs exposed to altitude and administered amphetamine was significantly raised (P less than .01) as compared with both ground-level and altitude nondrug conditions. Author (TAB)

**N69-12193#** School of Aerospace Medicine, Brooks AFB, Tex.  
**GLUCOSE TOLERANCE IN DOGS EXPOSED TO ALTITUDE AND DRUG ADMINISTRATION: MEPERIDINE**  
 Martin Taub and Albert T. Bernardini Jun. 1968 12 p refs  
 (AD-676147; SAM-TR-68-59) Avail: CFSTI CSCL 6/19

The rate of disappearance of an injected glucose load from the blood of dogs exposed to a simulated altitude of 27,000 ft. was compared to similar glucose tolerance at ground level. All dogs were anesthetized and maintained on the same PO<sub>2</sub> in the inspired air (152 mm. Hg PO<sub>2</sub>). In addition, 2.0 mg./kg. Demerol (meperidine) were administered intravenously to the dogs under both atmospheric conditions. A significant increase was seen in the K-value of the nondrug dogs exposed to simulated altitude (P < .05).

## N69-12199

There was no significant difference between drug and nondrug dogs at altitude or between drug and nondrug dogs at ground level. Author (TAB)

**N69-12199#** Human Engineering Labs., Aberdeen Proving Ground, Md.

### **WORK PERFORMANCE WITH MUSIC: INSTRUMENTATION AND FREQUENCY RESPONSE**

William Wokoun Jul. 1968 31 p refs  
(AD-675480; HEL-TM-9-68) Avail: CFSTI CSCL 5/5

This experiment tested whether music instrumentation affects response times on a vigilance task. Instrumentation was varied by restricting the frequency range, thus eliminating many of the overtones that determine timbre. Forty-one subjects worked at the task for one hour while listening to a program of 23 selections, alternately wide-range and filtered. The subjects showed significantly better alertness during the wide-range condition throughout the hour. The filtered condition gave slower responses, greater variability, and inferior individual consistency. Hence the music instrumentation had several significant effects on alertness. In addition, the more-stimulating musical program here appeared responsible for faster responses and lower variability than in the preceding experiment. Author (TAB)

**N69-12209#** School of Aerospace Medicine, Brooks AFB, Tex. School of Aerospace Medicine.

### **AN AUTOMATED CLOSED SYSTEM FOR GAS ANALYSIS. ASSAY OF CARBON MONOXIDE IN BLOOD, DECEMBER 1965-JULY 1967**

Dorothy F. Wease, Marion J. Stansell, and Eli S. Espinosa Dec. 1967 19 p refs  
(AD-666422; SAM-TR-67-107) Avail: CFSTI CSCL 6/1

A closed, automated system for the determination of carbon monoxide is described. The technic was found applicable to the assay of large numbers of blood samples with carbon monoxide content ranging from background levels up to lethal concentrations. The limits of assay for this method are 2 to 10 micromoles,  $\text{CO}$  per 100 ml. of whole blood, which is equivalent to 0.5 to 2.5 p.p.m. (w/w). Samples containing higher concentrations are appropriately diluted with degassed physiologic saline. Analysis of the optical density per micromole %  $\text{CO}$  obtained over several months using different bloods with hemoglobin concentrations ranging from 11.7 to 13.0 gm. showed a maximum deviation from the overall average of less than 0.005 OD. Whole blood recovery data ranged from 97% to 103% with an average value of 99.5%. The basic technic offers an approach to the quantitative assay of a wide variety of body and environmental gases, both those that are toxic and those that are vitally essential. Author (TAB)

**N69-12237\*#** Hamilton Standard Div., United Aircraft Corp., Farmington, Conn. Biomedical Systems Dept.

### **EXPERIMENTAL AND ANALYTICAL STUDY OF CARDIOVASCULAR CONTROL LOOPS** Final Report

N. A. Normann 20 Mar. 1967 40 p refs  
(Contract NASw-1350)

(NASA-CR-97845; HSER-5004) Avail: CFSTI CSCL 06P

Access was gained to the information flowing in intact autonomic nerves, specifically as it relates to circulatory control. Methods were developed with which neural data were obtained from representative efferent and afferent visceral nerves in the cat. Electrodes were developed which tolerated and caused minimum of trauma; maybe placed on small and relatively inaccessible nerves; minimized bioelectric interference; and were suitable for implantation. Methods were developed for implanting electrodes and for monitoring nerve traffic in the intact animal (hard-wire system). Cross-correlation technique was the principal method of nerve impulse identification. Signal conditioning and processing were sought and optimized for selectivity with respect to the various classes of nerve impulses. Signal averaging was applied to the cross-correlated

data, improving the accuracy of nerve patterns occurring during cardiac and/or respiratory cycles. Author

**N69-12255#** Flying Personnel Research Committee, London (England).

### **THE EFFECTS OF HIGH AMBIENT HUMIDITY ON THE PERFORMANCE OF THE LIQUID CONDITIONED SUIT**

J. R. Allan (RAF, Farnborough, Engl.) Jul. 1967 15 p refs  
(FPRC/1265) Avail: CFSTI

The effects of high humidity have been studied in 4 subjects wearing the liquid conditioned suit in a range of air temperatures from 30°C to 60°C. There was no significant difference in the choice of inlet temperature between the dry and humid conditions but the amount of heat extracted from all sources was approximately 50% greater in the humid conditions. There was a tendency for the suit to overcool the trunk, particularly the buttocks, but the striped cooling effect with the tunnelled suit used in this study was considerably less marked than in earlier versions of the suit. Author

**N69-12261#** Honeywell, Inc., St. Paul, Minn. Research Dept.

### **LASER RADIATION EFFECTS ON THE MORPHOLOGY AND FUNCTION OF OCULAR TISSUE** Annual Report, 1 Aug. 1967-31 Jul. 1968

Arthur E. Jones, David D. Fairchild, and Perry Spyropoulos Jul. 1968 76 p refs  
(Contract DADA-17-67-C-0019)

(AD-675476; AR-2; Rept.-12047-TDR2) Avail: CFSTI CSCL 6/5

A power spectral analysis was performed on averaged responses for a number of wavelengths and intensities of spectral light. An averaging computer was used to average at least 50 consecutive responses at each wavelength and intensity. The studies indicate that the ERG has more than one generator and there is no evidence of a single mechanism with a simple linear phase shift, energy is distributed in several frequency bands and each band has a threshold, the power spectrum contains different frequency bands as a function of wavelength, and anatomical substrates have a frequency fingerprint, and the ERG may be useful as a diagnostic tool to assess the state of the retina. The ERG of the mangabey was found to be altered by a single laser pulse of low energy density (0.2 J/sq cm) which irradiated a large retinal area. ERGs recorded six or more days post-exposure showed a depression or absence of the third oscillatory potential. The implicit time of the b-wave was significantly shorter ( $p < 0.001$ ) post-exposure. Replication of the study with testing at 6-10 days and six months post-exposure revealed statistically significant post-exposure ERG changes persisting up to six months. Author (TAB)

**N69-12279#** University of Southern Calif., Los Angeles. Electronics Personnel Research Group.

### **AN ANALYSIS OF STRUCTURE AND ERRORS IN CORRECTIVE MAINTENANCE WORK**

Joseph W. Rigney, Douglas M. Towne, Anthony K. Mason, and Robert H. Cremer Feb. 1968 89 p refs  
(Contract Nonr-228(22))

(AD-666568; TR-55) Avail: CFSTI CSCL 5/9

The report describes the work structure within which the technician operates when he performs corrective electronics maintenance. The structure is characterized as a hierarchy of goals, each necessarily achieved prior to achieving the general original goal of restoring a malfunctioning equipment to a normal state. Within this goal hierarchy is a structure of serial activities whose performance is required in the achievement of each goal. General methods of altering goal sets are described by which the technician may work toward satisfying activity goals and generating appropriate sub-goals. Using the work structure as a foundation, an analysis of errors is developed. Errors at the maintenance interface are precisely defined, and several concepts are introduced related

to the generation, detection, and correction of errors. In addition, the concept of technician and equipment error states is introduced. In order to gain further insight into error processes, and to gather empirical data in support of the concepts presented in the theoretical development, an empirical study was performed. Conclusions are drawn and implications for future research are discussed.  
Author (TAB)

**N69-12317#** Life Sciences Inc., Fort Worth, Tex.  
**IMPROVING PILOTING SKILLS IN TURBULENT AIR USING A SELF-ADAPTIVE TECHNIQUE FOR A DIGITAL OPERATIONAL FLIGHT TRAINER**

A. L. Lowes, N. C. Ellis, D. A. Norman, and W. G. Matheny  
Orlando, Fla. Naval Training Device Center Aug. 1968 57 p  
refs

(Contract N61339-67-C-0034)  
(AD-675805; NAVTRADEVEN-67-C-0034-2) Avail: CFSTI CSCL 14/2

The purpose of this study was to determine the feasibility of applying adaptive principles to flight simulator training functions. Of specific importance was the question: Can an Operational Flight Trainer be used as an adaptive trainer to improve piloting skills. Eighteen non jet-experienced pilots were assigned to two groups for the purpose of receiving a constant amount of flight simulator practice in the task of maintaining a constant altitude program during simulated air turbulence. One group was trained using an adaptive technique and the other was trained under conditions representative of conventional techniques. It was hypothesized that the adaptively trained pilots would be more proficient when transferred to a flight simulation representative of an aircraft in clear air turbulence than would the conventionally trained pilots. Resulting data supported the hypothesis, and it was concluded that self adaptive principles are feasible in the performance of flight simulator training functions.  
Author (TAB)

**N69-12322\*#** Miami Univ., Coral Gables, Fla. Inst. of Molecular Evolution.

**[INVESTIGATIONS IN SPACE-RELATED BIOLOGY, INCLUDING MOLECULAR EVOLUTION AND RELEVANT ASPECTS OF THE EXTRATERRESTRIAL ENVIRONMENT] Annual Report**

Sidney W. Fox 30 Sep. 1968 58 p refs  
(Grant NGR-10-007-008)

(NASA-CR-97831; AR-4) Avail: CFSTI CSCL 06C

The status of investigations of the origin of living systems is summarized and brief accounts are given on advances in laboratory and field research programs. Emphasis is currently directed to the question of how a peptide bond synthesis might have evolved through amino acid adenylates. Copolymerization of eighteen to twenty amino acid adenylates in the presence of preformed polyamino acid has shown striking results. Coupled with studies of selective reaction of polyamino acids and polynucleotides, this work provides a basis for a theory of the origin of the code. The adenylate model shows promise not only for contemporization of the model of a primitive cell, but also for clarifying the biosynthesis of contemporary protein.  
E.C.

**N69-12349#** Naval Aerospace Medical Inst., Pensacola, Fla. Aerospace Medical Inst.

**A SIXTY-MINUTE VIGILANCE TASK WITH 100 SCORABLE RESPONSES**

Robert S. Kennedy 16 Jul. 1968 15 p refs  
(AD-675213; NAMI-1045) Avail: CFSTI CSCL 5/10

Four forms of a vigilance task were administered over four sessions in counterbalanced order to 16 subjects. Three of the tasks required auditory (1, 2, or 3 tones) and one required visual (3 lights) monitoring. Visual performance was superior to auditory performance which was a function of the number of channels

monitored, and performance for the four sessions was asymptotic. Among the different scoring methods used, percent correct had the most common variance. Decrements in performance appeared within 10 minutes in the one- and two-channel auditory tasks. An overall downward trend appeared in the three-channel visual task but was less regular. No systematic change in performance was apparent in the three-channel auditory task. Intratask correlations were high (> .75), while intertest correlations showed only a 20 per cent common variance.  
Author (TAB)

**N69-12369#** Federal Aviation Administration, Washington, D. C. Office of Aviation Medicine.

**AVIATION MEDICINE FAA-1966**

P. V. Siegel Dec. 1967 12 p  
(AD-675943; AM-67-25) Avail: CFSTI CSCL 6/19

A review is presented of the nation-wide program which establishes the standards of medical fitness for pilots, air traffic controllers, and other personnel connected with civil aviation; provides a certification program which involves the periodic medical examination of these personnel; provides medical investigation for aircraft accidents; conducts medical research on a variety of subjects of importance to civil aviation safety; operates an occupational health program for the agencies 44,000 employees; and provides for the education of civil airmen on medical subjects of importance to safe flying.  
Author (TAB)

**N69-12389\*#** California Univ., Berkeley. Space Sciences Lab.  
**CHEMISTRY OF LIVING SYSTEMS Semiannual Report, 1 Apr.-30 Sep. 1968**

Thomas H. Jukes 30 Sep. 1968 43 p refs *Its* Space Sci. Lab. Ser. 9, Issue 64  
(Grant NsG-479)

(NASA-CR-97647) Avail: CFSTI CSCL 06A

Abstracted data are presented on the results obtained in several areas of chemical research. The projects pertain to protein studies; optical properties of supercoiled DNA molecules; the *A. Vinelandii* RNA polymerase; action of various mutagens on TMV and TMV-RNA; biosynthesis of the inosinic acid of transfer RNA; regulation of nucleoside metabolism in *E. coli*; factors influencing differentiation and development in erythropoiesis; and the interrelations between the biochemical and cytological changes; the regulation of the initiation of DNA replication in bacteria; DNA replication in vivo by a temperature-sensitive polynucleotide ligase mutant of T4; and structure and function of bacterial ribosomes; and the evolution of hydroxylases of aromatic compounds in pseudomonas.  
M.G.J.

**N69-12403#** Flying Personnel Research Committee, London (England).

**LEGIBILITY OF RED AND WHITE TEST OBJECTIVES**

A. B. Chaloner (RAF, Farnborough, Engl.) May 1967 12 p refs  
(FPRC/1272) Avail: CFSTI

The results show that to obtain equal legibility of instrument markings, approximately equal subjective brightness of red or white light is required. This information was needed for a larger study, the purpose of which was to compare the effect on the pilot's dark adaptation of viewing cockpit instruments lit by red and by white light. The levels of instrument lighting employed at night by some RAF pilots are also mentioned.  
Author

**N69-12413#** Federal Aviation Administration, Washington, D. C. Office of Aviation Medicine.

**A RETROSPECTIVE ANALYSIS OF AEROMEDICAL CERTIFICATION DENIAL ACTIONS, JANUARY 1961-DECEMBER 1967**

P. V. Siegel and Charles F. Booze, Jr. May 1968 15 p  
(AD-675521; FAA-AM-68-9) Avail: CFSTI CSCL 6/14

## N69-12416

The study quantifies several unknowns and/or uncertainties with respect to medical and general descriptive attributes of airmen denied medical certification. Data are presented concerning age, sex, occupation, total flying time, and medical characteristics of denied airmen. Certification actions at the appellate level are discussed to include medical problems associated with appeals to the Federal Air Surgeon and the FAA Administrator. An analysis of mortality experience among airmen exempted from the regulations due to cardiovascular problems is also presented. Author (TAB)

**N69-12416#** Aeronautical Research Labs., Wright-Patterson AFB, Ohio.

### **EFFECTS OF PRESENCE OR ABSENCE OF COCKPIT MOTION IN INSTRUMENT FLIGHT TRAINERS AND FLIGHT SIMULATORS**

Dominick J. Gibino Jun. 1968 17 p refs  
(AD-675543; ASD-TR-68-24) Avail: CFSTI CSCL 6/19

The report briefly examines the effects of motion on crew members in training devices with and without the presence of a motion system. Conclusions of motion system research are presented, including a sample bibliography of motion system studies and papers. The report concludes with recommendations for procurement practice and operational usage. Author (TAB)

**N69-12434\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

### **COMPENDIUM OF HUMAN RESPONSES TO THE AEROSPACE ENVIRONMENT. VOLUME 1: SECTIONS 1-6**

Emanuel M. Roth, ed. Washington NASA Nov. 1968 506 p refs

(Contract NASr-115)  
(NASA-CR-1205(I)) Avail: CFSTI CSCL 06S

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**N69-12435\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

### **MICROWAVE RADIATION**

Emanuel M. Roth *In its* Compendium of Human Responses to the Aerospace Environ. Nov. 1968 26 p refs (See N69-12434 02-04)

Avail: CFSTI CSCL 06R

The effects of microwave radiation on animals and humans are summarized, with microwaves being defined as electromagnetic energy with wavelengths in the range of 1 to 300 cm, or wave frequencies between 30,000 and 100 MHz. Penetration depth in tissue was determined, as well as thermal and microthermal factors in absorption. Total body, nervous system, eye, and testis effects on animals are outlined. Human effects were determined by a four-year surveillance program using a large group of radar-exposed workers who underwent repeated physical and eye examinations. Results of detailed hematological and other laboratory investigations failed to detect significant changes in the physical or optical inventories of the subjects. It was concluded that chronic irradiation under industrial conditions produces extremely polymorphic changes

in the body, causing functional changes in various organs and systems as determined by the intensity and duration of the microwave influence and by individual characteristics. Human tolerance limits for microwaves were estimated, with the most common power density standard for maximum continuous total body exposure to any wavelength being 10 mW/cm<sup>2</sup>. A.C.R.

**N69-12436\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

### **LIGHT ENVIRONMENT: A. VISIBLE LIGHT. B. ULTRAVIOLET LIGHT**

E. M. Roth and S. Finkelstein *In its* Compendium of Human Responses to the Aerospace Environ. Nov. 1968 160 p refs (See N69-12434 02-04)

Avail: CFSTI CSCL 06S

The characteristics of visible light and ultraviolet light as related to human performance on space missions are summarized. Definitions of terms and symbols commonly used in physiological optics are presented, and the light environment is described. *Human performance data with respect to visual acuity, visual search techniques and strategy, color functions, visual field limits, glare and flash blindness phenomena, and visual performance in actual space flight* are included. Spacecraft cabin and space suit design is treated, with recommendations for spacecraft illumination, comments on the role of color in habitability, emphasis on efficient viewing ports and visors, and investigation of the optical characteristics of instruments and displays. Visual considerations to be encountered in space operations include the observation and detection of other space vehicles, vision in rendezvous and docking, and optical requirements for lunar landing. The discussion on ultraviolet radiation was restricted to that of solar origin, since the sun is the primary source of ultraviolet light expected to influence manned space flight. The effects of this radiation on the skin and eyes are described. A.C.R.

**N69-12437\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

### **IONIZING RADIATION**

E. M. Roth *In its* Compendium of Human Responses to the Aerospace Environ. Nov. 1968 117 p refs (See N69-12434 02-04)

Avail: CFSTI CSCL 06R

Data on ionizing radiation are presented for use in calculating specific doses, radiation shielding, and risk hazard analysis for manned space missions. The types of space radiation are briefly reviewed, followed by definitions of terms and symbols and basic dosage factors utilized in radiobiology. The interaction of radiation with biological materials is treated, utilizing absorption tables for bone and muscle tissue. Examples are given of typical depth-dose patterns under shielding. The early effects of acute radiation at high dose-rates are tabulated, and dose-lethality relationships for animals and humans are derived. Hematological and skin reactions are studied in particular. Progressive performance decrements are analyzed where low-level exposures of a periodic or continued nature can lead to progressive decay in health and performance. The late or delayed effects of radiation damage are covered, including diseases of the ocular lens and skin, as well as general life-shortening, genetic, and carcinogenetic manifestations. Finally, *dose limits in space operations and risk analysis are investigated.* A.C.R.

**N69-12438\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

### **MAGNETIC FIELDS**

D. E. Busby *In its* Compendium of Human Responses to the Aerospace Environ. Nov. 1968 8 p refs (See N69-12434 02-04)

Avail: CFSTI CSCL 06S

The effects of high and low gradient magnetic fields on human performance are presented for space flight applications. Although few human exposures to a magnetically quiet environment have been reported, limited experience has revealed no traceable ailment to such surroundings. It is generally held that the magnitude of the geomagnetic field has remained steady during the long evolution of the earth, though its polarity and strength have detectably changed. It is assumed that living creatures have become accustomed to the field, and possible that some biologic processes may be to some degree dependent on it. The presently known effects of high magnetic fields on man are tabulated as obtained from personnel from a number of nuclear physics laboratories. It is stated that caution should be exercised in interpreting these data to mean that the performance of man will not be degraded in high magnetic fields. Recent studies using spider monkeys have indicated that neural and cardiac functions are affected. Although a variety of biologic effects have been noted, no definite magnetic dose-effect relationship has been established to date.

A.C.R.

**N69-12439\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

**ELECTRIC CURRENT**

S. Finkelstein and E. M. Roth *In its Compendium of Human Responses to the Aerospace Environ.* Nov. 1968 23 p refs (See N69-12434 02-04)

Avail: CFSTI CSCL 06S

A theoretical discussion of the behavior of physiological systems in the presence of electrical currents is presented, and the practical factors which must be considered in assessing the effects of electricity on humans are described. These factors include skin and body contact resistance; circuit voltage; amount of current flowing through the body; type of circuit; and frequency. It is stated that organs vary greatly in sensitivity and pathological response to electric currents. A summary of the reaction of the central nervous system, skin, voluntary muscles, bones, blood vessels, eyes and heart is given. Human tolerance limits are tabulated giving a rough estimate of short shocks and discharge thresholds and constant current thresholds. Both are critical time-dependent thresholds which may be extrapolated in setting safety and design standards for unusual electrical equipment or conditions.

A.C.R.

**N69-12440\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

**THERMAL ENVIRONMENT**

T. A. Bottomley (Bellcomm, Inc.) and E. M. Roth *In its Compendium of Human Responses to the Aerospace Environ.* Nov. 1968 148 p refs (See N69-12434 02-04)

Avail: CFSTI CSCL 06S

Biothermal terms and symbols are defined, followed by introduction of the biothermal equation for analysis of thermal equilibrium conditions between the human body and its environment. Environmental comfort zones and stress indices are examined. Space cabin atmospheres are then investigated in relation to radiant heat exchange, forced convective heat transfer, free convective heat transfer, and evaporative heat transfer between the astronaut and his environment. Regional cooling requirements of the human body are derived at various levels of altitude, humidity, and human activity. These principles are incorporated into a discussion of the thermal physiology of space clothing with additional factors of radiant insulation, vapor resistance, and conductive heat exchange being introduced. Space clothing considered are shirtsleeve garmets, air ventilated suits, and liquid cooled suits. Data are presented for use in establishing indices of thermal stress and tolerance in space operations under both hot and cold conditions. Included are such variables as body temperature, sweating response to thermal loads, pain and discomfort thresholds for heat and cold, body stress indices, and performance under thermal stress.

A.C.R.

**N69-12453#** Library of Congress, Washington, D. C. Aerospace Technology Div.

**DEVELOPMENTS IN RADIATION Surveys of Foreign Scientific and Technical Literature**

L. L. Schiroki 26 Aug. 1968 228 p refs

(AD-676008; ATD-68-126) Avail: CFSTI CSCL 6/18

The report reflects Soviet achievements, capabilities, trends, and problems in radiation detection, protection and treatment, based on Soviet and East European open literature from 1964 to date. The document is grouped into 4 parts: Radiation under spaceflight conditions; Radiation biological effects; Radiation protective agents; and Prophylaxis and therapy of radiation injuries.

TAB

**N69-12455#** Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

**DEVELOPMENT AND EVALUATION OF A DIGITAL COMPUTER PROGRAM FOR AUTOMATIC HUMAN PERFORMANCE MONITORING INFLIGHT SIMULATOR TRAINING Final Report Jan. 1966-Jan. 1967**

Patricia A. Knoop Aug. 1968 182 p refs

(AD-675542; AMRL-TR-67-97) Avail: CFSTI CSCL 5/9

A digital computer program for automatic human performance monitoring in flight simulator training was designed, implemented, and evaluated. The program is general purpose in design and consists of two segments: (1) the Input segment, permitting performance measures and criteria to be defined and updated on-line by the instructor and allowing the instructor to request integrated, easily interpreted performance information to be displayed or recorded; and (2) the Monitoring segment, operating on defined criteria to monitor and evaluate performance. The program was implemented on a Raytheon 440 computer and operated in real-time with an orbital-reentry vehicle simulation. Evaluations were made of the programs utility in monitoring and scoring tasks involving manual attainment of retro-attitude, overall attitude and rate control, and procedural tasks for reentry operations. The monitoring program was also applied to a representative tracking task to compare its efficiency with that of a special purpose monitoring approach. The research allows the following conclusions and recommendations to be made: (1) a general purpose program capable of a variety of performance monitoring and evaluating applications in simulator training is feasible and directly applicable to increasing the effective use of simulators; (2) with minor revisions to the prototype system, the monitoring program will operate within the spare time and memory of current flight simulators; (3) it is not justifiable to attempt to gain program efficiency at the expense of operational flexibility; and (4) a version of the present program can now be implemented in an operational simulator training system for field evaluation. Author (TAB)

**N69-12506#** CBS Labs., Stamford, Conn.

**DEVELOPMENT OF EAR PROTECTOR, ELECTROACOUSTIC, MX-7307 ( )/UIC Final Report, Oct. 1966-Jun. 1968**

John R. Pavlick Ft. Monmouth, N. J. Army Electron. Command Sep. 1968 17 p refs

(Contract DAAB07-67-C-0053)

(AD-675511; ECOM-0053-F; REPT-4) Avail: CFSTI CSCL 6/17

The report describes a program of design, construction, and testing of the Ear Protector, Electroacoustic, MX-7307 ( )/UIC, a device intended for use in armored vehicles carrying electrically fired weapons and equipped with Intercommunication Set AN/VIC-1 ( ). When the weapon trigger is depressed, the Electroacoustic Ear Protector introduces a pulsed tone into the intercommunication system which protectively conditions the ears of the crew members against the ensuing gun blast wave. Weapon ignition is delayed long enough (approximately 1/8 second) for the tone burst to cause a protective auditory reflex in crew members before the arrival of the gun blast wave. Two prototype units were designed and constructed. After testing and acceptance of these two units with

## N69-12509

some modifications sixteen final engineering models for service tests were constructed and tested. Author (TAB)

**N69-12509#** Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.

### U.S.S.R. LITERATURE ON AIR POLLUTION AND RELATED OCCUPATIONAL DISEASES. VOLUME 15: MAXIMUM PERMISSIBLE CONCENTRATIONS OF ATMOSPHERIC POLLUTANTS, BOOK 8

M. S. Gol'dberg, ed. and V. A. Ryazanov, ed. [1968] 136 p refs Transl. into ENGLISH of the book "Predelno Dopustimye Konsentratsii Atmosferykh Zagrayaznenii" Moscow, Medgiz., 1964

(Grant PHS-AP-00176)

(PB-179140) Avail: CFSTI CSCL 13B

The first paper is devoted to the determination of norms for atmospheric pollutants. Some of the articles present new experimental material for the determination of maximum permissible atmospheric air concentrations of waste products discharged into the air by new industries producing synthetic materials. One article on new synthetic material deals with chromium toxicity and its significance as an atmospheric pollutant. New substances obtained in the course of investigating chloroprene are described. Some articles are devoted to the combined action of atmospheric pollutants. The volume contains two articles discussing methods for the determination of atmospheric pollutants and by outlining statistical methods for processing experimental data. Author (USGRDR)

**N69-12511#** Clearing House for Federal Scientific and Technical Information, Springfield, Va.

### U.S.S.R. LITERATURE ON AIR POLLUTION AND RELATED OCCUPATIONAL DISEASES. VOLUME 16: BIOLOGICAL EFFECT AND HYGIENIC SIGNIFICANCE OF ATMOSPHERIC POLLUTANTS, BOOK 1/9

M. S. Gol'dberg, ed. and Y. A. Ryazanov, ed. [1968] 111 p refs Transl. into ENGLISH of the book "Biologicheskoe Deistvie i Gigienicheskoe Znachenie Atmosferykh Zagraznenii" Moscow, Medgiz., 1966

(Grant PHS-AP-00176)

(PB-179141) Avail: CFSTI CSCL 13B

The collection is the 9th issue of a series heretofore bearing the general designation of 'Limits of Allowable Atmospheric Air Pollutants'; hereafter it will bear the title of 'Biological Effect and Hygienic Significance of Atmospheric Pollutants'. The volume contains reports on hexylaminediamine, ethylene, propylene, butylene, nitrobenzene, cyclohexanol, cyclohexanone, carbon dioxide, and other organic and inorganic contaminants. The appendix contains a new Table of Maximum Allowable Concentrations in atmospheric air, including supplements and revisions added in 1964. Author (USGRDR)

**N69-12514#** George Washington Univ., Alexandria, Va. Human Resources Research Office.

### BACKGROUND AND SITUATIONAL CONFIDENCE; THEIR RELATION TO PERFORMANCE EFFECTIVENESS

Wiley R. Boyles Jun. 1968 19 p refs Presented at the Ala. Psychological Assoc. Ann. Meeting, Birmingham, Ala., Apr. 1968 (Contract DA-44-188-ARO-2)

(AD-674943; HumRRO-PP-22-68) Avail: CFSTI CSCL 5/10

Inventories designed to measure confidence in dangerous situations were administered to about 3,000 potential Army aviation warrant officers from January to December 1967. These paper-and-pencil inventories are based on a clinical-experimental fractional anticipatory response conceptualization of reactions to the psychological stresses of combat. Military performances of the men are subjected to longitudinal analysis to determine the relationship of scores on these inventories to various criterion performances. In this paper relationships of scores on two of these inventories--the Background Activities Inventory and the Situational Confidence

Inventory--to peer ratings, attrition during flight training, and accident information, are presented. Author (TAB)

### **N69-12515#** Honeywell, Inc., St. Paul, Minn. Research Dept. **THE EFFECTS OF HIGH-INTENSITY RADIANT STIMULATION OF VARYING WAVELENGTHS AND DURATIONS ON RETINAL SENSITIVITY** Final Report, 1 Jul. 1963-31 Mar. 1968

Harry G. Sperling, Arthur E. Jones, and W. S. Dockins Jul. 1968 39 p refs

(Contract DA-49-193-MD-2457)

(AD-675477; HONEYWELL-1549-FR1) Avail: CFSTI CSCL 6/5

The effects of intense spectral light on spectral sensitivity were investigated. Both continuous adaptation and pulsed adaptation were used. It was found that spectral adaptation in discrete spectral band was reduced by intense blue, green, and red adaptation. A model of the primate spectral sensitivity was developed which can be used to predict the effects of laser and other spectral sources on retinal sensitivity. Author (TAB)

**N69-12531#** Aeronautical Center, Oklahoma City, Okla.

### **EFFECTS OF DECOMPRESSION ON OPERATOR PERFORMANCE**

William F. O'Connor and George E. Pendergrass Apr. 1966 11 p refs

(AD-675774; AM-66-10) Avail: CFSTI CSCL 6/19

The study was performed to provide more quantitative estimates of degradation of pilot performance following decompression and the extent to which a decompression with mask donning interrupts the task of piloting. The experiments utilized a Scow complex coordinator and were conducted in an altitude chamber. Subjects were decompressed to altitudes from 25,000 to 41,000 feet. Results indicate impairment of performance for 2 to 4 minutes following rapid decompression. Total time loss from mask donning is much more extended than the 5 to 6 seconds required to don the mask. Author (TAB)

### **N69-12552** Technische Hochschule Munchen (West Germany). **NOISE MEASUREMENT AND DISTURBANCE ESTIMATE CONSIDERING THE CAUSAL CONNECTIONS BETWEEN PHYSICS, PHYSIOLOGY, AND PSYCHOLOGY [GERAEUSCHMESSUNG UN LAERMBEURTEILUNG IM LICHT DER KAUSALZUSAMMENHAENGE ZWISCHEN PHYSIK, PHYSIOLOGIE, UND PSYCHOLOGIE]**

W. Buerck In DVLR Aviation Acoustics Seminar, 3 [1967] p 5-21 (See N69-12551 02-02)

Avail: CFSTI

The physical, physiological, and psychological aspects of noise evaluation criteria are analyzed in order to eliminate contradictory evaluation methods and to prevent divergent results in noise tests. Causal relationships between man and environment are taken into account in this study, and the physiological processes in the organs of the human being as well as the psychological impacts and their secondary effects are considered. Transl. by K.W.

**N69-12559#** Federal Aviation Administration, Washington, D. C. Office of Aviation Medicine.

### **THE EFFECTS OF BODY THERMAL STATE ON MANUAL PERFORMANCE**

J. A. Vaughan, E. A. Higgins, G. E. Funkhouser, and Elinore M. Galerston May 1968 13 p refs

(AD-675522; FAA-AM-68-13) Avail: CFSTI CSCL 6/16

Thirty-six young men were exposed for 2 hours to environmental temperatures of 10, 26.7, or 46C. Measurements of rectal and skin temperature, heart rate and respiratory rate were made, and average skin and average body temperatures were calculated. Manual performance consisted of standardized peg tests



for hand and finger dexterity, and a written motor coordination test. Converted scores showed no significant differences in peg placing at any of the thermal states studied. Men exposed to the neutral environment scored highest in the finger dexterity tests, but values for motor coordination were greater in the heat than in the other two environments. These data suggest that coarse hand movements are independent of body thermal state, but that more discrete tasks involving hand and finger dexterity, and motor coordination, can be most efficiently performed in warmer environments which promote at least thermally neutral values of skin and deep body temperature.

Author (TAB)

**N69-12588\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

**COMPENDIUM OF HUMAN RESPONSES TO THE AEROSPACE ENVIRONMENT. VOLUME 2: SECTIONS 7-9**

Emanuel M. Roth, ed. Washington NASA Nov. 1968 507 p refs

(Contract NASr-115)

(NASA-CR-1205(11)) Avail: CFSTI CSCL 06S

**CONTENTS:**

1. ACCELERATION W. G. Teichner, R. L. Craig (Harvard School of Public Health), and E. M. Roth 222 p refs (See N69-12589 02-04)

2. VIBRATION A. N. Chambers (Bellcomm, Inc.) and E. M. Roth 95 p refs (See N69-12590 02-04)

3. SOUND AND NOISE A. N. Chambers (Bellcomm, Inc.) and E. M. Roth 83 p refs (See N69-12591 02-04)

**N69-12589\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

**ACCELERATION**

E. M. Roth, W. G. Teichner (Harvard School of Public Health), and R. L. Craig (Harvard School of Public Health) *In its* Compendium of Human Responses to the Aerospace Environ. Nov. 1968 222 p refs (See N69-10588 02-04)

Avail: CFSTI CSCL 06S

The acceleration environment for manned space flight is presented as it relates to human tolerance and performance. The spectrum of acceleration environments is extremely large and may vary in duration, magnitude, rate of onset and decline, and direction. Some acceleration exposures may be so mild that they have relatively no physiological or psychophysiological effects, or they may become so severe that they produce major disturbances. After a review of acceleration environment in general, specific sections on linear sustained acceleration in the three orthogonal axes, the rotating environment, angular acceleration, sub-gravity, zero gravity and impact are presented. Physiological effects from the various types of acceleration included degradation in visual, auditory, and motor performance, and cardiovascular, respiratory, and metabolic irregularities. The discussion on the effects of weightlessness included a summary of astronaut performance during the extravehicular activity of the Gemini program. A.C.R.

**N69-12590\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

**VIBRATION**

E. M. Roth and A. N. Chambers (Bellcomm, Inc.) *In its* Compendium of Human Responses to the Aerospace Environ. Nov. 1968 95 p refs (See N69-12588 02-04)

Avail: CFSTI CSCL 06S

The response of the human body to vibration during space operations was studied. A review of nomenclature is included, and data are presented on the biomechanical characteristics of humans in a vibrating environment; the physiological and biochemical responses to it; and the corresponding degradation of performance. The transmission of vibration through regions of the body was

traced in various horizontal and vertical positions for longitudinal, transverse, and random vibrations, as well as those in the ultrasonic range. Physiological responses in the skeletal system neurological, cardiovascular, respiratory, metabolic, and endocrinal functions were tabulated with the regional symptoms that arise. Threshold data on human tolerance to several vibrational modes and conditions are included. It is noted, however, that tolerance standards established by various investigators agree only within specified limits, since evaluation criteria, positioning, and support of the subjects have a marked effect on the limits. Effects on performance were found to be in the areas of visual tasks, vigilance, concentration, reaction time, simple motor tasks, speech, and complex motor tasks. A.C.R.

**N69-12591\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

**SOUND AND NOISE**

E. M. Roth and A. N. Chambers (Bellcomm, Inc.) *In its* Compendium of Human Responses to the Aerospace Environ. Nov. 1968 83 p refs (See N69-12588 02-04)

Avail: CFSTI CSCL 06S

Sound and noise problems that arise at several points in space operations are studied. It appears that the only novelty of space acoustics is the role of high-energy, low-frequency (under 50 Hz) sound, and that noise problems are probably of more significance to ground crews. The acoustic environment of a space vehicle during launch, flight and reentry is described, as well as the general principles for sound perception at varying intensities and frequencies. Speech characteristics, including speech spectra, intelligibility, and the use of an articulation index are noted. Data on the physiological and performance responses for all levels of the spectrum indicate that noise-experienced humans, wearing ear protectors, can safely tolerate broad-band and discrete frequency noise in the 1 to 100 Hz range for short durations at sound pressure levels as high as 150 dB. For the frequency range above 40 Hz, however, such exposures appear to be approaching the limit of subjective voluntary tolerance and reliable performance. It was concluded that personal protective equipment against degradation of performance by noise is an optimum approach to many aspects of sound control. A.C.R.

**N69-12592\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

**COMPENDIUM OF HUMAN RESPONSES TO THE AEROSPACE ENVIRONMENT. VOLUME 3: SECTIONS 10-16**

Emanuel M. Roth, ed. Washington NASA Nov. 1968 552 p refs

(NASr-115)

(NASA-CR-1205(11)) Avail: CFSTI CSCL 06S

**CONTENTS:**

1. OXYGEN-CO<sub>2</sub>-ENERGY E. M. Roth 77 p refs (See N69-12593 02-04)

2. INERT GAS E. M. Roth 40 p refs (See N69-12594 02-04)

3. PRESSURE E. M. Roth 40 p refs (See N69-12595 02-04)

4. CONTAMINANTS STANDARDS W. H. Teichner, A. O. Mirarchi (Harvard School of Public Health), and E. M. Roth 94 p refs (See N69-12596 02-04)

5. NUTRITION E. M. Roth 43 p refs (See N69-12597 02-04)

6. WATER E. M. Roth 27 p refs (See N69-12598 02-04)

7. ANTHROPOMETRY AND TEMPORO-SPATIAL ENVIRONMENT E. M. Roth 97 p refs (See N69-12599 02-04)

**N69-12593\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

**OXYGEN-CARBON DIOXIDE-ENERGY**

## N69-12594

E. M. Roth *In its* Compendium of Human Responses to the Aerospace Environ. Nov. 1968 77 p refs (See N69-12592 02-04)

Avail: CFSTI CSCL 06S

The factors determining oxygen consumption and CO<sub>2</sub> production are discussed in relation to determining the amount of oxygen which must be supplied to astronauts for specific space missions. Methods for calculating heat output from respiratory data are described and formulas are derived for calculating oxygen cost and energy expenditure under various conditions. Based on EVA data from the Gemini program, the effect of zero gravity and subgravity on the energy cost of metabolism is assessed. The energetics of locomotion on the lunar surface is discussed, and the additional energy requirements imposed by pressure suit operations are delineated. Data are included on the metabolic rate anticipated for the orbital phases of the Apollo mission. Consideration is also given to the effects of the oxygen and carbon dioxide partial pressure environments on human physiology and performance in space operations. The key physiological interactions between the atmosphere and the lung-body system are depicted by comparing the composition (partial pressure) of tracheal and alveolar gases at different altitudes in subjects breathing air, and breathing 100% oxygen. Examples are given to show the functional impairment after CO<sub>2</sub> withdrawal. M.G.J.

**N69-12594\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

### INERT GAS

E. M. Roth *In its* Compendium of Human Responses to the Aerospace Environ. Nov. 1968 40 p refs (See N69-12592 02-04)

Avail: CFSTI CSCL 06S

The physical properties of different inert gases are tabulated, with decompression sickness cited as the most significant physiological alteration determined by the inert gas environment. The biochemical properties of the inert gases which can be used to predict the frequency of these symptoms after different inert gas exposures are given, and psychometric charts for different oxygen and oxygen-inert gas mixtures are presented. Voice alteration is discussed. Human experiments performed over periods of days in atmospheres proposed for space cabins are reviewed, and studies of human exposure to helium are summarized. Gas leakage from space cabins is considered, along with the problems involved in gas storage and the advantages of cryogenic storage systems. Criteria for selecting space cabin atmospheres are proposed based on an evaluation of physiological factors, fire and blast hazards, and engineering factors for a 30-day, 2-man mission. M.G.J.

**N69-12595\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

### PRESSURE

E. M. Roth *In its* Compendium of Human Responses to the Aerospace Environ. Nov. 1968 40 p refs (See N69-12592 02-04)

Avail: CFSTI CSCL 06S

The physiological relations between the percentage of oxygen in the atmosphere of an aerospace vehicle and the total pressure of that atmosphere are depicted, based on continuous exposure for one week or more. It is shown that the upper limits of pressure are determined by nitrogen narcosis and oxygen toxicity. The symptoms of slow and rapid decompression sickness are described, and the general time course of these symptoms experienced from sea level air to altitude is plotted. The pathological physiology of the symptom complexes are categorized as bends, chokes, skin manifestations, circulatory collapse, and neurological disorders. Consideration is also given to the relationship between age and relative susceptibility to bends, and the effect of exercise on incidence of bends. Data are compiled on rate of protection by preoxygenation and rate of nitrogen loss from critical tissues, and protection factors

are listed for planning denitrogenation schedules for protecting against bends caused by exposure to space suit pressures in the early phases of flight. The antimeteoroid coveralls used on the Gemini flights are described. The physiological damage caused by rapid decompression and blast overpressure is detailed. M.G.J.

**N69-12596\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

### CONTAMINANTS STANDARDS

E. M. Roth, W. H. Teichner (Harvard School of Public Health), and A. O. Mirarchi (Harvard School of Public Health) *In its* Compendium of Human Responses to the Aerospace Environ. Nov. 1968 94 p refs (See N69-12592 02-04)

Avail: CFSTI CSCL 06K

Empirically derived data on the contaminant hazard in space operations are presented, along with the theoretical considerations which must be understood in order to extrapolate these data to space cabin conditions. The primary and secondary factors controlling the buildup of contaminants in sealed cabins are examined, and equations are formulated for determining the amount of concentration. Toxic agents are classified as asphyxiant, irritant, and toxicant, and the processing of these toxic agents by the body is discussed. The sources of contaminants in space operations are identified as man and his activities, materials and outgassing, equipment and processes, and malfunctions and emergencies. Extensive data tabulations are provided on such human sources of contaminants as expired air, urine, feces, flatus, and perspiration. Recommended limits are listed for contaminants already found and anticipated in space cabins and submarines. These contaminants are chemically classified. Also listed are possible space capsule contaminants classified according to their toxic effects on different body systems. M.G.J.

**N69-12597\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

### NUTRITION

E. M. Roth *In its* Compendium of Human Responses to the Aerospace Environ. Nov. 1968 43 p refs (See N69-12592 02-04)

Avail: CFSTI CSCL 06N

For missions up to 30 days, it is believed that the dietary needs of space men parallel those of men of similar stature on earth, although reliable data are not yet available on longer missions. Basic nutritional requirements for Apollo-type flights are outlined, and data are presented for determining metabolic, logistical, and operational trade-offs. Secondary physiological factors are considered which impose constraints other than weight and power on the preparation, storage, and packaging of food. A series of nomograms on metabolic interchanges in synthetic diet construction is included. Operational considerations of packing and dispensing foods are summarized based on environmental conditions of temperature, humidity, vacuum, and acceleration. A prototype diet developed early in the Apollo program is tabulated showing composition and astronaut preferences for components. It was not anticipated, however, that this diet would be available for the Apollo missions. Starvation tests are described for the possible situation where lack of food and water, rather than oxygen, threaten survival, and the effect of starvation on performance is considered. A.C.R.

**N69-12598\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

### WATER

E. M. Roth *In its* Compendium of Human Responses to the Aerospace Environ. Nov. 1968 27 p refs (See N69-12592 02-04)

Avail: CFSTI CSCL 06K

Water requirements for man in space operations are analyzed based on water balance and purity standards. Water balance is

defined as the difference between the input and output from all sources into the exchangeable water pool, where sources include the gastrointestinal, pulmonary, dermal, renal, circulatory, and metabolic functions. The significant results of water imbalance are discussed and water requirements during space operations are analyzed in normal and emergency operating modes. The standards for both washing and drinking water purity are considered, emphasizing that, unlike municipal water supplies, the recommended standard for purity must be met at all times, since complete monitoring during actual flight is not possible, possible adjustments are limited, and the same water supply must be used whether or not it meets standards. The recommended standards for physical properties and upper limits for chemical components are tabulated, and biological requirements are treated, stressing the need for biological monitoring to prevent possible contamination. Analyses are included of reclamation of water from various sources within the space cabin. A.C.R.

**N69-12599\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

**ANTHROPOMETRY AND TEMPORO-SPATIAL ENVIRONMENT**

E. M. Roth *In its* Compendium of Human Response to the Aerospace Environ. Nov. 1968 97 p refs (See N69-12592 02-04)

Avail: CFSTI CSCL 06N

Anthropometry and the aerospace environment are analyzed in relation to workspace factors, confinement, isolation and sensory deprivation, and activity cycles. The use of percentile as opposed to average or mean values in anthropometric data is emphasized. Body dimensions of U.S. males and Air Force flying personnel are summarized, with detailed tables of anthropometric data of astronauts. Increases in body dimensions from clothing are analyzed followed by an anthropometric study of pressure suit design. Division of workspace into functional compartments is considered. The range of body motion of the typical astronaut in shirtsleeve environment is treated, along with anthropometric factors in planning extravehicular mobility. Confinement, social isolation and sensory deprivation factors in short, medium and long duration space flight are considered individually, with emphasis that there has been little research in this general area. Work-rest-sleep cycles are treated, indicating variations in adaptation produced by weightlessness during actual U.S. missions. The importance of efficiency during wakefulness was emphasized. Finally, the sequence of progressive deterioration of performance with prolonged sleep deprivation was treated. A.C.R.

**N69-12600\*#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

**COMPENDIUM OF HUMAN RESPONSES TO THE AEROSPACE ENVIRONMENT. VOLUME 4: CONVERSION TABLES ALPHABETIC INDEX**

Emanuel M. Roth, ed. Washington NASA Nov. 1968 188 p

(Contract NASr-115)

(NASA-CR-1205(IV)) Avail: CFSTI CSCL 06S

Conversion tables are presented for the multiple systems of units and measures used in the basic biological, physical, and engineering sciences. Directions for the use of the tables are included. A.C.R.



## IAA ENTRIES

**A69-10157 #**

COSMIC RADIATION AND LIFE [LES RAYONNEMENTS DU COSMOS ET LA VIE].

Maurice Cartier.

L'Aéronautique et l'Astronautique, no. 5, 1968, p. 49-55. In French.

General discussion of the principal theories concerning the interactions between cosmic radiation and living viruses. The effects of X rays on inert and living matter are examined. The case of cancer cells is studied with reference to the dose of radiation which must be applied to destroy the maximum number of abnormal cells with the least injury to adjacent healthy tissue. Some comments are made on solar flares. F. R. L.

**A69-10167 \***

REGULARITIES OF HUMAN CIRCADIAN RHYTHMS AS DETERMINED FROM THE EFFECT OF A WEAK ALTERNATING ELECTRIC FIELD [GESETZMÄSSIGKEITEN DER CIRCADIANEN PERIODIK DES MENSCHEN, GEPRÜFT AN DER WIRKUNG EINES SCHWACHEN ELEKTRISCHEN WECHSELFELDES].

Rütger Wever (Max-Planck-Institut für Verhaltensphysiologie, Seewiesen über Starnberg and Erling-Andechs, West Germany). Pflügers Archiv für die gesamte Physiologie des Menschen und der Tiere, vol. 302, 1968, p. 97-122. 22 refs. In German.

Research supported by the Bundesministerium für Wissenschaftliche Forschung; Grant No. NsG-259-62.

Experimental investigation showing that the human circadian rhythm can be influenced regularly by a weak alternating electric field with a frequency of 10 cps. In contrast to the effects of environmental illumination, this field which is imperceptible to the subject, is as effective during activity time (eyes open) as during rest time (eyes closed). Under constant conditions, the values of the following parameters are statistically significantly higher for experiments with the field in operation than for those with the field not in operation: (1) free-running frequency of activity rhythm and temperature rhythm, (2) activity time/rest time ratio, (3) mean value of rectal temperature, and (4) a form coefficient characterizing the shape of the oscillation of rectal temperature. Thus the defined quantities are positively correlated to each other, as predicted by a hypothesis about circadian rhythms. M. M.

**A69-10209 #**

CONTROL PROCESSES IN THE RESPIRATION SYSTEM [O PROTSES-SAKH UPRAVLENIA V DYKHATEL'NOI SISTEME].

N. V. Zavalishin and L. A. Tenenbaum.

Avtomatika i Telemekhanika, Sept. 1968, p. 106-122. 5 refs. In Russian.

Experimental verification of two alternative hypotheses concerning the mechanism of control of the parameters of external respiration of living organisms. It is found that the experimental results can be interpreted only from the standpoint of the hypothesis of "functional control." V. P.

**A69-10449**

HUMAN FACTORS IN AIRCRAFT DEVELOPMENT.

Edward R. Jones (McDonnell Douglas Corp., McDonnell Co., Engineering Physiology Dept., St. Louis, Mo.).

IN: HUMAN FACTORS IN AVIATION: 1968; HUMAN FACTORS SOCIETY, ANNUAL SYMPOSIUM, 5TH, LOS ANGELES, CALIF., JUNE 1968, PROCEEDINGS. [A69-10448 01-02]

North Hollywood, Calif., Western Periodicals Co., 1968, p. 1-6; Discussion, p. 6, 7.

Description of the characteristics of a continuing human-factors effort for an aircraft system that has been in operation for a decade.

Some of the management characteristics are the use of a few highly skilled human factors personnel with a relatively constant manpower level throughout the design and manufacturing phases. The activities are selective rather than extensive with the individual having broad, continuous responsibilities for a system element. Formal documentation is severely limited. Field surveys and quick-reaction laboratory studies are used extensively to obtain objective data for design. An anthropologist has been used full time to support productively many facets of the system. P. v. T.

**A69-10450**

HUMAN FACTORS AND AIRLINE TRAINING.

Robert C. Houston (American Airlines, Inc., Fort Worth, Tex.).

IN: HUMAN FACTORS IN AVIATION: 1968; HUMAN FACTORS SOCIETY, ANNUAL SYMPOSIUM, 5TH, LOS ANGELES, CALIF., JUNE 1968, PROCEEDINGS. [A69-10448 01-02]

North Hollywood, Calif., Western Periodicals Co., 1968, p. 15-21; Discussion, p. 21, 22.

Discussion of recent progress made in airline crew training. Aircraft training times have been markedly reduced but with a resultant improved product. The airlines are primarily concerned with training personnel who are already competent airline crew members. The heaviest training workload is the transition of present crew members and pilots from one type aircraft to another. Recent airline training experience is reviewed, training trends are discussed, and the current key areas for research are outlined. P. v. T.

**A69-10451**

HUMAN ENGINEERING IN SST DEVELOPMENT.

Arvin O. Basnight (Federal Aviation Administration, Los Angeles, Calif.).

IN: HUMAN FACTORS IN AVIATION: 1968; HUMAN FACTORS SOCIETY, ANNUAL SYMPOSIUM, 5TH, LOS ANGELES, CALIF., JUNE 1968, PROCEEDINGS. [A69-10448 01-02]

North Hollywood, Calif., Western Periodicals Co., 1968, p. 23-27.

Discussion of the human engineering program plans for Phase III of the Supersonic Transport Development Program. These plans are in accordance with the statement of work for the human engineering program contained in the Phase III supersonic transport development contracts with the airframe and engine contractors. The program plans for integrating the principles of human physical, psychological, and physiological characteristics for application to supersonic transport and ground equipment design. The human engineering program management and support activities for the SST Development Program are also discussed including the approach to conducting personnel performance studies, workload, life support analyses, and related test and evaluation efforts. P. v. T.

**A69-10456 #**

SOME BENEFITS TO BE DERIVED FROM SPACE MICROBIOLOGY. Carl-Gören Hedén (Karolinska Institute; Medical Research Council, Stockholm, Sweden).

United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968, Paper 68-95861, 9 p. 6 refs.

Preliminary review of areas where space microbiology may lead to practically significant results. Due to the ever increasing air and water pollution, the recirculation of matter must obviously be accelerated. A natural solution is to arrange for reclamation which transforms the undesirable waste materials into a resource near their point of origin. In many of such interventions, microbiology could be used, but control is necessary, and this might well benefit by space-developed telemetry techniques. They could permit simultaneous and instantaneous readout and recording, at a central location, of many biological parameters describing the situation at distant points. P. v. T.

**A69-10471 #**

CONTRIBUTIONS OF SPACE TECHNOLOGY TO SOLUTIONS OF MEDICAL PROBLEMS.

Quentin L. Hartwig (George Washington University, Washington, D. C.).

**A69-10486**

United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968, Paper 68-95417, 18 p.

Description of the background, operations, and organization of the Biochemical Application Program of NASA. On this program, the Technical Utilization Division of NASA, using the existing "tools" of science, has been experimenting with the concept of interdisciplinary teams that serve as catalytic agents between scientific problem solvers and sources of potential solutions to these problems. Experience to date has shown that solutions originally designed for one purpose can play many other roles, thus giving greater return on the research investment. Although the Biomedical Application Program is in its infancy, it does provide an example of an aggressive infusion technique with feedback for program improvement.

P. v. T.

**A69-10486 #**

SPACE RESEARCH - SOURCE OF BIOLOGICAL KNOWLEDGE. Allan H. Brown (Pennsylvania, University, Philadelphia, Pa.). United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968, Paper 68-95345, 11 p. 32 refs.

General discussion of the U.S. program in space biology, including various engineering developments, methods, and apparatus which can be applied outside of the space-research context. Three areas of special scientific interest treated are: gravity/organism reactions, biochronology, and exobiology. An automated urine analyzer, an electroencephalographic spectrum analyzer, and a urinary catheter which may have application outside the space program are briefly described.

M. G.

**A69-10508 #**

FURTHER FINDINGS OF EXTRATERRESTRIAL VESTIBULAR RESEARCH.

Herbert J. Pichler.

United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968, Paper 68-95389, 11 p.

Discussion of the new field of extraterrestrial vestibular research, founded a few years ago in Vienna, Austria, which has met with wide international interest and active response in many countries. On leaving the earth's field of gravity, a change in the regulation of the human otolithic apparatus would take place, namely from geocentric to heliocentric orientation. This is of particular interest at the present time for future interplanetary space travel and is of importance in regard to all questions of orientation in space outside the planet earth.

P. v. T.

**A69-10583 #**

MEDICINAL THERAPY AND FLIGHT SAFETY [LEKARSTVENNAIA TERAPIA I BEZOPASNOST' POLETOV].

I. S. Gurin, B. I. Davydov, Ia. N. Divin, E. M. Panova, P. P. Saksonov, and V. G. Terent'ev.

Kosmicheskie Issledovaniia, vol. 6, Sept.-Oct. 1968, p. 782-787. 30 refs. In Russian.

Analysis of the side effects of drugs and their significance for the future activity of pilots and astronauts. The data discussed are mostly from American sources. It is noted that in the U.S. in order to make rational use of drugs the following measures have been adopted: (1) a handbook on the safe uses of drugs in aviation medicine has been released; (2) lists of drugs permitted for use by flight personnel have been established; (3) instructions on the dangers of self-treatment have been developed; (4) mandatory verification of the tolerance of astronauts to the drugs included in their onboard medicine chests has been authorized; and (5) pharmacological groups of preparations which should be tested under conditions where space flight factors act on the organism have been outlined. Aerospace medical workers are urged to conduct corresponding experiments on the questions raised.

I. P.

**A69-10584 #**

STIMULATION OF GROWTH IN CERTAIN BIOLOGICAL OBJECTS SUBJECTED TO VERTICAL VIBRATIONS [STIMULIATSIIA ROSTA U NEKOTORYKH BIOLOGICHESKIKH OB'EKTOV POD VOZDEISTVIEM VERTIKAL'NOI VIBRATSII].

N. L. Delone, V. V. Antipov, E. M. Morozova, P. P. Saksonov, and A. S. Trusova.

Kosmicheskie Issledovaniia, vol. 6, Sept.-Oct. 1968, p. 788-792. 11 refs. In Russian.

Description of the stimulation of the growth of bulbs of turnip-like onion *Allium cepa*, and of the body weight increase in mice subjected to vibration. The onions were subjected to vibrations at a frequency of 70 Hz at an oscillation amplitude of 0.51 mm. Four series of experiments were performed from 1962 through 1967. Vibration for a 10-hr period was found to stimulate growth of onions. The test specimens germinated earlier, the sprouts grew faster, and the roots grew faster after being cut. A total of 280 male mice were studied. A more pronounced weight increase was observed in the test group than in the control group. Analysis showed that the younger the mice, the greater the effect of vibration on their weight increase. Vibration for 1 hr at frequencies of 70 and 1500 Hz was found to considerably increase the weight of mice.

I. P.

**A69-10635 #**

HEAD-UP DISPLAY FOR AIRLINES.

Peter Cane (Smiths Industries, Ltd., Basingstoke, Hants., England).

Shell Aviation News, no. 363, 1968, p. 16-19.

Discussion of the application of Head-Up Display (HUD) to commercial flying, with special reference to a HUD system manufactured by a subsidiary of Smiths Industries, Ltd. Modern developments in the microminiaturization of the electronics make the equipment much more attractive than previously for civil application. Display projection can be accomplished by electronic and electromechanical means, most of the advantages lying with the electronic systems. It is considered that the HUD can improve the safety of commercial operations and reduce the pilot's work load in the more critical stages of a flight, in both visual and instrument conditions.

F. R. L.

**A69-10741**

CAUSAL RELATIONS BETWEEN ENVIRONMENT AND MAN IN THE JUDGMENT OF NOISE.

Werner Bürck (Rohde und Schwarz, Munich, West Germany).

Nachrichtentechnische Zeitschrift, vol. 21, Sept. 1968, p. 586-591. 5 refs. Translation.

Study of the causes and effects involved in sound perception, on the basis of a schematic diagram of the causal relations involved in sound perception, taking into account temporary and permanent threshold shifts. The considerations derived from this study are used as a basis for appraising the practical usefulness of methods of measurement and judgment required for describing noise and for noise control. Methods of measuring and judging the annoyance and harm caused by noise are discussed in terms of the equivalent steady-state levels and ratings of recovery intervals for the ear. A chart for the determination of sufficient interval duration, weighting of insufficient noise intervals, and the addition of various noise exposures is included.

V. P.

**A69-10743**

OUTLINES OF SPACE PHYSIOLOGY [OCHERKI PO KOSMICHESKOI FIZIOLOGII].

V. V. Parin, R. M. Baevskii, M. D. Emel'ianov, and I. M. Khazen. Moscow, Izdatel'stvo Meditsina, 1967. 136 p. 399 refs. In Russian.

This book examines certain past and present problems in space physiology. Data obtained in space flights and in laboratories are presented, and certain mechanisms of physiological reactions in flight are considered. An attempt is made to utilize concepts of cybernetics to explain some of the problems discussed. A hypothesis is offered stating that under extremal actions there occurs a reorganization of lower control levels (vegetative) toward the direction required to ensure optimal functioning of higher control levels, particularly the cerebral cortex. Data on the digestive system and certain morphological changes in tissue are presented and discussed.

The possible future development of space physiology is discussed, including problems on lunar and interplanetary flights, biocontrols, minimization of life functions, and the development of space research methods.

I. P.

**A69-10753 #**

INFLUENCE OF SUDDEN DECOMPRESSION ON THE ORGANISM [WPŁYW NAGLEJ DEKOMPRESJI NA USTRÓJ].

Lucjan Golec and Eugeniusz Sokołowski.

*Postępy Astronautyki*, no. 2, 1968, p. 95-105. 20 refs. In Polish.

Survey of previous studies concerning the effects of sudden decompression on the organism. Attention is given to investigations of (1) changes in the functions of organs during pressure equalization, (2) changes associated with the transformation of dissolved gases into a gaseous state, (3) the vaporization of body fluids, and (4) changes caused by the combined effects of these factors. Methods and techniques used in various experiments are outlined, and the overall state of knowledge about the effects of sudden decompression is evaluated.

T. M.

**A69-10757 #**

HUMAN BEHAVIOR IN A STRESS SITUATION SIMILAR TO THE CONDITIONS OF A LONG-DURATION SPACE FLIGHT (SPELEOLOGICAL EXPEDITION) [ZACHOWANIE SIĘ CZŁOWIEKA W SYTUACJI STRESSOWEJ PODOBNEJ DO WARUNKÓW DŁUGOTRWAŁEGO LOTU KOSMICZNEGO /WYPRAWA SPELEOLOGICZNA/].

Krystyna Galubińska.

*Postępy Astronautyki*, no. 1, 1967, p. 89-102. 35 refs. In Polish.

Description of psychological studies of the behavior of nine persons in a stress situation occasioned by a 14-day confinement within an underground cavern in the Tatra mountains. The stress situation involved difficult living conditions, isolation, confinement, and the presence of danger. The study was conducted to evaluate the actual, as opposed to symbolic (laboratory conditions), human behavior in a difficult environment. The results of psychometric studies conducted before, during, and after the confinement indicate a clear lack of changes in the functioning level and a lack of perceptible signs of impairment in the thought, perception, and psychomotor processes. This lack of psychological disturbances is caused by adaptation processes peculiar to each individual.

T. M.

**A69-10860 \***

SHORT-LATENCY ANTIDIURESIS FOLLOWING THE INITIATION OF FOOD INGESTION.

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

*Science*, vol. 162, Oct. 25, 1968, p. 458-460. 5 refs.

NIH Grant No. M-4529; Grant No. NsG-437.

A factor associated with the ingestion of food is shown to produce a short-latency antidiuresis. Animals consuming large quantities of a highly palatable solution during a period of food deprivation exhibit an antidiuresis immediately following the initiation of eating. The rapidity of the response raises the possibility of a signaling factor separate from postingestional influences. (Author)

**A69-10902 \***

A SENSITIVE AND SPECIFIC ISOTOPIC ASSAY FOR THE ESTIMATION OF TYROSINE TRANSAMINASE.

Richard J. Wurtman and Frances Larin (Massachusetts Institute of Technology, Dept. of Nutrition and Food Science, Cambridge, Mass.).

*Biochemical Pharmacology*, vol. 17, 1968, p. 817, 818. 6 refs.

PHS Grants No. AM-11709; No. AM-11237; Grant No. NGR-22-009-272.

Description of an isotopic method for estimating tyrosine transaminase (TT) activity. The assay is based upon the change in the polarity of tyrosine which follows the action of TT. The enzyme causes the amino acid to lose its only amine group and thereby to form p-hydroxyphenyl pyruvic acid (PHPPA). This compound is largely un-ionized at an acid pH and can thus be quantitatively separated from the substrate by extraction into an organic solvent.

The assay is sensitive, simple, and chemically specific, and can be used to study the enzyme in any tissue. Sixty or more determinations can be performed by a single technician in 3 hr, each using as little as 250 µg liver.

M. M.

**A69-10903 \***

PHOTO-INHIBITION OF CELL DIVISION AND GROWTH IN EUGLENOID FLAGELLATES.

J. R. Cook (Maine, University, Dept. of Zoology, Orono, Me.).

*Journal of Cellular Physiology*, vol. 71, Apr. 1968, p. 177-184.

25 refs.

NIH Grant No. GM-12179; Grants No. NsG-338; No. NGL-20-006-001.

Visible light of moderate intensity causes two and perhaps three types of division inhibition in *Euglena gracilis* and related cells. Fluorescent light causes a general inhibition of growth and division which is temperature-dependent. Pigmentation or complex organic media partially lift this inhibition. A second type of inhibition, which is transient, can be caused by either fluorescent or incandescent light and is found with an irreversibly bleached strain of *Euglena* grown on a limiting concentration of acetate; this inhibition could not be demonstrated in cells grown on limiting concentrations of glucose. (Author)

**A69-10904 \***

FURTHER OBSERVATIONS OF PSYCHOLOGICAL FACTORS INVOLVED IN CNV GENESIS.

Morton D. Low and Joseph W. McSherry (Baylor University, Methodist Hospital and Dept. of Physiology, Section of Neurophysiology, Houston, Tex.).

*Electroencephalography and Clinical Neurophysiology*, vol. 25,

1968, p. 203-207. 14 refs.

PHS Grant No. MH-05204; Grants No. NsG-390; No. NsG-44-003-001.

Description of experiments which were performed in man to define more extensively the psychological factors involved in contingent or conative negative variation (CNV) genesis. Two experimental designs were used. It was demonstrated that: (1) CNVs are additive if two anticipations are superimposed in time or if a subject is expecting to perform more than one response of the same kind; (2) increasing the force required to perform a response is associated with an increase in the magnitude of the CNV; and (3) the interposition of a mental task diminishes the degree of expected increase in CNV magnitude associated with the increased force requirements of the task. M. M.

**A69-10921 \***

URINARY EXCRETION OF ELECTROLYTES IN MICE DURING ACUTE HYPOXIA EXPOSURE.

George R. Isenberg and Adam Anthony (Pennsylvania State University, Dept. of Biology, Physiology Section, University Park, Pa.).

*Pennsylvania Academy of Science, Proceedings*, vol. 41, 1967.

5 p. 14 refs.

PHS Grant No. GM-05112; Grant No. NGR-39-009-015.

Alterations in urine volume and in the excretion of sodium and potassium were studied in mice over four-day intervals before, during, and after exposure to a simulated altitude of 18,000 ft (380 mm Hg). Acute hypoxia caused a marked oligouria with a consequent decrease in the urinary output of both electrolytes. Urine flow and urinary electrolytes were rapidly restored to control levels when mice were returned to ambient pressure. (Author)

**A69-10922 \***

BLOOD VOLUME CHANGES IN ALTITUDE EXPOSED RATS RETURNED TO AMBIENT PRESSURE.

Charles K. Grieshaber and Adam Anthony (Pennsylvania State University, Dept. of Biology, Physiology Section, University Park, Pa.).

*Pennsylvania Academy of Science, Proceedings*, vol. 41, 1967.

4 p. 14 refs.

PHS Grant No. GM-05112; Grant No. NGR-39-009-015.

Total blood volume, plasma volume, and red blood cell volume were measured in altitude acclimated rats (380 mm Hg) which were

## A69-10923

returned to ambient pressure for one- and two-week periods of deacclimation. The plasma volume was rapidly restored to and never exceeded control levels when rats were returned to ambient pressure. The total red blood cell volume was found to decline at a faster rate in deacclimating animals than could be expected from normal cell destruction alone. The total blood volume reduction during deacclimation paralleled that of the total red cell volume.

(Author)

### A69-10923 \*

EFFECT OF HYPOXIA EXPOSURE ON RNA SYNTHESIS IN THE RAT ANTERIOR PITUITARY IN VITRO.

Athleen Stere and W. C. Hymer (Pennsylvania State University, Dept. of Biology, Physiology Section, University Park, Pa.). Pennsylvania Academy of Science, Proceedings, vol. 41, 1967, 4 p. 12 refs.

PHS Grant No. GM-05112; Grant No. NGR-39-009-015.

Studies were made of the effect of hypoxia exposure on RNA synthesis in anterior pituitary glands from adult male rats exposed to a reduced barometric pressure of 349 mm Hg for 12, 24, and 48 hr. Pituitaries were removed immediately after hypoxia exposure and cultured in vitro for incubation periods of 1, 2, and 4 hr. The pattern of RNA synthesis in these explants was followed by the incorporation of  $H^3$ -uridine from the incubation medium. The rate of RNA synthesis was significantly decreased within the first 12 hr of hypoxia exposure, but returned to control levels in glands from animals exposed 24 hr.

(Author)

### A69-10924 \*

SPECTRAL ANALYSIS OF HEMATOXYLIN IN TISSUE SECTIONS.

John M. Kmetz, Margaret S. Gallagher, and Adam Anthony (Pennsylvania State University, Dept. of Biology, Physiology Section, University Park, Pa.).

Pennsylvania Academy of Science, Proceedings, vol. 41, 1967, 5 p. 7 refs.

PHS Grant No. GM-05112; Grant No. NGR-39-009-015.

Comparative study of the absorption spectra of three hematoxylin stains in stained tissue sections. Using a recording microspectrometer, spectral absorption curves are determined for rat thyroid fixed in formalin, or in Helly's or Bouin's fluid, prior to staining with Harris', Mayer's, or Delafield's hematoxylin. It is demonstrated that the major absorption peak for hematoxylin in tissue sections is at 600 m $\mu$  and that the spectral curve is not altered by either the fixative or the hematoxylin solution used.

Z. W.

### A69-10931 \*

SIGNIFICANCE OF SUBSTRATE INHIBITION OF DEHYDROGENASES.

N. O. Kaplan, J. Everse, and J. Admiraal (Brandeis University, Graduate Dept. of Biochemistry, Waltham, Mass.).

New York Academy of Sciences, Annals, vol. 151, June 14, 1968, p. 400-412. 18 refs.

NIH Grant No. CA-03611; American Cancer Society Grant No. P-771; Grants No. NsG-375; No. NsG-22-005-001.

Discussion of the importance of rates of glycolysis as factors in the regulation of substrate inhibition of dehydrogenases. It is noted that the results of experiments indicate that the inhibition observed with excess pyruvate is caused by the abortive ternary complex. It is believed that these studies also demonstrate that the complex can exist under conditions where kinetic measurements of H-type lactate dehydrogenases are not feasible. Substrate inhibition appears to be a characteristic of a number of dehydrogenases.

M.M.

### A69-10932 \*

WHEAT SEEDLING GROWTH IN THE ABSENCE OF GRAVITATIONAL FORCE.

Charles J. Lyon (Dartmouth College, Dept. of Biological Sciences, Hanover, N. H.).

Plant Physiology, vol. 43, June 1968, p. 1002-1007. 7 refs. Grants No. NsG-231; No. NsG-30-001-001; Contract No. NAS 2-1558.

Account of the wheat-seedling experiment on board Biosatellite 2. The satellite was in orbit for nearly two days to permit experimental study of the growth physiology of seeds of winter wheat

(*triticum aestivum* L.). Selected embryos were planted in special holders to produce sets of seedlings with organs free of mechanical disturbance of their tissues and orientation. The experimental package consisted of four plastic cylinders fitted with a thermistor. One large cylinder provided space and a moist sea-level atmosphere around three sets of seedlings. Of the other three chambers with one seed holder each, two were equipped to spray-fix their seedlings with formalin, acetic acid, and alcohol before the package was returned from orbit. The absence of gravitational force within the organs of a seedling seems to have no effect on the basic growth processes and biochemical reactions which control the rates of meristematic activity.

Z. W.

### A69-10947

PHYSIOLOGICAL METHODS AND RESULTS.

R. A. Wright and R. A. Duffee (Battelle Memorial Institute, Columbus, Ohio).

IN: HANDBOOK OF SOVIET SPACE-SCIENCE RESEARCH.

Edited by G. E. Wukelic.

New York, Gordon and Breach, Science Publishers, Inc., 1968, p. 323-341. 52 refs.

Review of the physiological measurements on men and animals aboard Soviet bioprobes and biosatellites from 1951 to 1966. Among the different types of measurements discussed are: electrocardiography, phonocardiography, sphygmography, seismocardiography, and pneumography. Tests designed for studying higher nervous activity and motor coordination with special transducers are described. Data concerning both vertical rocket flights and orbital missions are presented. Few physiological changes due to weightless space flight were noted, and acceleration and confinement were well tolerated by most of the Soviet cosmonauts.

M.G.

### A69-10948

BIOLOGICAL EXPERIMENTATION - METHODS AND RESULTS.

R. A. Duffee and H. T. Kemp (Battelle Memorial Institute, Columbus, Ohio).

IN: HANDBOOK OF SOVIET SPACE-SCIENCE RESEARCH.

Edited by G. E. Wukelic.

New York, Gordon and Breach, Science Publishers, Inc., 1968, p. 343-370. 67 refs.

Review of the biological experiments conducted by the Soviet Union on Spaceship Satellites 2, 4, and 5, the entire Vostok series, and both Voskhod flights. These flights were primarily concerned with the genetic effects of cosmic radiation, and with histological changes particularly of a pathological nature. Results of genetic studies on *Drosophila melanogaster* and the *Tradescantia paludosa* are presented. Microbiological studies on Actinomycetes, Chlorella and yeasts are described. These series of biological experiments have established that five-day flights at an orbital inclination of 65° and apogees up to 495 km do not have any seriously deleterious effects on the vital activity of the various organisms. However, disruptions of the mitotic mechanisms were noted in certain biological specimens - e.g., bone marrow cells, HeLa cells subjected to repeated flights, *Tradescantia*, and seeds of wheat. It is suggested that on prolonged flights, these disruptions could result in unacceptable alterations of closed or partially closed ecological systems.

M.G.

### A69-10953

SOVIET ATTITUDES CONCERNING THE EXISTENCE OF LIFE IN SPACE.

N. T. Bobrovnikoff.

IN: HANDBOOK OF SOVIET SPACE-SCIENCE RESEARCH.

Edited by G. E. Wukelic.

New York, Gordon and Breach, Science Publishers, Inc., 1968, p. 453-472. 32 refs.

Survey of Soviet literature and opinions in regard to the problem of the existence of extraterrestrial life. The evolution of the idea of life in space both in the western world and the Soviet Union is presented, and the attitudes of Soviet scientists concerning the existence of extraterrestrial life are analyzed mainly on the basis of the findings of the First Soviet Conference on Extraterrestrial Civilizations in 1964. Research regarding the existence of life on Mars, Venus, the moon, and meteorites is reviewed. Special at-



tention is given to the problem of establishing contact with extra-terrestrial civilizations by means of radio and laser sources.

Z. W.

### A69-11073

LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. Meeting sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences. Edited by A. H. Brown and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1968. 206 p. In English and French. \$12.60.

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#### LIFE DETECTION.

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IS VENUS HABITABLE? C. Sagan (Harvard University; Smithsonian Institution, Cambridge, Mass.), p. 198.

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### A69-11074 \*

#### THE MEDICAL LEGACY OF GEMINI.

Charles A. Berry (NASA, Manned Spacecraft Center, Houston, Tex.).

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

Meeting sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences. Edited by A. H. Brown and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1968, p. 1-19. 7 refs.

The Mercury and Gemini space flights have provided approximately 2,000 manhours of weightless exposure which can be used in comparing flight results with the predicted effects of manned space flight. In general the environmental hazards and the effects upon man appear to be of less magnitude than originally anticipated. The effects noted on the various body systems are summarized. The principal physiologic changes noted were orthostatism for some 50 hr after the flight, reduced red cell mass, and reduced

## A69-11075

X-ray density in the os calcis and the small finger. Much was learned about man's ability to work in a pressurized suit in the extravehicular condition. All of these findings are of importance in relation to the planning for future long duration missions.

(Author)

## A69-11075

LIFE IN THE SPACECRAFT AND PLANETARY STATION.

B. A. Adamovich, Iu. G. Nefedov, A. S. Ushakov, and S. V. Chizhov.

[COSPAR, Plenary Meeting, 10th, London, England, July 24-29, 1967, Paper.]

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

Meeting sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.

Edited by A. H. Brown and F. G. Favorite.  
Amsterdam, North-Holland Publishing Co., 1968, p. 23-26.

[For abstract see issue 19, page 3179, Accession no. A67-35209]

## A69-11076

MAN AS THE MAIN COMPONENT OF THE CLOSED ECOLOGICAL SYSTEM OF THE SPACECRAFT OR PLANETARY STATION.

V. V. Parin and B. A. Adamovich.

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

Meeting sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.

Edited by A. H. Brown and F. G. Favorite.

Amsterdam, North-Holland Publishing Co., 1968, p. 27-31.

General discussion of current and future life-support systems of manned spacecraft. It is visualized that in contrast to present life-support systems, which provide only food, water and oxygen, the life-support systems of the future will be self-sustaining biological cycles for the transformation of matter and will completely satisfy the material and energy requirements of man, who is considered to be their principal component. The importance of the development of effective techniques for collecting and monitoring physiological information on space-station crews for the optimization of such biological cycles is pointed out. Suggestions are made concerning the simulation of such systems. V. Z.

## A69-11077

EXPERIMENTAL BIOLOGICAL LIFE SUPPORT SYSTEM. I - CONTINUOUS CULTIVATION OF ALGAE AS A LINK OF A CLOSED ECOSYSTEM.

L. V. Kirenskii, I. A. Terskov, I. I. Gitelson, G. M. Lisovskii, B. G. Kovrov, and Iu. N. Okladnikov.

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

Meeting sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.

Edited by A. H. Brown and F. G. Favorite.

Amsterdam, North-Holland Publishing Co., 1968, p. 32-36.

10 refs.

Discussion of the design and performance of an experimental biological life-support cycle based on a continuous algae seaweed culture. Within 24 hr the algae recovered their normal productivity, which had been reduced by 75% after exposure to UV radiation. The system operated continuously for two months with assigned productivity showing no inhibition or other irregularities. A mathematical representation of the process is given. In terms of productivity, stability, and controllability, the system is assessed as a suitable component of a biological life-support system. V. Z.

## A69-11078

EXPERIMENTAL BIOLOGICAL LIFE SUPPORT SYSTEM. II - GAS EXCHANGE BETWEEN MAN AND MICROALGAE CULTURE IN A 30-DAY EXPERIMENT.

L. V. Kirenskii, I. A. Terskov, I. I. Gitelson, G. M. Lisovskii, B. G. Kovrov, and Iu. N. Okladnikov.

[COSPAR, Plenary Meeting, 10th, London, England, July 24-29, 1967, Paper.]

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

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Amsterdam, North-Holland Publishing Co., 1968, p. 37-40.

[For abstract see issue 19, page 3180, Accession no. A67-35236]

## A69-11079

PROBLEM OF REPRODUCTION OF FOOD PROTEIN BY AUTOTROPHIC ORGANISMS IN EXTRATERRESTRIAL CONDITIONS.

V. I. Fofanov, A. S. Ushakov, N. S. Kliushkina, and K. V. Smirnov.

[COSPAR, Plenary Meeting, 10th, London, England, July 24-29, 1967, Paper.]

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

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Amsterdam, North-Holland Publishing Co., 1968, p. 41-44.

[For abstract see issue 19, page 3179, Accession no. A67-35228]

## A69-11080

A LIFE SUPPORT SYSTEM FOR SATELLITE EXPERIMENTS OVER ONE YEAR.

R. G. A. Lotz (Frankfurt, Universität, Frankfurt am Main, West Germany).

[COSPAR, Plenary Meeting, 10th, London, England, July 24-29, 1967, Paper.]

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

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Amsterdam, North-Holland Publishing Co., 1968, p. 49-55.

[For abstract see issue 19, page 3180, Accession no. A67-35248]

## A69-11082

PSYCHOMOTOR REACTIONS AMONG PRIMATES PUT INTO BALLISTIC FLIGHT IN ROCKETS [REACTIONS PSYCHOMOTRICES CHEZ DES PRIMATES PLACES EN VOL BALLISTIQUE EN FUSEES].

R. Grandpierre and G. Chatelier.

[COSPAR, Plenary Meeting, 10th, London, England, July 24-29, 1967, Paper.]

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

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Edited by A. H. Brown and F. G. Favorite.

Amsterdam, North-Holland Publishing Co., 1968, p. 69-78.

In French.

[For abstract see issue 19, page 3178, Accession no. A67-35241]

**A69-11083**

RESISTANCE OF ORGANISMS TO EXTREME INFLUENCES IN RELATION TO SOME EXOBIOLOGICAL PROBLEMS.

L. K. Lozina-Lozinskii (Akademiia Nauk SSSR, Moscow, USSR).  
IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

Meeting sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.

Edited by A. H. Brown and F. G. Favorite.  
Amsterdam, North-Holland Publishing Co., 1968, p. 79-86.  
28 refs.

The conditions to which organisms have not been able to adapt in the process of evolution are called extreme influences or extreme conditions. The experiments show that organisms and cells have a potential for resistance; among animals, there are forms that are able to stand extremely low temperatures when the water content of their tissues is large enough. Some species of protozoa can tolerate ionizing radiation in doses exceeding those existing on the Earth and out in space. Many insects, especially alpine species, do not require as much as is contained in lower layers of the Earth's atmosphere. Hence, earth organisms possess some "margins of safety," suggesting the existence of similar biological systems in conditions different from the Earth's. The resistance to the action of extreme factors is probably connected with the resistance of biopolymers, protein complexes of cells, and also with the capability of the organism to recover from damage. (Author)

**A69-11084 \***

WEIGHTLESSNESS AND THE DEVELOPING FROG EGG.

R. S. Young (NASA, Washington, D.C.) and J. W. Tremor (NASA, Ames Research Center, Moffett Field, Calif.).

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

Meeting sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.

Edited by A. H. Brown and F. G. Favorite.  
Amsterdam, North-Holland Publishing Co., 1968, p. 87-93.

Description of the results of the flight of fertilized frog eggs in the manned orbital flights Gemini 8 and Gemini 12. The experiment was designed to determine the effect of weightlessness or near weightlessness on the ability of the cell to divide normally and on subsequent differentiation and embryogenesis. Eggs were fixed periodically in flight so that recovered material could be carefully compared to simultaneous ground controls with respect to gross morphology and histology. Some embryos were recovered alive after 4 days in orbit. In general, no abnormalities were detected which were inconsistent with the controls. Death, shortly after recovery, of the embryos recovered alive in Gemini 12, remains unexplained. The protocol of the experiment and the experimental hardware are described. (Author)

**A69-11085**

ON THE INTERRELATIONS BETWEEN ULTRAVIOLET AND VISIBLE LIGHT DURING THEIR SIMULTANEOUS ACTION ON THE CELL.

E. I. Zaar (Akademiia Nauk SSSR, Leningrad, USSR).

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

Meeting sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.

Edited by A. H. Brown and F. G. Favorite.  
Amsterdam, North-Holland Publishing Co., 1968, p. 94-99.  
40 refs.

Study of the effect of UV light (2537 Å) on the biological activity of unicellular infusoria of the Paramecium caudatum genus. The infusoria were exposed for 8 to 16 hr daily to radiation doses of

1.5 to 40 and 120 μW in the presence and absence of visible light. A sharp decrease in cell division rates followed by cell death was observed on the second to fifth day of the experiment in the absence of visible light. On the other hand, no harmful effects were observed even on the thirtieth day when the cells were illuminated during exposures from a visible light source of (2.8 to 15.0) x 10<sup>3</sup> lux.

V. Z.

**A69-11086 \***

THE BIOLOGICAL EFFECTIVENESS OF SOLAR ELECTROMAGNETIC RADIATION IN SPACE.

P. R. Lorenz, C. L. Hemenway, and J. Hotchin (Union University, Dudley Observatory; New York State, Dept. of Health, Div. of Laboratories and Research, Albany, N.Y.).

(COSPAR, Plenary Meeting, 10th, London, England, July 24-29, 1967, Paper.)

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

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Edited by A. H. Brown and F. G. Favorite.  
Amsterdam, North-Holland Publishing Co., 1968, p. 100-107.  
12 refs.

Grant No. NsG-155-61.

[For abstract see issue 19, page 3177, Accession no. A67-35184]

**A69-11087 \***

THE SURVIVAL OF TERRESTRIAL MICROORGANISMS IN SPACE AT ORBITAL ALTITUDES DURING GEMINI SATELLITE EXPERIMENTS.

J. Hotchin, P. Lorenz, and C. L. Hemenway (New York State, Dept. of Health, Div. of Laboratories and Research; Union University, Dudley Observatory, Albany, N.Y.).

(COSPAR, Plenary Meeting, 10th, London, England, July 24-29, 1967, Paper.)

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

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Edited by A. H. Brown and F. G. Favorite.  
Amsterdam, North-Holland Publishing Co., 1968, p. 108-114. 5 refs.  
Grant No. NsG-155-61; Contract No. NAS-95637.

[For abstract see issue 19, page 3178, Accession no. A67-35223]

**A69-11088**

MICROBIOLOGICAL STUDIES ON THE RADIATION ENVIRONMENT OF THE IONOSPHERE AND STRATOSPHERE.

E. Petras and K. Bisa (Fraunhofer Gesellschaft zur Förderung der angewandten Forschung, Institut für Aerobiologie, Graftschaft, West Germany).

(COSPAR, Plenary Meeting, 10th, London, England, July 24-29, 1967, Paper.)

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

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Edited by A. H. Brown and F. G. Favorite.  
Amsterdam, North-Holland Publishing Co., 1968, p. 115-122. 6 refs.  
Research supported by the Bundesministerium für Wissenschaftliche Forschung.

[For abstract see issue 19, page 3178, Accession no. A67-35271]

**A69-11089**

THE EFFECT OF EXTREME COOLING ON GLOBULAR AND FIBRILLAR PROTEINS.

## A69-11090

M. A. Khenokh and V. P. Pershina (Akademiia Nauk SSSR, Moscow, USSR).

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

Meeting sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.

Edited by A. H. Brown and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1968, p. 123-129. 11 refs.

Study of the effect of extremely low temperatures down to  $-196^{\circ}\text{C}$ , obtained with solid  $\text{CO}_2$  and liquid N, on the properties of deoxynucleoprotein of the calf thymus, crystalline egg albumin, and actin. It is found that all these proteins undergo partial coagulation when cooled. A reduced molecular weight in deoxynucleoprotein and fibrillar actin, an increased viscosity in deoxynucleoprotein and albumin and a decreased viscosity in fibrillar actin are established after exposures to low temperatures. V. Z.

## A69-11090 \*

RELATIONSHIP OF PLANETARY QUARANTINE TO BIOLOGICAL SEARCH STRATEGY.

E. C. Levinthal, J. Lederberg (Stanford University, Stanford, Calif.), and Carl Sagan (Harvard University; Smithsonian Institution, Smithsonian Astrophysical Observatory, Cambridge, Mass.).

(COSPAR, Plenary Meeting, 10th, London, England, July 24-29, 1967, Paper.)

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

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Edited by A. H. Brown and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1968, p. 136-145. 11 refs.

Grants No. NsG-81; No. NsG-05-020-004.

[For abstract see issue 19, page 3180, Accession no. A67-35233]

## A69-11091 \*

PROBABILITY OF GROWTH ( $p_G$ ) OF VIABLE MICROORGANISMS IN MARTIAN ENVIRONMENTS.

E. J. Hawrylewicz, C. A. Hagen, Vivian Tolkacz, B. T. Anderson, and Marjorie Ewing (IIT Research Institute, Chicago, Ill.).

(COSPAR, Plenary Meeting, 10th, London, England, July 24-29, 1967, Paper.)

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

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Edited by A. H. Brown and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1968, p. 146-156. 11 refs.

Contract No. NASr-22.

[For abstract see issue 19, page 3177, Accession no. A67-35220]

## A69-11092

APPLICATIONS OF CAPILLARY MICROSCOPY IN EXOBIOLOGICAL RESEARCH.

J. B. Opfell, G. P. Zebal, and J. L. Shannon (Philco-Ford Corp., Space and Re-Entry Systems Div. and Aeronutronic Div., Newport Beach, Calif.).

(COSPAR, Plenary Meeting, 10th, London, England, July 24-29, 1967, Paper.)

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

Meeting sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.

Edited by A. H. Brown and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1968, p. 157-169. 10 refs.

Research supported by the Philco-Ford Corp.

[For abstract see issue 19, page 3179, Accession no. A67-35205]

## A69-11093

A COMPARATIVE EVALUATION OF DIFFERENT METHODS FOR DETECTION OF EXTRATERRESTRIAL LIFE.

A. A. Imshenetskii, S. A. Butenko, L. A. Kuzjurina, M. Mukhin, G. G. Sotnikov, and R. I. Redorova (Akademiia Nauk SSSR, Moscow, USSR).

IN: LIFE SCIENCES AND SPACE RESEARCH VI; COSPAR, PLENARY MEETING, 10TH, OPEN MEETING OF WORKING GROUP V, LONDON, ENGLAND, JULY 27, 28, 1967, PROCEEDINGS. [A69-11073 01-04]

Meeting sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.

Edited by A. H. Brown and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1968, p. 170-182.

Comparative evaluation of different methods for detecting extraterrestrial life on the basis of soil or atmospheric sampling. Some physical analytical methods represent considerable interest - e.g., determination of DNA spectroscopically or in the cells with luminescent microscopy. However, the reliable methods are those based on the assay of enzymatic activity or cell growth in a nutrient medium. Determination of the activity of the enzyme systems of the  $\text{O}^{18}$  metabolism, phosphatases, and porphyrin-containing enzymes is discussed. The most reliable criterion is a growth of microbial cells found in the planet soil or atmosphere and transferred into a nutrient medium. A composition of such a medium must be chosen very carefully so as to permit growth of the wide range of microbial physiological groups. The growth can be registered by means of nephelometry, potentiometry, monometry, determination of enzyme activity, and  $^{14}\text{CO}_2$  released by the action of microorganisms on various organic substances containing labeled carbon atoms.

(Author)

## A69-11180

COORDINATION OF THE VOLUNTARY HUMAN MOVEMENTS DURING SPACE FLIGHT [KOORDINATSIIA PROIZVOL'NYKH DVIZHENII CHELOVEKA V USLOVIAKH KOSMICHESKOGO POLETA] (2nd Edition).

L. V. Chkhaidze.

Moscow, Izdatel'stvo Nauka, 1968. 133 p. 108 refs. In Russian.

This book is a revised edition of a monograph published in 1965, and contains new data from new developments in space (space walks, recent photographs of the lunar surface, and spacecraft docking). The principles by which a cosmonaut regulates his habitual motions are considered in detail, particularly the motor functions during weightlessness. Detailed treatment is given to the theoretical bases of the coordination of human movements under normal conditions, and under conditions of increased and decreased gravitational forces. The personal reports of cosmonauts on the stability of their motor habits during flight are presented, confirming the general conclusions made concerning the possibility of retaining the coordination of human motor functions during space flight. The book is intended for a broad circle of physiologists, physicians, scientists and technicians engaged in research on the coordination of human motor functions, as well as cosmonaut trainers and scientists concerned with problems of the capabilities of humans under varying gravity forces and other factors. I. P.

## A69-11198

D-LACTATE SPECIFIC PYRIDINE NUCLEOTIDE LACTATE DEHYDROGENASE IN ANIMALS.

George L. Long and Nathan O. Kaplan (Brandeis University, Graduate Dept. of Biochemistry, Waltham, Mass.).

Science, vol. 162, Nov. 8, 1968, p. 685, 686. 10 refs.

Research supported by the American Cancer Society; NIH Grant No. CA 3611-11; Grant No. NsG-375-S4.

A survey of representative invertebrates has revealed the presence of pyridine nucleotide-linked D-lactate dehydrogenase in a number of groups. All species studied contained either D- or L-lactate dehydrogenase, but no species contained both enzymes. The D-lactate dehydrogenase from *Limulus polyphemus* has been purified and has a molecular weight of 65,000. (Author)

**A69-11316**

MATHEMATICAL SIMULATION OF CLOSED ECOSYSTEMS.  
A. B. Rubin and A. S. Folkt.  
(*Kosmicheskie Issledovaniia*, vol. 6, Mar.-Apr. 1968, p. 286-298.)  
*Cosmic Research*, vol. 6, Mar.-Apr. 1968, p. 239-249. 9 refs.  
Translation.  
[For abstract see issue 14, page 2529, Accession no. A68-30300]

**A69-11317**

THE EFFECT OF SPACE FLIGHT ON COSMOS-110 ON THE MICRO-SPORES OF *TRADESCANTIA PALUDOSA*.  
N. L. Delone, A. S. Trusova, E. M. Morozova, V. V. Antipov, and G. P. Parfenov.  
(*Kosmicheskie Issledovaniia*, vol. 6, Mar.-Apr. 1968, p. 299-303.)  
*Cosmic Research*, vol. 6, Mar.-Apr. 1968, p. 250-253. Translation.  
[For abstract see issue 14, page 2526, Accession no. A68-30301]

**A69-11334 \***

CARDIOVASCULAR CHANGES DURING TILT AND LEG NEGATIVE PRESSURE TESTS.  
Stephen J. Bartok, Loren D. Carlson, and Richard F. Walters (California, University, School of Medicine, Davis, Calif.).  
*Aerospace Medicine*, vol. 39, Nov. 1968, p. 1157-1162. 7 refs.  
Grant No. NGR-05-004-026.  
Description of an experiment in which eight students were studied before and after nine days of supervised bedrest using 15 min at 70° tilt, followed by 15 min of negative pressure (up to 30 mm Hg) applied to the left leg as the testing stresses for measuring cardiovascular change. Values recorded included heart rate, blood pressure, and relative changes in leg volume using mercury in silastic strain gauges at the greatest calf circumference. The maximal increase in heart rate during tilt was approximately 40% higher at 0 and 2.5 hr post-bedrest than pre-bedrest. The diastolic pressure following bedrest tended to be higher pre-tilt and increased more during tilt, resulting in higher mean pressure and narrowed pulse pressures. The negative pressure tests showed changes in heart rate and blood pressure similar to the tilt tests, but to a lesser degree. Leg volume increases were greater following bedrest. M. G.

**A69-11335 \***

DYNAMIC RESPONSE OF THE HUMAN BODY TO VIBRATION WHEN COMBINED WITH VARIOUS MAGNITUDES OF LINEAR ACCELERATION.  
Hubert C. Vykukal (NASA, Ames Research Center, Moffett Field, Calif.).  
*Aerospace Medicine*, vol. 39, Nov. 1968, p. 1163-1166.  
To determine the effects of vibration combined with higher linear accelerations on human body dynamics, a study was conducted whereby four subjects, in a semisupine position, were exposed to vibration ( $\pm 0.4$  g at 2-1/2 to 20 cps in 1/2 cps increments) combined with linear accelerations of 1, 2-1/2, and 4 g. The mechanical impedance of each subject was measured. A vibration device developed for use with various motion generators was utilized in the investigation. Results show significant changes in both impedance magnitude and body resonance. The effects of higher linear accelerations on the human body dynamics are increased stiffness, reduced damping of the whole body, and higher energy transmission to internal organs. Resonances at higher frequencies became more predominant in magnitude because of increased coupling of the body system when immersed in a high g environment. (Author)

**A69-11336 #**

DECOMPRESSION STRESS IN SIMULATED ORBITAL FLIGHT.  
Henry B. Hale, James P. Ellis, and Edgar W. Williams (USAF Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiology Branch, Brooks AFB, Tex.).  
*Aerospace Medicine*, vol. 39, Nov. 1968, p. 1171-1174. 10 refs.  
Study of the possibility that prolonged exposure to hypobaric conditions (without hypoxia of any degree) causes endocrine-metabolic disturbance of the type that characterizes nonspecific stress. Endocrine-metabolic appraisal was made (by means of urinalysis) for human subjects experimentally exposed to hypobaric conditions similar to those used in orbiting spacecraft or during extravehicular activity in space. In one test, 26 subjects were exposed (after 1.5 hr of denitrogenation) sequentially to 5 psia for 2.5 hr, 3.5 psia for 15 min (with standardized exercise), 7 psia for 4 hr, and 3.5 psia for 2 hr (with standardized exercise). Nonspecific stress was evident as there were decompression-induced elevations in urinary creatinine, urea, magnesium, sodium, Na/K, urine volume, 17-hydroxycorticosteroids, epinephrine (E), norepinephrine (NE), and the NE/E ratio. In a second test, there was a 4-hr exposure to 5 psia instead of 7 psia. More intense and more progressive stress was evident in the second test, apparently reflecting the long exposure to 5 psia. M. G.

**A69-11337 #**

ENDOCRINE-METABOLIC RESPONSE TO SEQUENTIAL DECOMPRESSION DURING SIMULATED ORBITAL FLIGHT.  
Henry B. Hale and Edgar W. Williams (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiology Branch, Brooks AFB, Tex.).  
*Aerospace Medicine*, vol. 39, Nov. 1968, p. 1175-1177. 7 refs.  
Urinary catecholamines, 17-hydroxycorticosteroids, various electrolytes, and certain nitrogenous metabolites were measured for the purpose of assessing physiologic effects of exposure to hypobaric conditions similar to some that have been or may be used in orbiting spacecraft or during extravehicular activity. Nineteen volunteer human subjects were studied during sequential exposure to the following gaseous environments and pressures: (1) oxygen at 14.5 psia, 4 hr; (2) oxygen at 5 psia, 2.5 hr; (3) oxygen at 3.5 psia, 15 min; (4) 46 oxygen/50% nitrogen, at 7 psia, 4 hr; and (5) oxygen at 3.5 psia, 1.25 hr. Nonspecific stress was evident, as there were decompression-induced elevations (which were progressive with time) in creatinine, urine volume, sodium, norepinephrine, and urea. Epinephrine was also elevated, but the peak effect came at an early time. As a late effect, 17-OHCS excretion became elevated. These findings confirm previous observations. (Author)

**A69-11338 #**

NITROGEN AND HELIUM AS FACTORS AFFECTING DECOMPRESSION STRESS SEVERITY.  
Henry B. Hale and Edgar W. Williams (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiology Branch, Brooks AFB, Tex.).  
*Aerospace Medicine*, vol. 39, Nov. 1968, p. 1178-1181. 9 refs.  
Results of an endocrine-metabolic appraisal by means of a battery of urinary determinations. Three experiments are described in which human volunteers, all of whom had extensive backgrounds of training and experience in decompression chambers, were exposed to sequential changes in pressure and composition of the gaseous environment. In each test, there was exposure to a 2-gas environment, either 46% oxygen/50% nitrogen or 46% oxygen/50% helium, with ambient pressure of 7 psia. The objective was to quantify stress effects of the diluent gases of helium and nitrogen. Nonspecific stress was detected in each experiment, the sum of the deviations from control levels for ten urinary variables (including norepinephrine, epinephrine, 17-hydroxycorticosteroids, various electrolytes, and certain nitrogenous metabolites) serving to differentiate the effects of the different diluent gases. When exposure to the different 2-gas environments was only 4 hr and there was brief, subsequent exposure to 3.5 psia (breathing 100% pure oxygen), nitrogen appeared to be the stronger stressor; with duration increased to 12 hr, helium was judged to be the stronger stressor. I. P.

## A69-11339

### A69-11339 #

**RAPID PROCEDURES TO MONITOR WATER FOR POTABILITY.**  
Arnold R. Slonim (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

*Aerospace Medicine*, vol. 39, Nov. 1968, p. 1182-1189. 29 refs.

Description of the latest developments in methodology for monitoring aerospace water supplies for potability. Analytical techniques that meet some of the following criteria are emphasized: reproducibility, sensitivity of measurement, rapidity of analysis, instrumental capability, and potential for aerospace monitoring. The leading instrumental methods are the two recent combustion/infrared techniques for measuring organic pollution, one for total organic carbon and the other for chemical oxygen demand, and bioluminescence for determining microbiological contamination of water samples. All three methods are very rapid (analysis within minutes) and sensitive ( $< 1 \text{ mg/l}$  for the two chemical tests and  $< 1 \text{ pg ATP}$  for the biological assay) and can analyze a microsample ( $< 0.1 \text{ ml}$ ) in either aqueous or vapor phase. Other potentially sound methods as well as future trends for aerospace applications are discussed. (Author)

### A69-11340 #

**PSYCHOMOTOR AND PHYSIOLOGIC CHANGES DURING ACCELERATIONS OF 5, 7, AND 9 G<sub>x</sub>.**

Vija Z. Little (San Antonio State Hospital, San Antonio, Tex.), Sidney D. Leverett, and Bryce O. Hartman (Trinity University, San Antonio, Tex.; USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).  
*Aerospace Medicine*, vol. 39, Nov. 1968, p. 1190-1197. 24 refs.

Nine men were studied for physiologic and psychomotor changes during  $+5 \text{ G}_x$ ,  $+7 \text{ G}_x$ , and  $+9 \text{ G}_x$ . Each subject participated in three runs at one G level during a single session and underwent three such sessions, each at a different G level. Acceleration stress resulted in a decrement of performance, with the degree of decrement dependent on the level of acceleration. Heart rate also increased significantly as a function of the level of acceleration. An increase in systolic blood pressure was dependent only on acceleration stress, without regard for the level of acceleration. From psychomotor and physiologic data considered simultaneously, it appears that: (1) performance decrement resulted from specific factors rather than physiologic insult; (2) there was a heightened level of physiologic response to higher levels of acceleration; and (3) the physiologic responses were within tolerable limits and clearly short of any objective medical or operational end point. (Author)

### A69-11341

**EFFECTS OF TINTED OPHTHALMIC MEDIA ON THE DETECTION AND RECOGNITION OF RED SIGNAL LIGHTS.**

B. A. J. Clark (Department of Supply, Australian Defence Scientific Service, Defence Standards Laboratories, Melbourne, Australia).  
*Aerospace Medicine*, vol. 39, Nov. 1968, p. 1198-1205. 22 refs.

Examination of the effects of tinted ophthalmic media on the reaction time and recognition probability for red signal lights in daylight. Neutrally tinted lenses have the least effect on signal recognition. A new method of specifying allowable coloration in tinted media for aviation use is derived, and these coloration limits are supported by consideration of the recognition of near-threshold red signals. (Author)

### A69-11342 \*

**THREE-WEEK EXPOSURE OF RODENTS TO A NEON ENRICHED ATMOSPHERE.**

H. S. Weiss, J. F. Pitt, E. S. Kreglow, E. P. Hiatt (Ohio State University, College of Medicine, Dept. of Physiology, Environmental Physiology Laboratory, Columbus, Ohio), and M. Grimard.  
*Aerospace Medicine*, vol. 39, Nov. 1968, p. 1215-1217. 15 refs. Grant No. N5G-295-62.

Results of exposure of growing rats and adult mice to a gas mixture of roughly 71% neon, 8% helium, and 21% oxygen for three weeks in a sealed recycling system. The rats grew as well between body weights of 80 and 200 g as did the controls on the adjacent laboratory bench and did not differ significantly from controls in

feed and water uptake. The mice in neon gained significantly less weight and had 1/3 as many pregnancies as their laboratory bench controls but the litter size was the same. V. Z.

### A69-11343 #

**ENDOCRINE FUNCTIONS IN AN OXYGEN ATMOSPHERE AT REDUCED TOTAL PRESSURE.**

Frode Ulvedal and Ann J. Roberts (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Physiology Div., Environmental Systems Branch, Brooks AFB, Tex.).  
*Aerospace Medicine*, vol. 39, Nov. 1968, p. 1218-1224. 29 refs.

Discussion of certain aspects of the pituitary-adrenocortical axis and neuro-endocrine functions in animals maintained in an oxygen atmosphere at a total pressure of 380 mm Hg. Norepinephrine excretion was depressed in animals exposed to the oxygen atmosphere for 49 days, while epinephrine values indicated an initial period of depressed excretion followed by a period of increased excretion. Urinary corticosterone excretion showed an increased adrenal response to the environmental conditions, as did the adrenal weights. Further evidence for pituitary-adrenal involvement is demonstrated by a biphasic response of adrenal ascorbic acid concentrations and by electronmicrographs of the anterior pituitary and adrenal glands. The anterior pituitary gland showed increasing numbers of cells associated with ACTH production which finally became less granulated. It is, therefore, evident that the oxygen atmosphere influences the pituitary-adrenal axis and that this influence shows species variability. (Author)

### A69-11344

**STUDY OF U.S. PHYSICIAN-PILOT FLYING HABITS.**

Robert L. Wick, Jr. (Ohio State University, Dept. of Preventive Medicine, Aviation Medical Research Laboratory, Columbus, Ohio).  
*Aerospace Medicine*, vol. 39, Nov. 1968, p. 1225-1228. 14 refs.

Survey of the flight activities of physician-pilots in the U.S. to determine whether the published high accident rate of physicians is real or merely apparent. It is found that the active U.S. physician pilots sampled fly an average of 134 hr each year. Their consequent risk exposure is several times higher than that of the average pilot who flies for pleasure. The actual risks involved in flight, however, are more closely related to the number of flight segments, and in particular to the numbers of takeoffs and landings than they are to the number of miles or hours flown. It appears that, as with flying hours, physicians make many more takeoffs and landings than do groups of general-aviation pilots, and consequently expose themselves to danger more frequently than these other groups. I. P.

### A69-11345

**ALCOHOL QUESTION IN AIRCRAFT ACCIDENT INVESTIGATION.**

Stanley R. Mohler (Federal Aviation Administration, Office of Aviation Medicine, Aeromedical Applications Div., Washington, D. C.), William H. Berner (Department of Transportation, National Transportation Safety Board, Bureau of Aviation Safety, Washington, D. C.), and Leo R. Goldbaum (U.S. Armed Forces Institute of Pathology, Washington, D. C.).  
*Aerospace Medicine*, vol. 39, Nov. 1968, p. 1228-1230. 7 refs.

The purpose of determinations of blood or tissue alcohol in the pilot victim of an aircraft accident is to assist the National Transportation Safety Board in assessing the role played by alcohol relative to causing or contributing to the accident. Also, the extent to which alcohol is involved in aircraft accidents decides how extensive the Federal Aviation Administration's education and other safety programs are conducted. A progressive increase in toxicological examinations of fatal general aviation accidents has occurred, from 29% in 1963 to 74% in 1967. In 1967, 23% of the accidents investigated toxicologically presented blood alcohols in excess of 150 mg%, obviously indicating that continued airman education and other preventive programs are desirable. To minimize laboratory errors, it is recommended that samples from a given accident be split between two laboratories, at least one being experienced in forensic pathology (e.g., the Armed Forces Institute of Pathology). (Author)

**A69-11346 #**

## HEAD INJURY - A CLINICAL PERSPECTIVE.

Lauren K. Welch (Central Kansas Medical Center, Dept. of Neurology, Great Bend, Kan.).

Aerospace Medicine, vol. 39, Nov. 1968, p. 1231-1235. 27 refs. USAF-sponsored research.

Clinical and laboratory data were assessed on 108 head-injured patients. Unique to this study was a long term follow-up averaging 7.33 years per patient. Only two patients had open head injuries. Definite alteration in conscious state was found in 58 patients, focal neurological deficit in 28 patients, and skull fracture in 20 patients. EEG abnormalities were found in 24 patients. Surprisingly, 99 of the 108 patients returned to full employment, although 29 made a change in vocation following head trauma. Discussion of and recommendations for criteria to assess conscious state are given.

(Author)

**A69-11347 #**

## EFFECTS OF TOPICAL OPHTHALMIC 2 PERCENT Pilocarpine ON VISUAL PERFORMANCE OF NORMAL SUBJECTS.

Eric E. Lindstrom (U.S. Army, Office of the Surgeon, Preventive Medicine Div., Fort Rucker, Ala.), Thomas J. Tredici, and Benjamin G. Martin (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Ophthalmology Branch, Brooks AFB, Tex.).

Aerospace Medicine, vol. 39, Nov. 1968, p. 1236-1240. 16 refs.

Twenty subjects in different age groups were studied for the effects of 2% pilocarpine on normal ocular dynamics. Considerable individual variability in response was noted. Maximum effects on visual acuity, accommodation, and refraction were produced in the younger subjects, with the older subjects exhibiting less marked changes. The most significant change was the initial decrease in visual acuity for distance. All subjects demonstrated characteristic miosis but without significant reduction in peripheral fields. The mean reduction in intraocular pressure was 1.7 mm Hg. All subjects experienced some reduction in their dark-adaptive ability. The use of pilocarpine in the treatment of glaucoma in flying personnel is discussed.

(Author)

**A69-11488**

## STRUCTURAL AND FUNCTIONAL DISTURBANCES IN CERTAIN BODY SYSTEMS ON EXPOSURE TO EXTREME STRESS FACTORS - ANIMAL EXPERIMENTS.

V. V. Parin and I. M. Khazen.

(Kosmicheskaja Biologija i Meditsina), vol. 1, Sept.-Oct. 1967, p. 17-24.)

Environmental Space Sciences, vol. 1, Sept.-Oct. 1967, p. 328-333. 34 refs. Translation.

[For abstract see issue 04, page 600, Accession no. A68-14837]

**A69-11489**

## MATHEMATICAL MODELING OF TEMPERATURE AND HUMIDITY PROCESSES IN SECTIONS OF SEALED SPACESHIP CABINS.

B. A. Adamovich, A. V. Kostetskii, V. A. Kurochkin, and G. G. Ter-Minas'ian.

(Kosmicheskaja Biologija i Meditsina), vol. 1, Sept.-Oct. 1967, p. 25-30.)

Environmental Space Sciences, vol. 1, Sept.-Oct. 1967, p. 334-337. 8 refs. Translation.

[For abstract see issue 04, page 603, Accession no. A68-14838]

**A69-11490**

## EFFECT OF DIET CONTAINING UNICELLULAR ALGAE ON THE COMPOSITION OF ENTERIC MICROFLORA IN ANIMALS.

V. M. Shilov, N. N. Liz'ko, V. I. Fofanov, and N. S. Kliushkina.

(Kosmicheskaja Biologija i Meditsina), vol. 1, Sept.-Oct. 1967, p. 31-34.)

Environmental Space Sciences, vol. 1, Sept.-Oct. 1967, p. 338-340. 14 refs. Translation.

[For abstract see issue 04, page 600, Accession no. A68-14839]

**A69-11491**

## EFFECT OF TRANSVERSE ACCELERATIONS ON ACETYLCHOLINE CONTENT AND CHOLINESTERASE ACTIVITY IN THE BLOOD OF EXPERIMENTAL ANIMALS.

N. V. Korneeva and A. S. Ushakov.

(Kosmicheskaja Biologija i Meditsina), vol. 1, Sept.-Oct. 1967, p. 34-38.)

Environmental Space Sciences, vol. 1, Sept.-Oct. 1967, p. 341-343. 11 refs. Translation.

[For abstract see issue 04, page 601, Accession no. A68-14840]

**A69-11492**

## CORRELATION OF CHANGES IN EEG AND FOOD-PROCURING REFLEX OF RABBITS DURING INCREASING HYPOXIA.

L. V. Kaliuzhnyi, N. A. Agadzhanian, and I. N. Zakharova.

(Kosmicheskaja Biologija i Meditsina), vol. 1, Sept.-Oct. 1967, p. 38-46.)

Environmental Space Sciences, vol. 1, Sept.-Oct. 1967, p. 344-350. 32 refs. Translation.

[For abstract see issue 04, page 601, Accession no. A68-14841]

**A69-11493**

## USE OF PROPHYLACTIC AND THERAPEUTIC COMPLEXES FOR REPEATED EXPOSURE TO IONIZING RADIATION.

M. N. Trushina.

(Kosmicheskaja Biologija i Meditsina), vol. 1, Sept.-Oct. 1967, p. 46-52.)

Environmental Space Sciences, vol. 1, Sept.-Oct. 1967, p. 351-355. 17 refs. Translation.

[For abstract see issue 04, page 601, Accession no. A68-14842]

**A69-11494**SOME INTERPRETATIONS OF THE BIOLOGICAL EFFECTS OF CHRONIC  $\gamma$  IRRADIATION.

A. F. Khoruzhenko, A. I. Laptev, I. G. Oreshkin, V. N. Malakhovskii, and V. A. Rezontov.

(Kosmicheskaja Biologija i Meditsina), vol. 1, Sept.-Oct. 1967, p. 52-57.)

Environmental Space Sciences, vol. 1, Sept.-Oct. 1967, p. 356-360. 15 refs. Translation.

[For abstract see issue 04, page 601, Accession no. A68-14843]

**A69-11495**

## COMBINED EFFECT OF TWO-MONTH HYPOKINESIA AND ACCELERATION ON THE CARDIOVASCULAR SYSTEM.

G. P. Mikhailovskii, T. V. Benevolenskaia, T. A. Petrova, I. Ia. Iakovleva, O. I. Boikova, M. P. Kuz'min, A. A. Savilov, and S. N. Solov'eva.

(Kosmicheskaja Biologija i Meditsina), vol. 1, Sept.-Oct. 1967, p. 57-61.)

Environmental Space Sciences, vol. 1, Sept.-Oct. 1967, p. 361-363. 14 refs. Translation.

[For abstract see issue 04, page 601, Accession no. A68-14844]

**A69-11496**

## CHANGES IN FUNCTIONS OF THE NERVOUS SYSTEM AND OF SOME ANALYZERS DURING THE COMBINED ACTION OF HYPOKINESIA AND RADIAL ACCELERATIONS.

T. N. Krupina, A. Ia. Tizul, N. M. Boglevskaia, V. P. Baranova, E. I. Matsnev, and E. A. Chertovskikh.

(Kosmicheskaja Biologija i Meditsina), vol. 1, Sept.-Oct. 1967, p. 61-66.)

Environmental Space Sciences, vol. 1, Sept.-Oct. 1967, p. 364-368. 17 refs. Translation.

[For abstract see issue 04, page 601, Accession no. A68-14845]

**A69-11497**

## BASAL METABOLISM OF MAN DURING PROLONGED REST IN BED.

**A69-11498**

B. S. Katkovskii.  
(Kosmicheskaiia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 67-71.)  
Environmental Space Sciences, vol. 1, Sept.-Oct. 1967, p. 369-372.  
9 refs. Translation.  
[For abstract see issue 04, page 601, Accession no. A68-14846]

**A69-11498**

SOME RESULTS OF PHYSIOLOGICAL INVESTIGATIONS IN THE SLOW ROTATION ROOM.  
R. R. Galle and M. D. Emel'ianov.  
(Kosmicheskaiia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 72-79.)  
Environmental Space Sciences, vol. 1, Sept.-Oct. 1967, p. 373-378.  
11 refs. Translation.  
[For abstract see issue 04, page 601, Accession no. A68-14847]

**A69-11499**

INTERACTION BETWEEN SENSORY SYSTEMS IN WEIGHTLESSNESS.  
L. A. Kitaev-Smyk.  
(Kosmicheskaiia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 79-83.)  
Environmental Space Sciences, vol. 1, Sept.-Oct. 1967, p. 379-382.  
12 refs. Translation.  
[For abstract see issue 04, page 601, Accession no. A68-14848]

**A69-11500**

EFFECTS OF CERTAIN SPACE FLIGHT FACTORS ON AUDITORY REACTIONS IN MAN.  
Iu. V. Krylov.  
(Kosmicheskaiia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 84-89.)  
Environmental Space Sciences, vol. 1, Sept.-Oct. 1967, p. 383-386.  
22 refs. Translation.  
[For abstract see issue 04, page 601, Accession no. A68-14849]

**A69-11501**

CELL AND TISSUE CULTURES AS SUBJECT OF STUDY IN COSMIC BIOLOGY AND MEDICINE.  
V. V. Portugalov, F. V. Sushkov, and V. B. Starikov.  
(Kosmicheskaiia Biologiia i Meditsina, vol. 1, Nov.-Dec. 1967, p. 8-17.)  
Environmental Space Sciences, vol. 1, Nov.-Dec. 1967, p. 399-406.  
109 refs. Translation.  
[For abstract see issue 07, page 1135, Accession no. A68-19573]

**A69-11502**

SOME EFFECTS DEVELOPING DURING HYPOKINESIA.  
V. V. Portugalov, O. G. Gizenko, E. I. Il'ina-Kakueva, V. B. Malkin, T. V. Artiukhina, I. A. Bukaeva, V. Ia. Gotlib, K. D. Rokhlenko, N. A. Roshchina, and V. I. Starostin.  
(Kosmicheskaiia Biologiia i Meditsina, vol. 1, Nov.-Dec. 1967, p. 18-25.)  
Environmental Space Sciences, vol. 1, Nov.-Dec. 1967, p. 407-413.  
5 refs. Translation.  
[For abstract see issue 07, page 1135, Accession no. A68-19574]

**A69-11503**

REGULATORY MECHANISMS OF HEMODYNAMIC SHIFTS UNDER THE EFFECT OF ACCELERATION - EXPERIMENTAL STUDY IN A PHYSIOLOGIC MODEL.  
E. B. Shul'zhenko and T. V. Sebekina.  
(Kosmicheskaiia Biologiia i Meditsina, vol. 1, Nov.-Dec. 1967, p. 25-28.)  
Environmental Space Sciences, vol. 1, Nov.-Dec. 1967, p. 414-416.  
8 refs. Translation.  
[For abstract see issue 07, page 1136, Accession no. A68-19575]

**A69-11504**

SOME EVIDENCE OF THE MECHANISM IN ACCELERATION-INDUCED DISTURBANCE OF CEREBELLAR RECEPTION.  
L. D. Klimovskaia and N. P. Smirnova.  
(Kosmicheskaiia Biologiia i Meditsina, vol. 1, Nov.-Dec. 1967, p. 29-33.)  
Environmental Space Sciences, vol. 1, Nov.-Dec. 1967, p. 417-420.  
18 refs. Translation.  
[For abstract see issue 07, page 1136, Accession no. A68-19576]

**A69-11505**

SOME ASPECTS OF ACETYLCHOLINE METABOLISM IN GUINEA-PIG BRAIN AND HEART IN RELATION TO RADIAL ACCELERATION.  
N. V. Korneeva and A. S. Ushakov.  
(Kosmicheskaiia Biologiia i Meditsina, vol. 1, Nov.-Dec. 1967, p. 33-37.)  
Environmental Space Sciences, vol. 1, Nov.-Dec. 1967, p. 421-423.  
Translation.  
[For abstract see issue 07, page 1136, Accession no. A68-19577]

**A69-11506**

EFFECT OF HYPOXIA ON VESTIBULAR FUNCTION IN THE RAT.  
I. I. Voinova.  
(Kosmicheskaiia Biologiia i Meditsina, vol. 1, Nov.-Dec. 1967, p. 37-40.)  
Environmental Space Sciences, vol. 1, Nov.-Dec. 1967, p. 424-426.  
12 refs. Translation.  
[For abstract see issue 07, page 1136, Accession no. A68-19578]

**A69-11507**

INCORPORATION OF <sup>32</sup>P IN PROTEINS OF BLOOD SERUM, LIVER, AND BRAIN OF RATS IRRADIATED WITH HIGH-ENERGY PROTONS.  
R. D. Govorun and R. L. Orlianskaia.  
(Kosmicheskaiia Biologiia i Meditsina, vol. 1, Nov.-Dec. 1967, p. 41-44.)  
Environmental Space Sciences, vol. 1, Nov.-Dec. 1967, p. 427-429.  
10 refs. Translation.  
[For abstract see issue 07, page 1136, Accession no. A68-19579]

**A69-11508**

MATHEMATICAL MODEL OF PARAMETERS OF CHLORELLA CULTIVATION UNDER IONIZING IRRADIATION.  
I. S. Sakovich, I. V. Smirnov, V. A. Sakovich, and L. K. Vekshina.  
(Kosmicheskaiia Biologiia i Meditsina, vol. 1, Nov.-Dec. 1967, p. 44-47.)  
Environmental Space Sciences, vol. 1, Nov.-Dec. 1967, p. 430-433.  
14 refs. Translation.  
[For abstract see issue 07, page 1136, Accession no. A68-19580]

**A69-11509**

SOME DATA ON VOLATILE (OXYGEN-CONTAINING) COMPOUNDS EVOLVED BY A NUMBER OF VEGETABLES.  
V. P. Dadykin, L. N. Stepanov, and V. E. Ryzhkova.  
(Kosmicheskaiia Biologiia i Meditsina, vol. 1, Nov.-Dec. 1967, p. 48-52.)  
Environmental Space Sciences, vol. 1, Nov.-Dec. 1967, p. 434-437.  
13 refs. Translation.  
[For abstract see issue 07, page 1136, Accession no. A68-19581]

**A69-11510**

BIOLOGICAL VALUE OF CHLORELLA PROTEINS.  
N. S. Kliushkina and V. I. Fofanov.  
(Kosmicheskaiia Biologiia i Meditsina, vol. 1, Nov.-Dec. 1967, p. 52-56.)  
Environmental Space Sciences, vol. 1, Nov.-Dec. 1967, p. 438-440.  
Translation.  
[For abstract see issue 07, page 1136, Accession no. A68-19582]



**A69-11511**

POSSIBILITY OF CHLORELLA CULTIVATION OF SOLUTIONS WITH MINERALIZED HUMAN WASTES.

A. L. Agre, I. V. Aleksandrova, G. V. Ilgach, V. V. Krasnoshchekov, I. E. Ivanova, E. K. Lebedeva, and V. I. Iazdovskii. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 1, Nov.-Dec. 1967, p. 56-59.)

*Environmental Space Sciences*, vol. 1, Nov.-Dec. 1967, p. 441-443. Translation.

[For abstract see issue 07, page 1138, Accession no. A68-19583]

**A69-11512**

CALCULATION OF THE CONCENTRATIONS OF GASEOUS CONTAMINANTS IN THE ATMOSPHERE OF AIRCRAFT CABINS.

L. T. Bykov. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 1, Nov.-Dec. 1967, p. 59-65.)

*Environmental Space Sciences*, vol. 1, Nov.-Dec. 1967, p. 444-450. Translation.

[For abstract see issue 07, page 1138, Accession no. A68-19584]

**A69-11513**

GENERAL RESISTANCE IN 62-DAY PERIODS OF HYPOKINESIA WITH EXPOSURE TO ACCELERATION.

G. P. Mikhailovskii, N. N. Dobronravova, M. I. Kozar', M. M. Korotaev, N. I. Tsyganova, V. M. Shilov, and I. Ia. Iakovleva. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 1, Nov.-Dec. 1967, p. 66-70.)

*Environmental Space Sciences*, vol. 1, Nov.-Dec. 1967, p. 451-454. 7 refs. Translation.

[For abstract see issue 07, page 1136, Accession no. A68-19585]

**A69-11514**

EFFECT OF TRANSVERSE ACCELERATIONS ON CERTAIN KIDNEY FUNCTIONS.

M. M. Korotaev and A. I. Grigor'ev. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 1, Nov.-Dec. 1967, p. 70-75.)

*Environmental Space Sciences*, vol. 1, Nov.-Dec. 1967, p. 455-458. 33 refs. Translation.

[For abstract see issue 07, page 1137, Accession no. A68-19586]

**A69-11515**

EFFECT OF PROLONGED LIMITATION OF MUSCLE ACTIVITY ON CARDIAC DYNAMICS.

N. E. Panferova, V. A. Tishler, and T. G. Popova. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 1, Nov.-Dec. 1967, p. 75-78.)

*Environmental Space Sciences*, vol. 1, Nov.-Dec. 1967, p. 459-461. 12 refs. Translation.

[For abstract see issue 07, page 1137, Accession no. A68-19587]

**A69-11516**

EXPERIMENTER OBSERVATION FACTOR IN SOUNDPROOF CHAMBER TESTS.

O. N. Kuznetsov. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 1, Nov.-Dec. 1967, p. 79-82.)

*Environmental Space Sciences*, vol. 1, Nov.-Dec. 1967, p. 462-465. 18 refs. Translation.

[For abstract see issue 07, page 1138, Accession no. A68-19588]

**A69-11517**

UNIVERSAL VESTIBULOMETRIC CHAIR (UVC).

S. S. Markarian, A. A. Matveev, and I. V. Pavlov. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 1, Nov.-Dec. 1967, p. 83-85.)

*Environmental Space Sciences*, vol. 1, Nov.-Dec. 1967, p. 466-468. 20 refs. Translation.

[For abstract see issue 07, page 1138, Accession no. A68-19589]

**A69-11759 \***

ACQUISITION OF DATA FOR THE APOLLO APPLICATIONS PROGRAM CREW MOTION EXPERIMENT.

W. J. Maes and Charles H. Murrish (Martin Marietta Corp., Denver, Colo.).

IN: SPACE PROJECTIONS FROM THE ROCKY MOUNTAIN REGION; PROCEEDINGS OF THE SYMPOSIUM, DENVER, COLO., JULY 15, 16, 1968. VOLUME 3. [A69-11755 02-11]

Symposium sponsored by the American Astronautical Society and the American Institute of Aeronautics and Astronautics. Tarzana, Calif., American Astronautical Society, 1968. 22 p. 5 refs.

Contract No. NAS 1-7276.

Description of a program for obtaining data for the Apollo crew motion experiment. The program consists of ground simulations and of an orbital experiment to establish the accuracy and reliability of the model. A limb motion sensing system (LIMS) was developed to obtain an accurate history of the type of crew motion which produces a specific spacecraft disturbance. The operation of the system is described, together with that of the Astronaut Data Acquisition Subsystem (ADAS). The data-system characteristics are tabulated.

M. M.

**A69-11769**

DESIGN EVOLUTION OF THE WOLF TRAP LIFE DETECTOR.

D. E. Buckendahl (Ball Brothers Research Corp., Boulder, Colo.). IN: SPACE PROJECTIONS FROM THE ROCKY MOUNTAIN REGION; PROCEEDINGS OF THE SYMPOSIUM, DENVER, COLO., JULY 15, 16, 1968. VOLUME 3. [A69-11755 02-11]

Symposium sponsored by the American Astronautical Society and the American Institute of Aeronautics and Astronautics. Tarzana, Calif., American Astronautical Society, 1968. 12 p.

Description of the Wolf Trap life detector which is designed to acquire a sample of dirt from the Martian surface and test this culture for microorganism growth. The engineering development of the life detector is reviewed. The detector is designed to survive 145°C for 24 hr, as well as a reasonably soft 200-g landing on the surface of Mars. The vacuum cleaner (the part of the device for collecting the surface sample) is designed to operate in a 50-mb atmosphere.

M. G.

**A69-11770 \***

SOME BIOLOGICAL PROBLEMS IN THE SEARCH FOR EXTRA-TERRESTRIAL LIFE.

Harold P. Klein (NASA, Ames Research Center, Moffett Field, Calif.).

(*International Symposium on Bioastronautics and the Exploration of Space*, 4th, San Antonio, Tex., June 27, 1968.)

IN: SPACE PROJECTIONS FROM THE ROCKY MOUNTAIN REGION; PROCEEDINGS OF THE SYMPOSIUM, DENVER, COLO., JULY 15, 16, 1968. VOLUME 3. [A69-11755 02-11]

Symposium sponsored by the American Astronautical Society and the American Institute of Aeronautics and Astronautics. Tarzana, Calif., American Astronautical Society, 1968. 21 p. 44 refs.

General discussion of the possible existence of extraterrestrial life forms in the solar system. The various components of the Martian atmosphere are reviewed on the basis of data obtained from the Mariner 4 flyby of 1965. It is suggested that the factor most prohibitive to the existence of life on Mars would be the almost total lack of water vapor. The adaptation of terrestrial organisms to simulated Martian atmospheres is briefly discussed. Some problems in planning "life detection" experiments to be used on unmanned Mars probes are also treated.

M. G.

**A69-11771**

NON-EXISTENCE OF A BIOTA-CLOUD RECONTAMINATION HAZARD FOR A PLANETARY LANDER.

J. Friedrich Vandrey (Martin Marietta Corp., Research Institute for Advanced Study, Baltimore, Md.).

IN: SPACE PROJECTIONS FROM THE ROCKY MOUNTAIN REGION; PROCEEDINGS OF THE SYMPOSIUM, DENVER, COLO., JULY 15, 16, 1968. VOLUME 3. [A69-11755 02-11]

**A69-11772**

Symposium sponsored by the American Astronautical Society and the American Institute of Aeronautics and Astronautics. Tarzana, Calif., American Astronautical Society, 1968. 13 p. 5 refs.

Using a spacecraft of the Voyager class as an example, it is shown by an order-of-magnitude analysis of the interactions between small particles and the physical fields around the vehicle that the "Biota-Cloud" hypothesis is unfounded since dissipative thermal radiation pressures and electrostatic forces are considerably greater than the spacecraft gravity which alone could contain the cloud. A corollary is that a suitably designed spacecraft can have no unacceptable recontamination hazard from any cause while in its normal flight attitude with the solar panels facing the sun. More study is needed for the hazards during maneuvers. They are very probably well below acceptable limits, but have not yet been conclusively shown to be so. (Author)

**A69-11772 \***

DETERMINATION OF THE TERMINAL STERILIZATION CYCLE FOR A POSSIBLE MARS CAPSULE.

Alan R. Hoffman (California Institute of Technology, Jet Propulsion Laboratory, Environmental Requirements Section, Sterilization Group, Pasadena, Calif.).

IN: SPACE PROJECTIONS FROM THE ROCKY MOUNTAIN REGION; PROCEEDINGS OF THE SYMPOSIUM. DENVER, COLO., JULY 15, 16, 1968. VOLUME 3. [A69-11755 02-11]

Symposium sponsored by the American Astronautical Society and the American Institute of Aeronautics and Astronautics. Tarzana, Calif., American Astronautical Society, 1968. 30 p. 9 refs.

A dry-heat thermal sterilization process has been applied to a feasibility model of a Mars capsule. The objective of the sterilization test was to subject the feasibility model to a terminal sterilization environment that had been determined to be sufficient to achieve the appropriate probability of sterility required by the planetary quarantine constraints. First, a thermal analytical model of the capsule was constructed. Then, microbiological assays were performed during assembly to estimate the microbial burden on the capsule surfaces. With these data, a sterilization cycle was determined. The technique, philosophy, and logic that were used in calculating the process times are discussed. A technique for altering the sterilization cycle to reflect conditions and thermal responses that exist after the processing had begun is demonstrated. (Author)

**A69-11773**

NEW FAST TECHNIQUES FOR BIO-ASSAY.

Lothar L. Salomon and Mortimer A. Rothenberg (Dugway Proving Ground, Dugway, Utah).

IN: SPACE PROJECTIONS FROM THE ROCKY MOUNTAIN REGION; PROCEEDINGS OF THE SYMPOSIUM, DENVER, COLO., JULY 15, 16, 1968. VOLUME 3. [A69-11755 02-11]

Symposium sponsored by the American Astronautical Society and the American Institute of Aeronautics and Astronautics. Tarzana, Calif., American Astronautical Society, 1968. 19 p.

Description of automatic devices for counting bacterial colonies on Petri dishes. Each counter consists of two separate cabinets, the culture plate scanner and the data processor. The flying spot scanner and its associated scan-raster chassis, high-voltage cathode-ray tube supply, optical system, and photomultiplier tube system are housed in one cabinet. The logic system, printer, cathode-ray oscilloscope video monitor and display system are in a second cabinet. The automatic bacterial colony counters perform the following functions in automatically programmed sequential order: (1) index the Petri dish to the scanning station, (2) scan, display, and print the relative area of the colonies on the Petri dish, (3) scan, display, and print the bacterial colony count for either one scan or ten scans, and (4) print a preselected eight-digit identification code consisting of as many lines as chosen by the operator. A method for assaying staphylococcal enterotoxin B by latex-bead agglutination is also presented. M. G.

**A69-11774**

BIOLOGICAL MONITORING OF A FULL SCALE SIMULATED MARS LANDER.

Arnold A. Rothstein (Martin Marietta Corp., Denver, Colo.) and Harry Kaufman (Highland Laboratories, Costa Mesa, Calif.). IN: SPACE PROJECTIONS FROM THE ROCKY MOUNTAIN REGION; PROCEEDINGS OF THE SYMPOSIUM, DENVER, COLO., JULY 15, 16, 1968. VOLUME 3. [A69-11755 02-11]

Symposium sponsored by the American Astronautical Society and the American Institute of Aeronautics and Astronautics. Tarzana, Calif., American Astronautical Society, 1968. 14 p.

Description of biological monitoring on the Technological Feasibility Spacecraft (TFS), a full-scale, semifunctional Voyager-class planetary landing capsule designed, fabricated, and tested to evaluate the thermal control techniques most likely to be used on such a spacecraft. The complete program of biological assay performed on the TFS in accordance with NASA standard procedures is reviewed. The purpose of this program was to gain experience in performing biological monitoring during assembly of a large spacecraft, to evaluate alternate methods of biological sampling, to identify problems, and to determine the impact of worst-case assembly environment on the total microbiological burden on TFS, prior to sterilization. M. G.

**A69-11821 \***

MATHEMATICAL AND ELECTRICAL MODELS OF AUDITORY DETECTION.

Lloyd A. Jeffress (Texas, University, Defense Research Laboratory and Dept. of Psychology, Austin, Tex.).

Acoustical Society of America, Journal, vol. 44, July 1968, p. 187-203. 27 refs.

NASA Contracts No. R-129; No. R-09-030-017.

McGill's (1968) generalization of Marill's (1956) formula for the probability of a correct response in a two-alternative, forced-choice experiment is obtained from a special case of the noncentral chi-square distribution. The present paper shows that a special case of the noncentral chi distribution is more appropriate than the noncentral chi square for monaural detection of a tonal signal in a continuous background of Gaussian noise. The special noncentral chi function fits distributions obtained from an electrical model, and yields psychometric functions appropriate both to it and to human observers. Estimates of bandwidth and of integration time derived from the distribution functions lie within the range of values often assumed from human subjects. (Author)

**A69-11827 #**

RESEARCH ON PSYCHOMOTOR BEHAVIOR UNDER SPACE-FLIGHT CONDITIONS [RECHERCHES SUR LE COMPORTEMENT PSYCHOMOTEUR DANS LES CONDITIONS DE VOLS SPATIAUX].

Robert Grandpierre (Bordeaux, Université, Faculté de Médecine, Talence, Gironde, France; Ecole Pratique des Hautes Etudes, Laboratoire de Biologie Aérospatiale, Paris, France).

Sciences et Industries Spatiales, vol. 4, no. 7-8, 1968, p. 17-23. In French.

Research supported by the Centre National d'Etudes Spatiales.

Study of various physiological processes occurring in voluntary movements of animals during ballistic flight in rockets or aircraft for short periods of time (processes varying from less than a minute to 15 minutes). Various biological parameters were recorded and transmitted to the ground: brain activity, the activity of certain nerves and muscles, respiration, electrocardiograms, etc. Certain animals were trained to execute coordinated and precise movements in response to a light signal. Their general behavior was recorded on film. The conclusion is reached that in the weightless condition of space flight, "behavioral" vigilance is profoundly affected, sometimes even to the point of inhibiting any voluntary movement. P. v. T.

**A69-11828 #**

BIOLOGICAL EXPERIMENTS IN INTERPLANETARY SPACE [BIOLOGISCHE EXPERIMENTE IM INTERPLANETAREN RAUM].

Robert Lotz (Frankfurt, Universität, Forschungsgruppe für extraterrestrische Biologie, Frankfurt am Main, West Germany). Sciences et Industries Spatiales, vol. 4, no. 7-8, 1968, p. 25-34. 9 refs. In German.

Research supported by the Bundesministerium für Wissenschaftliche Forschung.

Development of an original "life-support system," an "automatic bioprobe," which, with a weight of about 3 kg and a current intake of some 3 W, satisfies the prerequisites for a long-term experiment in interplanetary space. A decisive factor was the selection of the animal to be used in this experiment. The *Hirudo medicinalis*, the blood leech, was chosen. This creature sucks in as much as 10 ml of mammalian blood, and with this supply of nourishment can live for a whole year without becoming hungry. Moreover, it is highly suitable for the research problem in question. P. v. T.

**A69-11865**

A NEUTRAL BUOYANCY MICRO-ELECTRODE FOR PROLONGED RECORDING FROM SINGLE NERVE UNITS.

Torquato Gualtierotti and Pearl Bailey (NASA, Ames Research Center, Instrumentation Div., Neurobiology Branch, Moffett Field, Calif.).

Electroencephalography and Clinical Neurophysiology, vol. 25, 1968, p. 77-81. 7 refs.

Description of a new electrode which allows continuous recording from single neurones or nerve fibers for an extended period of time. It also allows recording during gross movement and high acceleration and vibration. The basic principle of such an electrode is that its density equals that of the surrounding tissue. Moreover, to avoid standing oscillations, the electrode is counterbalanced against torque momentum and is floating. A miniaturized voltage-follower to be used with the microelectrode is also described. M. M.

**A69-11866 \***

CHARACTERIZATION OF RIBULOSE DIPHOSPHATE CARBOXYLASE AND PHOSPHORIBULOKINASE FROM *THIOBACILLUS THIOPARUS* AND *THIOBACILLUS NEAPOLITANUS*.

R. D. MacElroy, E. J. Johnson, and M. K. Johnson (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).

Archives of Biochemistry and Biophysics, vol. 127, Sept. 1968, p. 310-316. 24 refs.

Investigation of two enzymes involved in the fixation of CO<sub>2</sub> by the chemosynthetic autotrophs *Thiobacillus thioparus* and *Thiobacillus neapolitanus*. Both of these enzymes, ATP:D-ribulose-5-phosphate 1-phosphotransferase (phosphoribulokinase) and D-ribulose-1,5-diphosphate carboxylase (ribulose diphosphate carboxylase) appear to sediment at identical rates in sucrose density gradients and to have similar characteristics during gel filtration. In addition to the major peak of ribulose diphosphate carboxylase activity observed in sucrose density gradients, an additional lighter peak of activity, suggestive of a subunit, has been observed. The relationship of these enzymes to those found in Fraction I protein of plant tissue is discussed, and it is suggested that both enzymes from the chemo-autotrophs may be part of the same moiety. M. M.

**A69-11885 \***

THE EFFECT OF IN VITRO AND IN VIVO CAFFEINE, THEOPHYLLINE, AND HYDROCORTISONE ON THE PHOSPHODIESTERASE ACTIVITY OF THE PITUITARY, MEDIAN EMINENCE, HEART, AND CEREBRAL CORTEX OF THE RAT.

Joan Vernikos-Danellis and Clifton G. Harris, III (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.).

Society for Experimental Biology and Medicine, Proceedings, vol. 128, 1968, p. 1016-1021. 20 refs.

Description of a study which was undertaken to substantiate the thesis that the potentiation of the stress-induced secretion of ACTH by the methyl xanthenes is due to their ability to inhibit the 3',5'-cyclic nucleotide phosphodiesterase. The effect of various drugs on the phosphodiesterase activity of the anterior pituitary, median eminence, brain cortex, and heart of rats was determined both in vitro and in vivo. The incubation of homogenates with caffeine and theophylline markedly reduced the phosphodiesterase activity in all tissues studied except the heart, which showed a significant reduction only in the presence of theophylline. In contrast, pre-treating the animals with a single dose of caffeine of theophylline reduced the enzyme activity of the anterior pituitary only, and caffeine was more effective than theophylline. Adrenalectomy,

chronic or acute administration of hydrocortisone, or incubation of tissue homogenates with hydrocortisone or dexamethasone did not alter the phosphodiesterase activity of the tissues studied. It is concluded that the effects of caffeine and theophylline on the pituitary stress response could be attributed to their inhibition of the phosphodiesterase activity in that tissue. M. M.

**A69-11909**

SPACE BIOLOGY [LA BIOLOGIE SPATIALE].

F. Violette.

IN: THE FRENCH SPACE EFFORT [L'EFFORT SPATIAL FRANÇAIS].

Paris, Information Propagandes Françaises Editeurs, 1968, p. 77-83. In French.

Review of the results of French research in space biology. Both applied and basic research are currently being carried out in space biology. Applied research consists essentially in placing a man in space with more and more favorable environmental conditions. Basic research attempts to approach the deep-space biology problems, which are far from being solved. Details concerning rocket and balloon studies of the influence of weightlessness on mammalian central nervous systems are presented, as well as the results of studies of the biological action of cosmic radiation in which heavy ions are involved. The considerable French contribution to space biology is emphasized. Z. W.

**A69-11923**

LIQUID FLUIDICS CONTROLS FLIGHT SUIT TEMPERATURE.

Edward G. Zoerb (Honeywell, Inc., Systems and Research Div., Military Products Group, St. Paul, Minn.).

Hydraulics and Pneumatics, vol. 21, Nov. 1968, p. 111-115.

Description of a flight suit in which two proportional liquid fluidic amplifiers are combined into a controller which modulates coolant temperature (not flow rate) to control flight suit temperature. Three main requirements have been met with a fluidic system automatically controlling skin temperature directly: (1) simplicity with minimum attention and adjustment needed; (2) rapid response with minimum control lag; and (3) high equipment reliability - with a minimum of moving parts, signal transducing, and interface points. The cooling system undergarment was placed on a human subject and covered with an outer thermal layer. After adjusting to the 88°F skin temperature, the subject started exercising to raise his skin temperature. During an exercise period of 15 min the skin temperature was regulated at 89°F. Throughout this period, and particularly at the time of peak exercise, the subject expressed a favorable reaction to the flight suit. P. v. T.

**A69-11950 \***

MEASUREMENT OF PILOT DESCRIBING FUNCTIONS FROM FLIGHT TEST DATA WITH AN EXAMPLE FROM GEMINI X. Rodney C. Wingrove and Frederick G. Edwards (NASA, Ames Research Center, Moffett Field, Calif.).

(NASA, Annual University Conference on Manual Control Systems, 4th, University of Michigan, Ann Arbor, Mich., Mar. 25, 1968.) IEEE Transactions on Man-Machine Systems, vol. MMS-9, Sept. 1968, p. 49-55. 11 refs.

Theoretical analysis of a technique for reducing the error in identifying the pilot-describing function from routine flight-test records due to the fact that the pilot's output noise is correlated with the input error signal. The error can be reduced in the computer processing by shifting the input signal by an amount equivalent to the pilot's time delay. This technique for reducing the identification error is analyzed with theory and is demonstrated with the identification of a simulated pilot model. The technique is applied to flight-test records obtained from the retrofire phase of the Gemini X mission. M. M.

**A69-11951 \***

MANUAL CONTROL USING THE MATCHED MANIPULATOR CONTROL TECHNIQUE.

James H. Herzog (Oregon State University, Dept. of Electrical Engineering, Corvallis, Ore.).

## A69-11952

IEEE Transactions on Man-Machine Systems, vol. MMS-9, Sept. 1968, p. 56-60. 7 refs.  
Contract No. NASr-54(06).

A manual control technique is described in which the force and position cues experienced by the operator from his control stick provide information relevant to the control problem. By constructing the operator's control stick in the form of a mechanical analog of the system being controlled, the apparent complexity of the control task is decreased and control performance is improved. Experimental results are included that compare performance of an operator controlling a second order system in a compensatory control task using both conventional control methods and the matched manipulator technique. (Author)

## A69-11952 \*

A NEUROMUSCULAR ACTUATION SYSTEM MODEL.  
Duane T. McRuer, Raymond E. Magdaleno (Systems Technology, Inc., Hawthorne, Calif.), and George P. Moore (Southern California, University, Dept. of Electrical Engineering and Physiology, Los Angeles, Calif.).

IEEE Transactions on Man-Machine Systems, vol. MMS-9, Sept. 1968, p. 61-71. 25 refs.  
Contracts No. NAS 2-2824; No. AF 33(657)-10835.

Description of a simple neuromuscular actuation system model that is compatible with the available physiological data and provides insight into the overall human-control structure. The physiological data of interest include recent anatomical and physiological data for the muscle spindle and input-output studies of the muscle. These data indicate that simple linear models can describe the basic behavior of these two elements in tracking tasks. Two key developments are treated: (1) the variation in system parameters as a function of average muscle tension or operating point; and (2) the role of the muscle spindle both as an equalization element and in its effects on muscle tone or average tension. The phase lag of the closed-loop describing function of the neuromuscular system exhibits a variation with average muscle tension that is strikingly similar to that observed for the overall human operator in complex tracking tasks. The pertinent human-operator describing-function data include the covariation of high- and low-frequency phase data and the variation of hf phase with set tension changes interpreted from force-disturbance experiments. M.M.

## A69-11953 \*

INSTANT MODULAR 3-D MOCKUP FOR CONFIGURING CONTROL AND DISPLAY EQUIPMENT.

Charles C. Kubokawa (NASA, Ames Research Center, Moffett Field, Calif.).

IEEE Transactions on Man-Machine Systems, vol. MMS-9, Sept. 1968, p. 72-81. 18 refs.

A modular three-dimensional mockup technique was developed as a method for economizing and facilitating the design of control and display equipment. The integral parts of the mockup include modular easy-to-assemble console bays and panels, simulated magnetic backed three-dimensional controls and displays of actual size, various writing shelf configurations, fast assembly clamps, storage cabinet with casters, and a Polaroid camera. Human engineering constraints were designed into the mockup parts - i.e., optimum reach, height, view, and control limits - so that the designers could not deviate from human engineering inputs, facilitating optimum operating conditions. (Author)

## A69-11954 \*

A QUEUEING MODEL OF VISUAL SAMPLING EXPERIMENTAL VALIDATION.

Jaime R. Carbonell (Bolt, Beranek and Newman, Inc.; Massachusetts Institute of Technology, Cambridge, Mass.) Jane L. Ward (Bolt, Beranek and Newman, Inc., Cambridge, Mass.), and John W. Senders (Bolt, Beranek and Newman, Inc., Cambridge; Brandeis University, Waltham, Mass.).

IEEE Transactions on Man-Machine Systems, vol. MMS-9, Sept. 1968, p. 82-87.  
Contract No. NAS 1-5059.

Description of the results of a validation study of an economic model of a pilot's visual sampling behavior. This model was recently proposed by Carbonell (1966) and is based on queueing theory. The validation was based on instrument data and eye-movement data taken during mission flights using a Link trainer. The results of the simulation using the queueing model are shown to correlate well with eye-movement data. Characteristics of the model and results of the validation study are described, and suggestions for further work are discussed. M.M.

## A69-11982 #

CHANGES IN THE ACTIVITY OF LACTODEHYDROGENASE AND ITS ISOENZYMES IN THE BLOOD AND TISSUES OF RATS AS A RESULT OF TRAINING TO HYPOXIA [IZMENENIE AKTIVNOSTI LAKTATDEGIDROGENAZY I EE IZOFRMENTOV V KROVI I TKANIAXH KRYV V REZUL'TATE TRENIROVKI K GIPOKSII].  
I. M. Markelov and L. N. Simanovskii (Voenno-Meditsinskaya Akademiia; Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimi, Leningrad, USSR).  
Akademiia Nauk SSSR, Doklady, vol. 182, Oct. 1, 1968, p. 982-984. 20 refs. In Russian.

Study of the changes in the lactodehydrogenase (LDG) activity and in the ratio of the LDG isoenzymes of 34 white rats subjected to prolonged hypoxia at simulated heights ranging from 2500 to 7600 m. The LDG activity and the ratio of its isoenzymes were studied in the blood plasma, erythrocytes, brain, liver, spleen, and kidneys. The animals were examined on the tenth, twentieth, and thirtieth days of exposure to hypoxia. Changes are shown to differ in different tissues and to progress at various rates. This is associated with the functional features of the various tissues. Long-term exposure (adaptation) leads to changes which may be interpreted as compensatory changes associated with decreased oxygen pressure. T.M.

## A69-12120 #

BASIC PROBLEMS IN THE STUDY OF WEIGHTLESSNESS [OSNOVNYE VOPROSY IZUCHENIIA NEVESOMOSTI].

V. I. Izdovskii, I. I. Kas'ian, and V. I. Kopanev.

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

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

Moscow, Izdatel'stvo Meditsina, 1968, p. 34-51. 108 refs. In Russian.

Review article summarizing the results of Soviet and foreign research concerning the effects of complete or partial weightlessness on man, with particular reference to results obtained during Soviet and U.S. manned space flights. A discussion of the observed sensor motor, and sympathetic changes in the human organism shows that sensory manifestations vary greatly from case to case, and that reactions to weightlessness range from exhilaration to nausea. Sensory reactions to weightlessness are caused mainly by altered afferentation from the receptor zones of proprioceptive, vestibular, cutaneous, and other analyzers. It is shown that animals lag substantially behind man in their ability to adapt themselves rapidly to space flight conditions. Improved space vehicle design and creation of artificial gravitation are seen to be promising ways of minimizing the effects of weightlessness. V.P.

## A69-12121 #

CLINICAL ASPECTS OF INTERPLANETARY FLIGHTS [KLINICHESKIE ASPEKTY MEZHPLANETNYKH POLETOV].

V. V. Parin, E. B. Zakrzhevskii, and R. M. Baevskii.

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

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

Moscow, Izdatel'stvo Meditsina, 1968, p. 25-28. In Russian.

Discussion of some clinical problems peculiar to interplanetary flights due to living conditions, space-flight factors, and endogenous hazards. In view of the many medical problems which can arise during such flights, a complex mathematical analysis must be conducted to determine the probabilities of the appearance of all possible medical situations. To simplify matters, a diagnostic approach based on syndromes rather than specific diseases is suggested, and the need for diagnostic algorithms is stressed. The

diagnostic capabilities of the physician on board the spacecraft must be enhanced by automated medical equipment and by special tables and instructions. The need for automation is demonstrated not only in diagnosis but in treatment as well. T.M.

**A69-12122 #**

MOTION SICKNESS AS A PROBLEM OF SPACE MEDICINE [UKACHIVANIE KAK PROBLEMA KOSMICHESKOI MEDITSINY].

G. L. Komendantov and V. I. Kopanov.

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

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

Moscow, Izdatel'stvo Meditsina, 1968, p. 331-338. 77 refs. In Russian.

Discussion of the physiological causes of motion sickness during space flight and evaluation of methods for preventing this condition in astronauts. Attention is given to the effects caused by conditioned-reflex mechanisms, disturbances in the interaction of different analysors, and vestibular-vegetative changes during weightlessness. Differences between the motion sickness encountered on earth and that occurring during space flight are outlined. Adaptation to weightlessness is interpreted in terms of the formation of new functional interrelationships between different analysors. Several approaches are suggested for preventing the occurrence of motion sickness in astronauts. T.M.

**A69-12123 #**

WORK ACTIVITY OF A COSMONAUT DURING WEIGHTLESSNESS AND IN UNSUPPORTED SPACE [RABOCHAIA DEIATEL'NOST' KOSMONAVTA V NEVESOMOSTI I BEZOPORNOM PROSTRANSTVE].

E. A. Ivanov, V. A. Popov, and L. S. Khachaturskants.

IN: MEDICO-BIOLOGICAL STUDIES OF WEIGHTLESSNESS

[MEDIKO-BIOLOGICHESKIE ISSLEDOVANIYA V NEVESOMOSTI].

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

Moscow, Izdatel'stvo Meditsina, 1968, p. 410-439. 30 refs. In Russian.

Results of an analysis of the performance, space orientation, and motor activity of the Voskhod 1 and 2 crew members, and of cosmonaut Leonov, in particular, during extravehicular activity. It is indicated that task performance required more time during the early stage of the space flight than on the ground or in the later stages of the flight, and that various psychophysiological irregularities were apparent in the activity of Leonov and Beliaev at the flight controls. On the other hand, the stress caused by orientation and motor activity did not substantially affect Leonov's other activities during the space walk. An impaired functioning of the visual analysors (a reduction of up to 44% in certain cases) is noted. V. Z.

**A69-12212 #**

THE EFFECT OF THE OPERATOR'S HANDEDNESS ON SOME DIRECTIONAL STEREOTYPES IN CONTROL-DISPLAY RELATIONSHIPS.

Alphonse Chapanis and Bernard A. Gropper (Johns Hopkins University, Dept. of Psychology, Baltimore, Md.).

Human Factors, vol. 10, Aug. 1968, p. 303-319. 11 refs.

Contract No. Nonr-4010(03).

Experimental study of some common control-display movement stereotypes to find out if these stereotypes are equally valid for left- and right-handed subjects. The apparatus used presented a scale that could be oriented horizontally or vertically. Records were made of (1) the direction of the first movement made by the subject on each trial; (2) the total number of reversal movements made on each setting; (3) the time taken to make a setting; and (4) the actual setting made. Sixty-four subjects were tested (32 left-handed and 32 right-handed) each using his preferred and nonpreferred hands. Significant differences were found in the time to make settings, the number of reversal movements, and errors in initial direction of movement as functions of handedness and the various apparatus relationships. In addition to overall differences between the performance of the left- and right-handed subjects, the two groups behaved differently on some measures when using their preferred and nonpreferred hands. P.v.T.

**A69-12213**

AIRBORNE DISPLAYS FOR FLIGHT AND NAVIGATION.

Stanley N. Roscoe (Hughes Aircraft Co., Display Systems Dept., Culver City, Calif.).

Human Factors, vol. 10, Aug. 1968, p. 321-332. 8 refs.

Investigation of certain types of airborne displays, specifically those used in navigating and flying aircraft. The concept of the hierarchical nature of the aircrew's tasks provides the rationale for the logical grouping of information into a relatively small number of integrated displays. The basic notion of display integration requires that related information is presented in a common reference system which allows the relationships among the items to be perceived directly. Besides the principle of display integration, the principles of (1) pictorial realism, (2) the moving part, (3) pursuit tracking, (4) frequency separation, and (5) optimum scaling are discussed. It is believed that pilot performance in the navigation and control of aircraft would be vastly improved if cockpit displays were designed in accordance with these principles. P.v.T.

**A69-12214**

COMPONENT-TOTAL TASK RELATIONSHIPS - SIMPLE AND SEQUENTIAL PRACTICE EFFECTS.

Albert Zavala and Arlene M. Geist (American Institutes for Research, Washington, D.C.).

Human Factors, vol. 10, Aug. 1968, p. 333-343. 11 refs.

Contract No. DA-49-193-MD-2632.

Examination of simple and sequential practice effects on component-total task relations with the aid of the Complex Coordinator described by Melton (1947). Part tasks were three single-level tasks, and three double-level tasks. Of 126 paid male volunteers, 63 practiced first on a part task and then on the total task; 63 practiced in the reverse sequence. All groups improved across trials and across sessions, regardless of the task practiced first. However, the single-level rudder task facilitated total practice most. Practice on the most difficult among single and double level tasks, respectively, led to the best total task performance. P.v.T.

**A69-12215**

ASSESSMENT OF THE FIDELITY OF DYNAMIC FLIGHT SIMULATORS.

Samuel Mudd (Hughes Aircraft Co., Culver City, Calif.; Gettysburg College, Gettysburg, Pa.).

Human Factors, vol. 10, Aug. 1968, p. 351-358. 9 refs.

The evaluation of dynamic flight simulators is considered from the standpoint of the efficiency and validity of the currently used pilot evaluations and assessment techniques. A set of requirements for an ideal fidelity measurement technique is presented, followed by a comparison of the two general approaches to fidelity measurement, the analytic and the empirical, with reference to those requirements. A hybrid method which involves the use of pilot psychomotor responses rather than verbal responses is introduced. This technique retains the subjective characteristic of rating scales, but provides information of an analytic nature that is more amenable to engineering analyses. Problems involved in the development of the technique are considered. (Author)

**A69-12216 \***

THE EFFECT OF BREATHING 100% OXYGEN ON FOVEAL THRESHOLDS.

Mary M. Connors (NASA, Ames Research Center, Moffett Field, Calif.).

Human Factors, vol. 10, Aug. 1968, p. 377-384. 18 refs.

This study examined the effects of breathing 100% oxygen at sea level on the luminance thresholds necessary for perception of red (642 nm), green (521 nm), blue (468 nm), and yellow (584 nm), and the chromatic and absolute thresholds associated with these dominant wavelengths. Using two highly trained observers, thresholds were measured for one target size and exposure duration by the method of constant stimuli. For the foveal thresholds investigated, no differences were found between the condition of breathing 100% oxygen and breathing normal room air at sea level. There is at least some physiological basis for thinking that vision may improve in a high oxygen environment. At the other extreme, breathing

## A69-12217

high concentrations of oxygen under pressure is known to degrade vision. Evidence relating to the visual effects of high oxygen concentrations is evaluated and conclusions are drawn with reference to the findings of this and other studies. (Author)

## A69-12217

### LUNAR GRAVITY SIMULATION AND ITS EFFECT ON HUMAN PERFORMANCE.

R. J. Shavelson (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Sunnyvale, Calif.).

Human Factors, vol. 10, Aug. 1968, p. 393-401. 24 refs.

Survey of research made on human performance using a variety of lunar-gravity simulators. It is concluded that the existing simulators do not represent a high fidelity simulation of 1/6 g, and a validation study of the various simulators is needed. Man will be capable of self-locomotion in lunar gravity, and man's metabolic rate will be lower in 1/6 g during self-locomotion. The method of performing common earth tasks when in 1/6 g will be changed; psychomotor task decrement in 1/6 g will be observed. Future research should direct itself toward a higher fidelity simulation of the total lunar ecology for study of mission-specific tasks. P. v. T.

## A69-12218

### VISUAL DETECTION PROBABILITY OF "SONAR" TARGETS AS A FUNCTION OF RETINAL POSITION AND BRIGHTNESS CONTRAST.

Leroy L. Vallerie and James M. Link (Dunlap and Associates, Inc., Darien, Conn.).

Human Factors, vol. 10, Aug. 1968, p. 403-411. 8 refs.

A study was carried out in the laboratory to determine the detectability of visual sonar targets as a function of retinal position and brightness contrast using a simulated sonar scope. Nine different retinal positions were investigated under photopic conditions of illumination. The target was approximately square and subtended 24' visually on a side. Average peak intensity of the sweep, which formed the target background, was 9.12 FL. The results of the study were presented in terms of probability of detection curves. Equations were developed for determining the probability of detection given the target's normalized brightness intensity, expressed in  $\log \Delta/I$ , and its angular distance from the point of fixation. (Author)

## A69-12219

### THE PRIME TECHNICAL INFORMATION SOURCE - THE LOCAL WORK ENVIRONMENT.

J. D. Hodges, Jr. (North American Rockwell Corp., Autonetics Div., El Segundo, Calif.) and B. W. Angalet (McDonnell Douglas Corp., Douglas Aircraft Co., Aircraft Div., Santa Monica, Calif.).

Human Factors, vol. 10, Aug. 1968, p. 425-429. DOD-sponsored research.

Assessment of the DOD user-need study concerning the flow of scientific and technical information within the defense industry. The major study conclusion is that the local work environment is an important and necessary source of scientific and technical information. The current trend, however, is toward greater reliance on this information source; certain aspects of the informal and formal information system experience seem to be reinforcing the local, informal system utilization and lessening the use of formal systems. The understanding of the needs of the user and an organized effort by the formal system to respond to these needs is the course that must be followed if the technical information system and its personnel are to fill a more meaningful position within the scientific and technical information flow process. P. v. T.

## A69-12220

### HUMAN FACTORS EVALUATION OF A COMPUTER BASED INFORMATION STORAGE AND RETRIEVAL SYSTEM.

Gerald V. Barrett, Carl L. Thornton, and Patrick A. Cabe (Good-year Aerospace Corp., Akron, Ohio).

Human Factors, vol. 10, Aug. 1968, p. 431-436. 5 refs.

The human factors aspects of a computer-based information storage and retrieval system were evaluated in three government

intelligence services using questionnaire and interview techniques. It was found that many factors entered into satisfaction with the information system, including familiarity, ease of use, and importance. Other relevant factors included training in the use of the system, amount and type of information to meet needs in the system and tolerances of individuals for irrelevant material in the output of searches. The interaction of these factors is discussed in relation to satisfaction with the system. (Author)

## A69-12479 \*

### DIFFUSION COEFFICIENTS FOR OXYGEN TRANSPORT IN WHOLE BLOOD.

Daniel Hershey (Cincinnati, University, Cincinnati, Ohio) and Terry Karhan (Union Carbide Corp., Bound Brook, N. J.).

AIChE Journal, vol. 14, Nov. 1968, p. 969-972. 27 refs.

NIH Grant No. HE-08781; Grant No. NGR-36-004-014.

Analysis of experiments to determine the rate of oxygen uptake by the blood. Using previous diffusion studies as a point of departure, the diffusion coefficient for oxygen in whole blood (without chemical reaction) is determined. The effect of the concentration of intact red cells (hematocrit) upon this coefficient is observed. The experiments were designed to follow the unsteady-state diffusion of oxygen into a layer of whole blood (unhemolyzed). By using the appropriate boundary conditions to the diffusion equation, a solution was obtained which could be used with experimental data to obtain diffusion coefficients. B. H.

## A69-12496

### RETINAL BURNS FROM INTENSE LIGHT SOURCES.

C. J. Bartleson (Eastman Kodak Co., Research Laboratories, Rochester, N. Y.).

American Industrial Hygiene Association Journal, vol. 29, Sept.-Oct. 1968, p. 415-424. 13 refs.

Examination of the nature of eye injuries caused by radiant energy. Four experimental studies dealing quantitatively with the problem of thermal lesions of the retina as a function of irradiation rate, exposure time and image size, utilizing the eyes of Chinchilla gray or brown rabbits are reviewed, and a method of computing retinal irradiance is discussed. The data are considered applicable to the human eye. The need for additional data for moderately intense heat sources is emphasized. B. H.

## A69-12497

### THE EVALUATION OF LASER HAZARDS.

David H. Sliney and William A. Palmisano (U.S. Army Environmental Hygiene Agency, Edgewood Arsenal, Md.).

American Industrial Hygiene Association Journal, vol. 29, Sept.-Oct. 1968, p. 425-431. 9 refs.

Account of a program of hazard evaluation and control conducted at a number of facilities where lasers are used. The principle hazards of laser radiation to the eye due to either direct or reflected viewing are discussed. Criteria are given for determining the hazards of a given laser by evaluating the effects of the laser output characteristics (power or energy output, wavelength, emergent beam diameter, and divergence), and the effects of various environmental factors (output or laboratory setting, ambient lighting, etc.). Methods for measuring or calculating the light intensity at a given point are also described. B. H.

## A69-12498 \*

### PROTECTION AGAINST TOXIC ROCKET FUELS.

Wallace B. Frierson (SysteMed Corp.; NASA, Marshall Space Flight Center, Medical Center, Huntsville, Ala.).

American Industrial Hygiene Association Journal, vol. 29, Sept.-Oct. 1968, p. 456-460.

Description of a detailed treatment procedure for acute exposures to toxic rocket fuels or oxidizers. Other aspects of a preventive program are outlined. These cover construction of the facility, preparation and use of operating procedures, environmental health surveys, and inspections and monitoring of exposed employees. Among the toxic chemicals considered are UDMH, Aerozine 50, N<sub>2</sub>O<sub>4</sub>, fluorine derivatives, and the boranes. B. H.

**A69-12601 \*****A RAPID AND SIMPLE METHOD FOR THE FABRICATION OF ARRAYS OF RECORDING ELECTRODES.**

G. R. Hanna and R. N. Johnson (Virginia, University, School of Medicine, Dept. of Neurology and Dept. of Biomedical Engineering, Charlottesville, Va.).

Electroencephalography and Clinical Neurophysiology, vol. 25, 1968, p. 284-286.

Vocational Rehabilitation Administration Grant No. RD 1870-M; PHS Grant No. 1-F3-GM-35; Grants No. NsG-682; No. NGL-47-005-014.

Description of a method using the recent technological development of flexible printed circuitry for the fabrication of a multiple-electrode array to record surface cortical potentials in experimental animals. A specialized knowledge of photographic processing or electronic circuitry is not required, nor is any special equipment necessary, other than the simplest photographic aids. B.H.

**A69-12602 \*****THE DISSIPATION AND DISPERSION OF SMALL WAVES IN ARTERIES AND VEINS WITH VISCOELASTIC WALL PROPERTIES.**

James A. Maxwell and Max Anliker (Stanford University, Dept. of Aeronautics and Astronautics, Stanford, Calif.).

Biophysical Journal, vol. 8, no. 8, 1968, p. 920-950, 17 refs.

NSF Grant No. GK-47; Contract No. DA-31-124-ARO(D)-223; Grant No. NGR-05-020-223.

Theoretical and experimental evidence suggests that the dissipation of high-frequency pressure waves in blood vessels is caused primarily by the viscoelastic behavior of the vessel wall. In this theoretical analysis, the vessels are considered as fluid-filled circular cylindrical shells whose walls have isotropic and homogeneous viscoelastic properties and are subjected to an initial axial stretch and a transmural pressure. If the wall material is incompressible and behaves as a Voigt solid in shear, the results predict a decrease in wave amplitude per wavelength which is essentially independent of frequency over a wide range. This finding is in qualitative agreement with recent experiments on anesthetized dogs. A parametric study also shows a great sensitivity of the dissipation to changes in transmural pressure and axial stretch. Axisymmetric waves are only mildly dispersive, while all nonaxisymmetric waves are highly dispersive and exhibit much stronger damping per wavelength at low frequencies than do axisymmetric waves. (Author)

**A69-12722 \*****PHARMACOLOGIC TOOLS IN AUTONOMIC NERVOUS SYSTEM RESEARCH.**

Richard J. Wurtman and Michael J. Zigmond (Massachusetts Institute of Technology, Dept. of Nutrition and Food Science, Cambridge, Mass.).

Anesthesiology, vol. 29, July-Aug. 1968, p. 714-723, 72 refs.

PHS Grants No. AM-11237; No. AM-11709; Grant No. NGR-22-009-272.

Discussion of stages in the biosynthesis, storage, release, and inactivation of norepinephrine, a substance released from the sympathetic nerve endings of mammals in response to certain drugs. Extensive bibliography concerning these topics is reviewed. V.Z.

**A69-12724 \*****PATTERN PERCEPTION - INTEGRATING INFORMATION PRESENTED IN TWO MODALITIES.**

Stephen Handel and Louis Buffardi (Kansas State University of Agriculture and Applied Science, Dept. of Psychology, Manhattan, Kan.).

Science, vol. 162, Nov. 29, 1968, p. 1026-1028, 7 refs.

NIH Grant No. MH-08359; Grant No. NsG-692.

Description of an experiment in which subjects were required to organize and identify temporal patterns presented in two modalities. These patterns were composed of either: (1) two stimuli in one modality, (2) two stimuli in each of two modalities, with the pattern alternately presented in the two modalities, or (3) one stimulus in each of two modalities. Patterns 1 and 3 are organized

as structural patterns, but pattern 2 is organized by modality, not by pattern structure. The stimuli within the modalities consist of a sequence of dichotomous elements generated by a repeating pattern of eight dichotomous elements. It is shown that differences in the rate of identification of patterns are determined by the modality or pair of modalities used to present the pattern. The rate of identification of patterns presented in pairs of modalities is not necessarily slower than identification of patterns presented in one modality. M.G.

**A69-12766****HUMAN REACTION TO AIRCRAFT ENGINE NOISE.**

J. W. Little and J. E. Mabry (Boeing Co., Seattle, Wash.).

Sound and Vibration, vol. 2, Nov. 1968, p. 14-22, 16 refs.

Considerable efforts have been made to relate human response to aircraft noise. Comparisons of field test studies by observer groups, unsolicited complaints, social surveys, and controlled laboratory studies show the latter to be most relevant for engineering decisions. The evolution of EPNL (effective perceived noise level) and its possible constraint on engine design and a new approach to subjective evaluations are significant areas for discussion. (Author)

**A69-12804 \*****THE SEARCH FOR LIFE - PLANETARY EVOLUTION.**

Richard S. Young (NASA, Washington, D. C.).

IN: SPACE PROJECTIONS FROM THE ROCKY MOUNTAIN REGION; PROCEEDINGS OF THE SYMPOSIUM, DENVER, COLO., JULY 15, 16, 1968. VOLUME 1. [A69-12801 02-30]

Symposium sponsored by the American Astronautical Society and the American Institute of Aeronautics and Astronautics. Tarzana, Calif., American Astronautical Society, 1968. 19 p.

Discussion of the two primary objectives of the NASA Planetary Exploration Program - namely, to gain data concerning the origin of the solar system and the origin of life. These two objectives are actually so interwoven as to be essentially indistinguishable from each other. If present theories concerning the sequence of events which led to the origin of life on earth are correct, then it is clear that the very early environment of any given planet is critical to the ability of that planet to produce and sustain a living system. Thus the physics and chemistry of planetary formation and early evolution are of the utmost importance to an understanding of the origin of life. It is believed that the likelihood of life on the moon, Venus, and Jupiter is considerably less than for Mars, but that much can be learned about planetary evolution from each of them. P. v. T.





## LC ENTRIES

A69-80001

### UV-EFFECT ON THE CHLOROPLAST ULTRASTRUCTURE [DEISTVIE UF-LUCHEI NA UL'TRATONKUIU STRUKTURU KHLOROPLASTOV].

A. A. Shakhov and B. M. Golubkova (USSR, Acad. of Sci., K. A. Timiriazev Inst. of Physiol. of Plants, Moscow). *Izvestiia Akademii Nauk SSSR, Serii Biologicheskaja*, no. 1, Jan.-Feb. 1968, p. 45-52. 36 refs. In Russian.

An artificial UV-irradiation of radish plants grown on the Aragats Mountain (3,200 m. above sea level, in Armenia) resulted in a distinct destruction of the chloroplast matrix. The irradiation was performed for 10 min./day for a month. As compared to the matrix the lamellar system proved to be more stable. It shifted to the less damaged section of the plastide becoming cup-shaped. Irradiated leaves showed a higher absorbancy within the range of 400-860  $m\mu$ . This may have a photoreactivating effect for chloroplasts. The ability of a higher absorbancy of light energy exhibited by leaves may act as the factor maintaining the fine chloroplast structure in the state of photosynthetic activity during UV-irradiation. It is suggested that unlike medium waves ( $\lambda=300-320 m\mu$ ) short waves ( $\lambda=240-260 m\mu$ ) do not play a constructive part, and that the evolution of the photosynthetic apparatus is not related to the utilization of UV-rays. Medium UV-rays can promote the biosynthesis and participate in the photosynthesis of lower and higher plants.

A69-80002

### MECHANISM OF STIMULATION OF SEMICIRCULAR CANALS UNDER CONDITIONS OF MAN'S ROTATION IN TWO MUTUALLY PERPENDICULAR PLANES [MEKHAIZM RAZDRAZHENIIA POLUKRUZHNYKH KANALOV PRI VRASHCHENII CHELOVEKA V DVUKH VZAIMNO PERPENDIKULIARNYKH PLOSKOSTIAXH].

F. A. Solodovnik, L. M. Vorob'ev, and G. F. Khlebnikov. *Izvestiia Akademii Nauk SSSR, Serii Biologicheskaja*, no. 1, Jan.-Feb. 1968, p. 78-88. 18 refs. In Russian.

Conditions were studied for stimulation of semicircular canals when men were rotated in two mutually perpendicular planes. The rotation was carried out in a rotating arm-chair involving inclination and straightening of the subject's head. It was established that Coriolis acceleration which develops in the course of rotation associated with simultaneous movement of the subject's head along the radius, not changing the plane of spacing of semicircular canals, failed to produce an inertial shift of endolymph. The stimulation of semicircular canals developed during rotation accompanied by simultaneous turning of subject's head (in the plane perpendicular to the plane of rotation) when a pair of Coriolis forces were manifested and applied to opposite points of the canal. The stimulation rate of semicircular canals by Coriolis acceleration in the course of rotation with head inclined depended on the rate of rotating the arm-chair and the angular rate of the bended head. This position is of significance to suppress rocking under conditions of space flights. The astronaut ought to move his head translationally, without rotating in a sagittal plane, when performing labor operations in a rotating space craft.

A69-80003

### PECULIAR FEATURES OF MAN'S SLEEP UNDER CONDITIONS OF CONTINUOUS, PROTRACTED EFFECT OF BROAD-BAND NOISE OF AVERAGE INTENSITY [OSOBENности SNA CHELOVEKA V USLOVIIAXH NEPRERYVNOGO DLITEL'NOGO VOZDEISTVIIA SHIROKOPOLOSNOGO SHUMA SREDNEI INTENSIVNOSTI].

V. I. Miasnikov, O. P. Kozerenko, I. IA. Iakovleva, E. I. Matsnev, I. P. Lebedeva, V. N. Nesterenko, and E. Z. Tambiev (USSR, Min. of Health, Inst. of Medico-Biol. Problems, Moscow). *Izvestiia Akademii Nauk SSSR, Serii Biologicheskaja*, no. 1, Jan.-Feb. 1968, p. 89-98. 36 refs. In Russian.

Man's protracted stay in a noisy environment may lead to disturbance of the quality of his sleep. This is manifested in the difficulty he encounters while falling asleep, in superficial sleep with frequent awakenings, and also in the increase of disordered functions of the acoustic analyzer (screening thresholds, acoustic adaptation). Obtained data revealed some aspects of physiologic mechanisms comprising the very basis of unpleasant sensations in cosmonauts during space flights which are connected with noise. In the course of choosing subjects for special tasks it is advisable to pay attention to the adaptive capacity of the acoustic organ and sleeping features of subjects under conditions of a noisy environment.

A69-80004

### EFFECT OF BETA-MERCAPTOPYRILAMINE ON THE INDUCTION OF THE PHAGE YIELD OF *E. COLI* K-12 GAMMA LYSOGENIC CULTURE STUDIES ON BOARD THE VOSTOK-5 AND VOSTOK-6 SPACECRAFT [ISSLEDOVANIE DEISTVIIA BETA-MERKAPTOPYRILAMINA NA INDUKTSIIU FAGOPRODUKTSII LIZOGENNOI KULTURY *E. COLI* K-12 GAMMA V EKSPERIMENTAKH NA KOSMICHESKIKH KORABLIAXH VOSTOK-5 I VOSTOK-6].

N. I. Rybakov, V. A. Kozlov, E. D. Aniskin, and A. V. Kolobov. *Izvestiia Akademii Nauk SSSR, Serii Biologicheskaja*, no. 1, Jan.-Feb. 1968, p. 123-126. 13 refs. In Russian.

Laboratory and flight experiments carried out on board the Vostok-5 and Vostok-6 spacecraft revealed a similar regularity in the inhibitory effect of  $\beta$ -mercaptopyriline on the development of the induced phage of *E. coli* K-12  $\lambda$  lysogenic bacteria.

A69-80005

### EFFECT OF SPACE FLIGHT ENVIRONMENT ON SEEDS OF HIGHER PLANTS FLOWN ON BOARD COSMOS-110 [VLIANIE USLOVII KOSMICHESKOGO POLETA NA KORABLE-SPUTNIKE KOSMOS-110 NA SEMENA NEKOTORYKH VYSSHIKH RASTENII].

N. L. Delone, E. M. Morozova, V. V. Antipov, G. P. Parfenov, A. S. Trusova, and Z. I. Ukstina.

*Izvestiia Akademii Nauk SSSR, Serii Biologicheskaja*, no. 1, Jan.-Feb. 1968, p. 126-129. 8 refs. In Russian.

Air-dry seeds of some higher plants were placed in the Cosmos-110 cabin. After the recovery the seeds were grown together with controls and physiological and cytological studies were carried out. The test seeds showed physiological changes during their germination and disturbances in their hereditary structures.

A69-80006

### NITROGEN-CONTAINING COMPOUNDS OF SOME BLUE-GREEN ALGAE [AZOTSODERZHASHCHIE SOEDINENIIA NEKOTORYKH SINEZELENYKH VODOROSLEI].

G. N. Rzhanova (USSR, Acad. of Sci., Inst. of Microbiol., Moscow). *Izvestiia Akademii Nauk SSSR, Serii Biologicheskaja*, no. 1, Jan.-Feb. 1968, p. 143-149. 7 refs. In Russian.

By applying the method of ion exchange chromatography in an automatic amino acid analyzer the author determined the content and composition of 17 amino acids in the following blue-green algae: *Mastigocladus laminosus*, *Nostoc muscorum*, *Phormidium*

## A69-80007

*uncinatum* and *Lyngbya aestuarii*. The total nitrogen amounted to 6.5 to 7.5% in the examined species. Amino acids comprised 30 to 35% of the algae organic substance. The nitrogen of amino acids made up 60 to 65% of the total nitrogen. All the investigated species were distinguished by a high content of basic amino acids (lysine, histidine, arginine); these amino acids made up 25 to 35% of the total amount of amino acids. A high content of dicarboxylic amino acids, alanine, glycine, valine was found. *N. muscorum* and *L. aestuarii* grown in nitrate nitrogen revealed an especially high content of asparagine acid, glutamic acid, glycine, alanine as compared to the nitrogen-fixating *M. laminosus* and *N. muscorum* species. Cultures differ very little in the content of basic amino acids except in the case of *N. muscorum* which showed a much lesser content of arginine.

## A69-80007

### ENDOCRINOLOGICAL ASPECTS OF EXPOSURE TO HIGH ENVIRONMENTAL TEMPERATURE.

K. J. Collins and J. S. Weiner (MRC, Environ. Physiol. Res. Unit, London School of Hyg. and Trop. Med., London, Great Britain). *Physiological Reviews*, vol. 48, Oct. 1968, p. 785-839. 453 refs.

The pattern of endocrine involvement in the physiological adjustments of homeotherms exposed to high-temperature conditions has been examined. A number of recent studies have contributed important information by the direct measurement of blood hormone levels and turnover. Two main aspects emerge as being reasonably well understood. One is the neurohypophysial and adrenocortical control of water and electrolyte balance. The second concerns the level of thermogenesis that is related to the severity of the heat stress and involves hormones of the pituitary-adrenal-thyroid system. Moderate or gradual heating appears to be associated with a reduced output of these hormones and a suppression of thermogenesis, whereas intense heating stimulates pituitary-adrenal and pituitary-thyroid activity accompanied by an increase in metabolic activity. The evidence supporting these patterns of endocrine response may be briefly summarized: (1) Thyroid activity as measured by <sup>131</sup>I uptake and release as well as by histological changes is generally found to be lower in a wide variety of experimental animals exposed to moderately warm (27-34°C.) conditions. This hormonally controlled depression of metabolism may be of biological significance for survival in hot climates. (2) There is no adequate proof that the suppression of calorogenesis during mild heat exposure involves a reduction in adrenal medullary activity as it does in thyroid activity. (3) Judged by the urinary excretion of adrenal corticosteroid metabolites, it appears that glucocorticoid secretion remains unchanged or may be reduced in hot environments. (4) In man, aldosterone participates in the regulation of renal and sweat-gland losses of salt during exposure to heat. Urinary aldosterone levels increase in the heat, especially if large salt losses have been incurred. The action of aldosterone on the eccrine sweat glands of man contributes largely to the reestablishment of salt balance after sweating but the time course of response differs from that of the kidney. (5) Exposure to high temperatures is accompanied by a decrease in urine volume, initially as the result of a reduced renal plasma flow. (6) The hypothalamus exerts a central influence on thermoregulatory processes and in the stress response, food and water intake, osmoregulation, growth, and reproduction. The evidence for hypothalamic control and integration of these functions in hot conditions is discussed in relation to their neural and endocrine basis.

## A69-80008

### PROTECTION AGAINST WHOLE BODY X-IRRADIATION BY ADRENOCROME MONOQUANYLHYDRAZONE METANESULPHONATE IN MICE.

Tsutomu Sugahara and Tomizo Tanaka (Kyoto U., Fac. of Med., Dept. of Exptl. Radiol., Japan).

*Nature*, vol. 220, Oct. 19, 1968, p. 271-272.

The protective effect of adrenochrome monoguanylhydrazone methanesulphonate against whole body x-ray irradiation of mice was investigated. The results indicated that the compound has a definite protective effect even at very low doses, far below the toxic level, and its future applicability to human beings seems promising.

## A69-80009

### EXPERIMENTAL STUDY OF THE EFFECTS OF HYPOXIA AND HYPEROXIA ON GLYCEMIA [ETUDE EXPERIMENTALE DES EFFETS DE L'HYPOXIE ET DE L'HYPEROXIE SUR LA GLYCEMIE].

Pierre Michel Pingannaud and Philippe Cochin.

*Revue de Médecine Aéronautique et Spatiale*, vol. 7, no. 26, 1968, p. 81-85. 9 refs. In French.

The effects of hypoxia and hyperoxia on glycemia were studied in seven rabbits in two series of experiments. The animals were exposed to hypoxia and hyperoxia (97-99% oxygen) for one hr., while the blood sugar level was recorded continuously. The preliminary results showed an occurrence of rapid changes in sugar metabolism, and sharp and repeated variations in the blood sugar level. Hyperglycemia with variations of  $\pm 10$  cg./l. in two min. could be observed during hyperoxia. In hypoxia no marked changes occurred after one hr. exposure, but by prolonging the exposure time some differences were recorded. On the whole the results lacked uniformity and further studies on humans were suggested.

## A69-80010

### EVALUATION OF THE PERCEPTUAL LOAD BASED ON THE VARIATIONS OF THE HEART RATE. APPLICATION TO A PILOT TASK [APPRECIATION DE LA CHARGE PERCEPTIVE PAR LA VARIABILITE DU RYTHME CARDIAQUE. APPLICATION A UNE TACHE DE PILOTAGE].

R. Auffret, H. Seris, A. Berthoz, and B. Fatras (Centre d'Essais en Vol, Lab. de Méd. Aéronautique, Brétigny-sur-Orge, France).

*Revue de Médecine Aéronautique et Spatiale*, vol. 7, no. 26, 1968, p. 87-89. 14 refs. In French.

Pilot task workloads were correlated with the variation of the cardiac rhythms. Two series of tests were carried out: inflight during scanning of a device for instrumental landing and on the ground in the course of a compensatory tracking task. The inflight tests consisted of takeoff, circling around the airfield, initial approach, simulated landing procedures and resumption of flight. During the tests the pilot's electrocardiogram, the flying control operations, and all the measures related to the position and movements of the aircraft were recorded, simultaneously. On the ground the recording of the aircraft parameters were replaced by the errors and answers of the subject during the performance of the tracking task; the palpebral movements were also recorded. The analysis of the data obtained showed a correlation between the psychomotor workload and the cardiac arrhythmias. The measure of the instantaneous heart rate variability seemed a useful criterion in the evaluation of workload or the detection of the workload variations in the course of a predominantly perceptual task, for it fluctuated in relationship to the work load even when no heart rate variations occurred.

## A69-80011

### STATISTICAL REPORT ON THE GENERAL PATHOLOGY OF CIVIL AVIATION PERSONNEL [RAPPORT STATISTIQUE SUR LA PATHOLOGIE GENERALE DU PERSONNEL NAVIGANT DE L'AVIATION CIVILE].

J. Raboutet, J. Salvagniac, R. Quemerc'h, M.-J. Nicolas, and R. Carré.

*Revue de Médecine Aéronautique et Spatiale*, vol. 7, no. 26, 1968, p. 90-93. In French.

A statistical survey was presented on the frequency of existing pathological defects among the civil aviation flight personnel (airplane and helicopter pilots and technical aircrew: 222 subjects) leading to permanent grounding. The study covered a period of 12

yr., from 1955 through 1966. The permanent medical grounding rate was found to be on the whole relatively small (4.5%), and cardiovascular diseases accounted for the highest rate, almost a third of the medical reasons. The highest amount of disability was in the 46 to 50 yr. group, and in this age range the rate of removal from flying for cardiovascular diseases reached 36% of the disability cases. It was concluded that after the age of 45, routine flying personnel examinations should be oriented toward the detection of cardiovascular disorders and their most frequent cause, atherosclerosis.

#### A69-80012

##### PHYSIOLOGICAL EFFECTS OF HEAT STRESS. 2. INITIATION OF SWEATING [LES EFFETS PHYSIOLOGIQUES D'UN CHOC THERMIQUE. II. DECLenchement DE LA SUDATION].

Jean Colin, Y. Houdas, J. Timbal, and C. Boutelier (Centre d'Essais en Vol, Lab. de Méd. Aéronautique, Brétigny-sur-Orge, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 7, no. 26, 1968, p. 95-103. 47 refs. In French.

The sweating response to heat stress was studied in 14 male and one female subject, their body weight and body temperature (cutaneous, rectal, buccal, and tympanic) were monitored continuously during the experiments. It was found that the sweating was initiated by the conjugated effect of cutaneous and central thermoreceptors. An average temperature threshold existed in most of the subjects and this threshold was reached in a subject after a storage of heating of constant value. The storage of heat accounted for the time lag in the sweating response and could be calculated when the thermal load was known. In some subjects the almost instantaneous initiation of sweating was assumed to be due to either a higher sensitivity of the thermoregulatory centers controlling the heat loss, the sweating response mechanism remaining the same, or the prevailing effect of cutaneous thermoreceptors capable of stimulating alone, the hypothalamic thermoregulatory center.

#### A69-80013

##### TRANSPORTATION OF THE SICK AND THE WOUNDED BY COMMERCIAL AIRLINES [LE TRANSPORT DES MALADES ET DES BLESSES SUR LES AVIONS DE LIGNE REGULIERS].

Poisvert, Cara, Lafontaine, and Courillon (Serv. Méd. Central d'Air France and Groupe Hosp. Necker-Enfants Malades, Dept. d'Anesthésiol., Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 7, no. 26, 1968, p. 104-106. In French.

The medical services of Air France with the collaboration of the Department of Anesthesiology of the Necker Hospital in Paris, have organized and developed an intensive care unit for rapid evacuation of acutely sick or seriously injured patients to specialized hospitals. It can be installed rapidly aboard regular commercial aircraft (Boeing, Caravelle) in the passenger cabin. These services have been in use in France for four yr. The duties of the staff and the medical equipment used are described and discussed. Three case histories of successful long distance aero-medical evacuations are included.

#### A69-80014

##### RHYTHMS OF THE RECTAL TEMPERATURE IN FREE-RUN CONDITIONS [LE RYTHME DE LA TEMPERATURE RECTALE EN LIBRE COURS].

J. Timbal, J. Colin, C. Boutelier, Y. Houdas, and M. Siffre. *Revue de Médecine Aéronautique et Spatiale*, vol. 7, no. 26, 1968, p. 107-114. 37 refs. In French.

The variations of the rectal temperature rhythms were studied in a 23 yr. old man during six mo. confinement in an underground cave under free-run conditions (lack of time cues). The subject's normal circadian cycles were recorded prior to the confinement and

served as controls. The findings showed a remarkable continuity in the rectal temperature of the circadian rhythm during the whole confinement period. The period of the circadian rhythm of the rectal temperature increased gradually, reaching 24 hr. 47 min. during the last four mo. Another interesting observation was that the rectal temperature maintained a stable circadian rhythm over long periods of time despite marked day to day variations. This partial lability of the thermal rhythm was explained as in the case of an inversion of the activity cycles such as night work with the reversal of the rectal temperature curve occurring. In case of an increase of 2 hr. 30 min. in the cycle, five days would be needed for the temperature cycles to eliminate all variance existing between the internal cycle and the external synchronizers.

#### A69-80015

##### RELATIONS BETWEEN THE ACTIVITY CYCLE AND THE RECTAL TEMPERATURE RHYTHM IN FREE-RUN CONDITIONS [RELATIONS ENTRE LE RHYME D'ACTIVITE ET LE RYTHME DE LA TEMPERATURE RECTALE EN LIBRE COURS].

J. Colin, J. Timbal, C. Boutelier, Y. Houdas, and M. Siffre. *Revue de Médecine Aéronautique et Spatiale*, vol. 7, no. 26, 1968, p. 115-120. 7 refs. In French.

The activity cycle, based on the time period separating two arousals, and the rhythm of the rectal temperature of a subject in free-run (lack of time cues) were compared and discussed. The observation showed that the activity cycle rhythm influenced the rectal temperature only over a short period of time. Nonetheless the presence of a basic period of activity identical to that of the rectal temperature and the position of the peak rectal temperature showed a close relationship between the two phenomena. The time estimation by the subject differed significantly from the actual amount of time but was always a multiple of the circadian activity period. It was inferred that the circadian rhythm of the rectal temperature was independent of the activity cycle.

#### A69-80016

##### SUBJECTIVE AND OBJECTIVE RESPONSES TO DISRUPTIONS IN THE CIRCADIAN RHYTHMS DURING LONG DISTANCE COMMERCIAL FLIGHTS EAST-WEST AND VICE-VERSA [LES REACTIONS SUBJECTIVES ET OBJECTIVES AUX RUPTURES DES RHYTHMES CIRCADIENS LORS DES VOLS COMMERCIAUX LONGS-COURRIERS EST-OUEST ET VICE-VERSA].

J. Lavernhe, E. Lafontaine, and J. Pasquet (Serv. Méd. d'Air France, Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 7, no. 26, 1968, p. 121-123. 6 refs. In French.

A survey was presented on pertinent French and American literature on the disruption of circadian periodicity and the subjective effects resulting from rapid translocation through many time zones. The results of these different studies showed a remarkable agreement. A rapid translocation through seven time zones required four to five days for completion of the phase shift. Return back to the environment of origin also effected a shift of phase but required less time for completion. Increase in subjective fatigue occurred during the primary period of transition and following return to the environment of origin, but significant impairments of psychological performance were produced only by East-West flights. Compared to the time lag of the physiological phase shift, the duration of subjective fatigue was very short.

#### A69-80017

##### PHYSIOLOGICAL ASPECTS OF THE CIRCADIAN RHYTHMS [ASPECTS PHYSIOLOGIQUES DES RHYTHMES CIRCADIENS].

A. Morali-Daninos and F. Cerf. *Revue de Médecine Aéronautique et Spatiale*, vol. 7, no. 26, 1968, p. 124-126. In French.

#### A69-80018

A general discussion on the physiological and neuropsychological aspects of circadian rhythms was presented. The occurrence of phase shifts during intercontinental flights was also mentioned.

#### A69-80018

##### **BIOLOGICAL RHYTHMS (REVIEW OF SOME RECENT DATA) [RYTHMES BIOLOGIQUES (RAPPEL DE QUELQUES DONNEES RECENTES)].**

Alain Reinberg (C.N.R.S., Lab. de Physiol., Paris, France).  
*Revue de Médecine Aéronautique et Spatiale*, vol. 7, no. 26, 1968, p. 127-130. 59 refs. In French.

A survey of the problems and progress in the studies of biological rhythms in man, animals and plants based on pertinent literature published during the last ten yr. was presented and reviewed.

#### A69-80019

##### **SPINAL FRACTURES IN HELICOPTER ACCIDENTS (BASED ON 25 CASES) [LES FRACTURES DU RACHIS DANS LES ACCIDENTS D'HELICOPTERES (A PROPOS DE 25 CAS)].**

R. P. Delahaye, R. Carre, R. Auffret, and Farand (Centre d'Essais en Vol, Lab. de Méd. Aéronautique, Bretigny-sur-Orge, France).  
*Revue de Médecine Aéronautique et Spatiale*, vol. 7, no. 26, 1968, p. 131-133. 5 refs. In French.

A statistical survey on the frequency of spinal fractures in helicopter crashes was presented. The study was based on recent data (1961-1966) made available by the French Armed Forces. Five case histories were included. The localization and pathogenesis of the fractures were studied and discussed.

#### A69-80020

##### **PERIODIC PHENOMENON IN FIGURAL PERCEPTION [UBER EINIGE PERIODISCHE VORGANGE IN DER FIGURALWAHRNEHMUNG].**

Michael Stadler and Heiner Erke (Münster, U., Physiol. Inst., West Germany).  
*Vision Research*, vol. 8, Aug. 1968, p. 1081-1092. 58 refs. In German.

The fact that periodic fluctuations in perception are observed under certain boundary conditions, e.g. appearance and disappearance of contours in the threshold domain (so called fluctuations of attention) or the permanent reversals of the figure-ground relation in ambiguous figures (inversion figures) gave rise to the question whether such periodic-rhythmic behaviour may also be proved for simple figures during prolonged observation. Ten subjects were presented circles and squares in the left half of the visual field for 200 sec., on the right side the corresponding figures were shown for comparison in intervals of 2.5 sec. Statistically secured periodic fluctuations of magnitude with amplitude between 3 and 9% of the actual figure size were obtained. By serial correlation the mean oscillation periods were established between 7.5 and 12.5 sec, a value that corresponds to a large degree to those found with inversion figures and attention fluctuations. The periodic fluctuations of attention are brought into connection with macrorhythmical potential fluctuations in the electroencephalogram.

#### A69-80021

##### **THE ROLE OF THE PUPIL IN THE DISABILITY GLARE MEASUREMENTS.**

H. A. W. Schober (Munich, U., Inst. of Med. Optics, West Germany) and G. A. Fry (Ohio State U., Coll. of Optometry, Columbus).  
*Vision Research*, vol. 8, Aug. 1968, p. 1107-1122. 17 refs.

The effect of a peripheral glare source on the perception of fine detail at the center of the field of view has been investigated by using artificial pupils to control the beams of light entering the eye. One of the ways in which a peripheral glare source can improve

central vision is by restricting the pupil and thereby reducing the blur. This effect can be accentuated by covering the retina with a patch of veiling illuminance, which masks the effect of stray light produced by the flare source. Geldard had found that when an artificial pupil is used, a peripheral glare source improves the detection of a brightness difference between the two halves of a bipartite test object centered on the line of sight. This effect disappears when both the glare beam and the test beam are narrow and are made to pass through the center of the pupil. This eliminates the need for proposing a mechanism of retinal interaction involving large distances across the retina. One can now concentrate on retinal interactions which involve short distances across the retina such as summation, simultaneous contrast, metacontrast, and interaction between adjacent borders.

#### A69-80022

##### **MOTION AND TEXTURE AS SOURCES OF SLANT INFORMATION.**

Myron L. Braunstein (Calif., U., Irvine).  
*Journal of Experimental Psychology*, vol. 78, Oct. 1968, p. 247-253. 9 refs.  
Grant NSF GB 5545.

Computer-generated motion pictures of random dot patterns on slanted planes translating along a horizontal axis were displayed to 40 subjects. The displays included combinations of four levels of texture gradients, corresponding to 0°, 20°, 40° and 60° slants, and five levels of velocity gradients, 0°, 40°, 60°, and no motion. Subjects were instructed to tilt a clear plastic plane to the same angle as the displayed plane. Slant judgments were predictable from a combination of the gradients, with greater weight given to velocity information. The relationship of the findings to gradient and perspective interpretations of slant perception was discussed.

#### A69-80023

##### **ASSOCIATIVE REACTION TIME, MEANINGFULNESS, AND PRESENTATION RATE IN PAIRED-ASSOCIATE LEARNING.**

Ronald Ley (N.Y., State U., Albany).  
*Journal of Experimental Psychology*, vol. 78, Oct. 1968, p. 285-291. 16 refs. N.Y., State U. supported research.

Sixty undergraduate students learned a list of eight paired associates in a factorial design with four pairs composed of short-latency associative reaction time (RT) response terms and four pairs with long-latency RT terms. Two of the four response terms of each group were low-meaningfulness trigrams and two were high-meaningfulness trigrams. The list was learned by three groups of subjects under 2-, 4-, or 8-sec. presentation rate. Consonant with the predictions of the study, the trigrams of short RT were learned faster than the trigrams of long RT and the effect of RT was most pronounced under the shortest presentation rate. Fewer trials were required to learn high-meaningfulness trigrams than low-meaningfulness trigrams and the learning rate was faster the longer the presentation rate but total time to learn did not vary with presentation rate. Significant interactions suggested that the effect of RT was limited to low-meaningfulness trigrams.

#### A69-80024

##### **PERCEPTION OF SLANT WHEN PERSPECTIVE AND STEREOPSIS CONFLICT: EXPERIMENTS WITH ANISEIKONIC LENSES.**

B. J. Gillam (N. Y. State Dept. of Mental Hyg., Biometrics Res., New York).  
*Journal of Experimental Psychology*, vol. 78, Oct. 1968, p. 299-305. 10 refs.

Aniseikonic lenses change disparities such that perspective and stereoscopic slant cues are in conflict. Subjects viewing binocularly through aniseikonic lenses were required to judge the slant of each of a set of surfaces providing perspective slant cues.

An adjustment method was used to record slant judgments. In general, reliable compromise responses between the conflicting cues were obtained although some subjects suppressed perspective cues almost completely. Response to stereoscopic cues was greatest for perspective patterns which were found to provide ineffective slant cues in monocular vision.

**A69-80025****MASKING PHENOMENA AND TIME-INTENSITY RECIPROCALITY FOR FORM.**

Donald L. Schurman, Charles W. Eriksen (Ill., U., Urbana), and John Rohrbaugh.

*Journal of Experimental Psychology*, vol. 78, Oct. 1968, p. 310-317. 16 refs.

Grants PHS MH-1206, PHS K6-MH-22,014, and NSF GY 2538.

While temporal summation for brightness has been found to be independent of the distribution of energy within the critical duration, there is some question as to whether the same conclusion holds for temporal summation in form perception. Backward and forward masking experiments have failed to show a critical duration for form which suggests that interruption in the energy presentation impairs temporal integration. Exp. I failed to find a critical duration for form when light energy was presented in 10 pulses separated by intervals (IPIs) varying from 2 to 48 msec. Form identification appeared to be a monotonic decreasing function of pulse-train duration (PTD) even when the PTDs were less than 100 msec. Exp. II replicated Exp. I in part and in addition found that form identification was significantly poorer at all PTDs for two longer light pulses separated by a single dark interval than for 10 pulses separated by nine shorter dark IPIs.

**A69-80026****REACTION TIME FOR NUMERICAL CODING AND NAMING OF NUMERALS.**

James D. Windes (Ariz., U., Tucson).

*Journal of Experimental Psychology*, vol. 78, Oct. 1968, p. 318-322. 9 refs.

Grant NSF GB 3955.

Reaction times (RT) for two different identification tasks, numeral naming and quantity naming, were compared in two experiments. Exp. I used single Arabic numerals for the numeral naming task and corresponding amounts of arbitrary figures for the quantity-naming task. Exp. II used the same Arabic numerals in different corresponding amounts for both tasks. Eighteen subjects served in each experiment, nine under one task condition and nine under the other. Exp. I showed an insignificant difference between the two tasks. Exp. II showed that RT was slower for naming the different quantities of numerals than for naming the numerals themselves, even when the stimuli and naming responses were identical. An interpretation in terms of identification-task conflict, as distinct from response conflict, is presented.

**A69-80027****MAGNITUDE ESTIMATES OF ROTATIONAL VELOCITY DURING AND FOLLOWING PROLONGED INCREASING, CONSTANT, AND ZERO ANGULAR ACCELERATION.**

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

*Journal of Experimental Psychology*, vol. 78, Oct. 1968, p. 329-339. 24 refs.

Velocity of rotation was observed by 10 subjects in a rotating simulator during and following accelerations about a vertical axis which varied between  $.5^\circ$  to  $1.5^\circ/\text{sec.}^2$  and  $.006$  to  $.030^\circ/\text{sec.}^3$  and continued for two to three min. Trials with 0 acceleration were also included. Magnitude estimates of velocity of rotation increased and then declined during the constant accelerations, while more

complex effects occurred during increasing accelerations. Aftereffects and autokinetic effect were also observed. Current theory of vestibular function is considered in the light of these results.

**A69-80028****EFFECT OF EAR STIMULATED ON REACTION TIME AND MOVEMENT TIME.**

J. Richard Simon.

*Journal of Experimental Psychology*, vol. 78, Oct. 1968, p. 344-346.

In a unimanual choice reaction time (RT) task, subjects moved a control handle to the right or left from the midline of the body in response to monaural verbal commands of "right" or "left" which were presented to the right or left ear. Both RT and movement time MT were significantly faster when the content of the command corresponded to the ear stimulated than when it did not; i.e., the time required to initiate and execute the movement was affected by a cue irrelevant to the task itself, the ear in which the command was heard. RT was faster for abductive movements toward the side of the responding member whereas MT (for the right hand) was faster when movements were directed toward the opposite arm.

**A69-80029****READAPTATION AND DECAY AFTER EXPOSURE TO OPTICAL TILT.**

Sheldon M. Ebenholtz (Wis., U., Madison).

*Journal of Experimental Psychology*, vol. 78, Oct. 1968, p. 350-351.

Grant NIMH MH-13006-02.

In Exp. I 16 subjects were exposed initially to a  $15^\circ$  optical tilt (T) for a one-half hr. period. During the second one-half hr. interval eight subjects (Group O) viewed the normal environment without prisms and with both eyes open. The remaining eight subjects (Group C) were guided over the same path as those of Group O, but with both eyes covered by blindfolds. Exp. II differed in that T was  $30^\circ$  and the transfer period for subjects of Group O required monocular observation with T at  $0^\circ$ . In both experiments Group O readapted to the normal environment at about the same rate as during initial adaptation. Group C exhibited decay of adaptation but at a rate significantly slower than that of readaptation.

**A69-80030****EFFECTS OF ANXIETY AND INTERFERENCE ON SHORT-TERM MEMORY.**

John G. Borkowski (Notre Dame, U., Ind.) and Thomas Mann (Oberlin Coll., Ohio).

*Journal of Experimental Psychology*, vol. 78, Oct. 1968, p. 352-354. 9 refs.

Short-term recall for high- (HA) and low-anxious (LA) subjects was compared using a single-item technique designed to produce inter-item competition between six consecutive CCCs and to evoke situational anxiety. Results indicated that in the absence of specific, prior interference (PI) there was no difference as a function of anxiety level. As PI developed, the LA group recalled significantly more items than the HA group. However, the superiority of the LA group was not related to the absolute amount of PI. Rehearsal activity (i.e., digit recitation) increased and short-term memory decreased as PI developed. It was concluded that individual differences, such as anxiety, influence the course of short-term memory.

**A69-80031****TACHISTOSCOPIC RECOGNITION THRESHOLDS AS A FUNCTION OF AROUSAL LEVEL.**

Gary W. R. Patton (Tufts U., Medford, Mass.).

*Journal of Experimental Psychology*, vol. 78, Oct. 1968, p. 354-356. 5 refs.

## A69-80032

This experiment attempted to test the hypothesis that recognition thresholds are related to autonomic activity in the curvilinear manner. According to this hypothesis, lowest thresholds are associated with moderate sympathetic nervous system excitation, while higher thresholds are linked with either low or high extremes of sympathetic activity. To test this proposition, tachistoscopic recognition thresholds for four-digit numbers were determined for 24 male subjects during counterbalanced minimal, moderate, and high states of sympathetic excitation. Recognition thresholds were found to be significantly higher during the high levels of autonomic activity than during the minimal or moderate autonomic arousal conditions. When allowance was made for the fact that no truly low arousal state was achieved in this experiment, the data were explicable in terms of the predicted curvilinear relationship.

## A69-80032

### A 24-HOUR RHYTHM IN SERUM COPPER AND MANGANESE LEVELS OF NORMAL AND ADRENAL MEDULLECTOMIZED ADULT MALE RATS.

L. E. Scheving, J. E. Pauly, E. L. Kanabrocki, and E. Kaplan (La. State U., Med. School, Depts. of Anat., New Orleans; Ark., U., Med. School, Little Rock; and Veterans Admin. Hosp., Radioisotope Serv., Hines, Ill.).  
*Texas Reports on Biology and Medicine*, vol. 26, Fall 1968, p. 341-347. 10 refs.  
Grant PHS 4659.

In normal and adrenal medullectomized adult male rats, maintained under rigidly standardized conditions which included a light-dark cycle (light, 0600 to 1800), a 24 hr. rhythm in the fluctuation of serum copper and manganese was seen. The daily variation for copper in normal animals was 100% and for experimental animals it was 32%. A similar comparison for manganese represented a 157% change in the serum of normal animals and a 84% variation in adrenal medullectomized animals. Adrenal medullectomy modified but did not abolish the rhythms. This experimental procedure showed a significant increase in manganese values when the overall 24 hr. mean values for normal and experimental animals were compared. A similar comparison of copper levels revealed no difference between normal and adrenal medullectomized animals.

## A69-80033

### MODEL FOR VISUAL LUMINANCE DISCRIMINATION AND FLICKER DETECTION.

George Sperling and Man Mohan Sondhi (Bell Telephone Labs., Inc., Murray Hill, N. J.).  
*Journal of the Optical Society of America*, vol. 58, Aug. 1968, p. 1133-1145. 53 refs.

A model for vision is proposed. Its basic units are RC stages whose time constants, in three instances, are parametrically controlled. The requirements of compressing the dynamic range of the input and of fitting luminance pulse-detection data suffice to determine the arrangement and parameters of the components. This model accurately predicts the psychophysical results of flicker detection (Delange characteristics at above 10 Hz.), the Ferry-Porter and Weber laws in the ranges where they apply, the effects of light adaptation, and it accounts for individual differences. By considering the variable RC stage as an approximate analog of a synaptic excitatory process which is controlled by inhibition, significant correspondences are observed between the internal connectivity of the model and the neural connectivity of the retina.

## A69-80034

### SELECTIVITIES OF HUMAN VISUAL MECHANISMS FOR DIRECTION OF MOVEMENT AND CONTOUR ORIENTATION.

R. W. Sekuler, E. L. Rubin, and W. H. Cushman (Northwestern U., Evanston, Ill.).

*Journal of the Optical Society of America*, vol. 58, Aug. 1968, p. 1146-1150. 9 refs.

Grant NINDB NB-06354.

The luminance threshold for horizontal contours which move upward is raised by prior exposure of any of wide range of different directions of movement. The threshold for a stationary grating of horizontal bars is raised only by prior exposure of similarly oriented bars. It is also found that sensitivity to changes in orientation of a stationary grating is greater than sensitivity to changes in the direction in which a grating moves. It is proposed that the interactions between pre-exposed adapting stimuli and the stimuli for which thresholds are determined reflect the orientation and direction selectivities of the underlying mechanisms.

## A69-80035

### CYTOMETRICAL INVESTIGATIONS OF NEUROCYTES NUCLEI IN THE BRAINS OF NEONATAL RATS EXPOSED TO X-RAY IRRADIATION DURING VARIOUS PERIODS OF FETAL LIFE.

O. Mularek (Med. Acad., Dept. of Neurol., Poznań, Poland).

*Radiobiologia Radiotherapia*, vol. 9, no. 4, 1968, p. 495-499. 12 refs.

The planimetric measurements of the cross-sectional surface area of 2,400 nervous cell nuclei observed in the brain cortex, hippocampus, and in cerebellar cortex were carried out. The measurements dealt with brains of newborn rats which were X-ray irradiated during fetal life on 6.5th 9.5th or 18.5th day using the single dose of 250 r. or on 9.5th day 150 r. In all investigated cell nuclei the decrease of the cross-sectional surface area as compared with control material was found. Largest decrease of nuclear size was observed in the brain cortex of the rats which were irradiated on 9.5th day of fetal life. Smaller changes were found in the experimental group irradiated on 6.5th day of prenatal development. In the newborn rats irradiated on 18.5th day of pregnancy, which showed smallest deviations from the normal nuclear size, most sensitive appeared to be *Purkinje* cells of the cerebellum.

## A69-80036

### PYRIDINE NUCLEOTIDE CONTENT IN RAT LIVER MITOCHONDRIA AFTER WHOLE-BODY X-IRRADIATION WITH 1400 R.

B. Zicha and J. Beneš (Vet. Res. Center, Prague, Czechoslovakia).  
*Radiobiologia Radiotherapia*, vol. 9, no. 4, 1968, p. 501-508. 21 refs.

The action of whole-body X-ray irradiation on pyridine nucleotide content in liver mitochondria of rats given 1,400 r. was studied. A significant decrease of reduced pyridine coenzymes was shown. The function ability of isolated mitochondrial particles in different functional states according to previous investigators was examined. After the irradiation there were no changes by hydrogen transport from substrate to pyridine nucleotides, judged as a redox ratio change. On the contrary, the elevated oxidation of reduced coenzymes was observed even 30 min. after the exposure with the corresponding decrease of NADH + NADPH oxidation 12 hr. after irradiation. These alternative changes correspond to the observed initial elevation and secondary depression of oxygen uptake as described by other investigators.

## A69-80037

### ON THE LOCATION OF A MONOCULARLY SEEN POINT OF LIGHT IN THE VISUAL FIELD OF THE OTHER EYE: INVESTIGATIONS ON LUCHINS' "HALF VIEWS AND AUTOKINETIC EFFECT" [UBER DIE EINORDNUNG EINES

**EINAUGIG GESEHENEN LICHTPUNKTES IN DAS SEHFELD DES ANDEREN AUGES: UNTERSUCHUNGEN ZUR "AUTOKINETISCHEN" SCHEINBEWEGUNG NACH LUCHINS].**

Heiner Erke and Heinrich Crabus (Münster i. Westf., U., Psychol. Inst., West Germany).

*Psychologische Forschung*, vol. 32, Aug. 22, 1968, p. 104–123. 25 refs. In German.

Following some observations of previous investigators on apparent movement, certain half views were presented to each eye separately. One eye always saw a small point of light (E-point) against a dark background while the other eye saw a light, structured field or various point-configurations against a dark background. During variation of configurational properties, the monocularly seen point of light showed apparent movement. It achieved stability only when it fused with a point of the configuration. Under all different configurational conditions only the nearness (especially horizontal) of the E-point to the configuration was of importance for the fusion of the points. The E-point sometimes arrived at a position of rest after having moved in the direction of the configuration. This position seemed not to depend on the figural conditions of the configuration (fusion excepted). The objective distance between E-point and configuration were varied. Under the condition where the E-point reached an unstable position of rest at the free point of the configuration, the objective distance between E-point and the configuration was measured. This distance depended on the direction of the visual axes and was always greater than their difference. The position of the eyes in the dark fluctuated during the experiment. That eye which was not perceiving the E-point was presented an illuminated field. The subjects were tested with the Maddox rod method (near). The E-point appeared in the illuminated field without any perceived movement. Thereafter it began to show apparent movement. The distance between the place where the E-point first appeared and its objective position depended on the degree of heterophoria or orthophoria of the subjects.

**A69-80038**

**VARIATION OF THE SUBJECTIVE VERTICAL ON THE PARALLEL SWING AT DIFFERENT BODY POSITIONS.**

Hermann Schöne and Hans-George Mortag (Max-Planck-Inst. für Verhaltensphysiol., Seewiesen, West Germany).

*Psychologische Forschung*, vol. 32, Aug. 22, 1968, p. 124–134. 14 refs.

Subjects on a horizontally moving parallel swing perceive a change of the position of the body of the Subjective Vertical (SV). The magnitude of the SV-change was recorded at different body positions on the swing. The SV-change was smaller when the vertex-base head-axis was oriented parallel or close to parallel to swing movement than when the vertex-base head axis was oriented perpendicular to this movement. Perpendicular orientation implies either head vertex-up or head vertex-down. The results are discussed with respect to other findings on the various sensory input systems.

**A69-80039**

**PERSONALITY COMPONENTS OF DECISION MAKING. 1. RELATIONSHIPS BETWEEN DECISION-MAKING BEHAVIOR AND INTERFERENCE PRONENESS. [PERSONLICHKEITSSPEZIFISCHE KOMPONENTEN DES ENTSCHEIDUNGSVERHALTENS. 1. BEZIEHUNGEN ZWISCHEN DER INTERFERENZNEIGUNG UND DEM ENTSCHEIDUNGSVERHALTEN].**

Robert W. Goldsmith (Freien U., Psychol. Inst., Berlin, East Germany).

*Psychologische Forschung*, vol. 32, Aug. 22, 1968, p. 135–168. 42 refs. In German.

Relationships between proneness to perceptual interference and decision-making behavior were investigated. Sixty-four subjects took part in two experiments. In one, designed to measure probability

preferences, success was determined by chance. In the other success depended upon skill in hitting a ball between two posts. In the first experiment, high interference (HI) subjects chose lower probabilities of success. Interpretation of these results was based on the assumption that HI are long samplers and LI (low interference subjects) short samplers. Long sampling was defined as the tendency to process information from a wide area as regards content, space and time-span. The respective sampling tendencies were held to induce the subjective probabilities of HI to be displaced toward the middle of the scale, those of LI toward the extremes in relation to objective probabilities. Hypothetical values corresponding to this conception were inserted in EDWARDS' SEU-model. Predictions of the model concurred with our results. Also explainable in terms of sampling were the findings that HI differentiated to a lesser degree between the relative difficulty of the left and right positions in the ball-hitting tasks and demonstrated less intransitivity in decisions containing two aspects of unequal subjective importance. It could be shown that a wide range of results reported in the literature on the interference phenomenon are interpretable on the basis of long and short sampling.

**A69-80040**

**ON THE RELIABILITY OF THE WORK CAPACITY-PULSE INDEX (LPI) AFTER E. A. MULLER AS CRITERION OF PHYSICAL FITNESS [UBER DIE ZUVERLASSIGKEIT DES LEISTUNGSPULSINDEX (LPI) NACH E. A. MULLER ALS KRITERIUM DER KÖRPERLICHEN LEISTUNGSFAHIGKEIT].**

Wolfgang Ehrenstein and Wolf Müller-Limmroth (Tech. Hochschule, Inst. für Arbeitsphysiol., Munich, West Germany).

*Internationale Zeitschrift für Angewandte Physiologie*, vol. 26, Sep. 10, 1968, p. 189–204. 17 refs. In German.

In two mo. 489 capacity-pulse indices (LPI) were run on nine women and four men between 20 and 28 yr. of age. Standard conditions were observed except for optimum room temperature. The median values of LPI fluctuated between 2.74 and 5.55, the standard deviations between  $\pm 0.25$  and  $\pm 0.50$ . Standard deviations were independent of medial LPI; the 95% reliance ranges of the median values from groups of three subsequent LPIs each fluctuated between  $\pm 8.2\%$  and  $\pm 25.4\%$  of the respective median value from all LPIs of one subject. A linear increase in pulse frequency during the 10 min. capacity test was not observed; pulse frequency climbs steeper with increasing load. In 5 of 13 subjects a significant negative correlation between LPI and starting pulse was observed, caused in all probability only in part by high room temperatures on hot days.

**A69-80041**

**THE RELATION BETWEEN TILT TABLE AND ACCELERATION TOLERANCE AND THEIR DEPENDENCE ON STATURE AND PHYSICAL FITNESS [DIE ABHÄNGIGKEIT DER ORTHOSTASE- UND BESCHLEUNIGUNGSTOLERANZ VON KÖRPERBAU UND LEISTUNGSFAHIGKEIT].**

K. E. Klein, F. Backhausen, H. Bruner, J. Eichhorn, D. Jovy, J. Schotte, L. Vogt, and H. M. Wegmann (Deut. Versuchsanstalt für Luft- und Raumfahrt e. V., Inst. für Flugmed., Bad Godesberg, and Deut. Sporthochschule, Sportphysiol. Inst., Cologne, West Germany).

*Internationale Zeitschrift für Angewandte Physiologie*, vol. 26, Sep. 10, 1968, p. 205–226. 50 refs. In German.

Experimental studies in a group of 12 highly trained athletes ( $VO_2$ /max: 4.6 l./min.) and a group of 12 untrained students ( $VO_2$  max: 3.4 l./min.) lead to the following results: (1) during a 20 min. tilt ( $90^\circ$ ), which included two additional respiratory maneuvers, the number of faints and the average cardiovascular responses did not differ significantly between the groups, except for a lower heart

## A69-80042

rate level in athletes; (2) during linear increase of acceleration with a rate of 1 g/15 sec. the average  $+g_z$ -tolerance (blackout level) was almost identical in both groups, being 6.9 for the athletes and 6.8 for the students; (3) statistically significant coefficients of the product-moment correlation were calculated in the total of both groups for the interrelation of the following variables: (a)  $+g_z$ -tolerance arterial blood pressure at rest ( $r = +0.48$  to  $0.55$ ); (b)  $+g_z$ -tolerance and heart-eye distance ( $r = -0.41$ ); and (c) total body length and responses of mean arterial pressure to tilt (in fainsters:  $r = -0.11$ , in non-fainsters:  $r = +0.47$ ); (4) the coefficient of multiple determination computed for the dependence of  $+g_z$ -tolerance on heart-eye distance and systolic blood pressure at rest ( $R^2_{1,23} = 0.492$ ) allows the explanation of almost 50% of the variation of  $+g_z$ -tolerance, instead of 16%, respectively 23%, if the two independent variables are used singly; and (5) the maximal oxygen uptake showed the expected significant correlation to the heart rate at rest ( $r = -0.68$ ), but not to the acceleration tolerance or to the cardiovascular responses to tilting.

## A69-80042

### ADAPTATION OF TRAINED ATHLETES' ENERGY EXPENDITURE TO REPEATED CONCENTRIC AND ECCENTRIC MUSCLE CONTRACTIONS.

V. Seliger, L. Dolejš, V. Karas, and I. Pachlopnikova (Charles U., Fac. of Phys. Educ. and Sports, Dept. of Physiol., Prague, Czechoslovakia).

*Internationale Zeitschrift für Angewandte Physiologie*, vol. 26, Sep. 10, 1968, p. 227-234. 18 refs.

At the beginning and end of a 13 wk. strengthening period, the energy expenditure was examined in 15 trained athletes. Half the athletes (A) trained in a traditional manner by lifting weights whose weight corresponded to 90 to 95% of the maximum weight of which the athletes were able to lift. (concentric contraction). The other half (B) trained only by lowering weights whose weight corresponded to 145 to 150% of the maximum lifted weight (eccentric contractions). Both concentric and eccentric strengthening led to equal strength increases in both lower and upper limbs. Towards the end of the training, the energy expenditure needed for one dumb-bell lifting decreased from the initial 6.0 to 5.3 kcal., while the energy expenditure, needed for one dumb-bell lowering changed from the initial value of 4.7 to 4.0 kcal. The energy expenditure, related to kg. body weight and to kg. load weight decreased from the initial value of 0.68 to 0.40 cal./kg./kg. dumb-bell weight in lifting and from 0.36 to 0.21 cal./kg./kg. dumb-bell weight in lowering. The ratio of dumb-bell lifting to lowering increases from the initial value of 1.87 to 1.94 at the end of the training. Oxygen uptake for all the experiment and especially the oxygen debt decreased towards the end of training in spite of the fact, that the weight load increased substantially. It was shown that strengthening using eccentric contractions is more advantageous from the point of view of the energy expenditure when compared with strengthening using concentric contractions. Since it leads to equal strength increases as a training using concentric contractions, it may be used as a further means of a controlled strengthening.

## A69-80043

**SELFCONTROL OF THE VEGETATIVE SYSTEM, WITH PARTICULAR REFERENCE TO THE TRAINING CAUSED DEVELOPMENT OF VAGOTONUS, AS SEEN FROM THE STANDPOINT OF CONTROL-THEORY [ÜBER DIE SELBSTSTEUERUNG DES VEGETATIVUMS, INSBESONDERE DIE TRAININGSBEDINGTE ENTWICKLUNG EINER VAGOTONIE, VOM STANDPUNKT DER REGELUNGSLEHRE].**

M. G. Koch (Kiel, U., Physiol. Inst. and Inst. für Bioklimatol., West Germany).

*Internationale Zeitschrift für Angewandte Physiologie*, vol. 26, Sep. 10, 1968, p. 235-244. 36 refs. In German.

Investigations of blood gases on healthy persons revealed correlations between the relative training state and the "Fullblood" buffer base content. An interpretation is being considered, that can at the same time represent one of the searched for intermediate steps in the vegetative regulation: Frequent physical stress leads, if the respiratory and the cardiovascular systems can no longer meet the demands for a constant blood-pH, to an intermittent blood acidity. In this case the slower metabolic processes come to function, that means acid elimination and the renal base retention. As a consequence a gradual increase of "Fullblood" buffer bases results. This causes during the activity pauses a light, rather metabolic alkalosis, in response to which again primarily the quicker respiratory and cardiovascular dynamic reactions ensue. These consist of, a stepping down of the corresponding values to a vagotonal sparing stage, by which at the same time the prerequisite conditions for the inert metabolic regulations are withdrawn. In this way a temporal fixation of this state results, by which the leading values of the systems involved can attain afresh their optima and in this way become rather permanently shifted. Vagotonus would therefore be dependent on the post-stress phase, the dimensions of which would be determined among other things by the conditional susceptibility to base retention and other regulation mechanisms. This principle may be generalized. Considerations of clarifying problems follow.

## A69-80044

**RELATIONSHIPS BETWEEN EXERCISE AND RECOVERY HEART RATES; THEIR DEPENDENCE ON WORK LOAD AND DURATION OF RECOVERY WITH SPECIAL REFERENCE TO THE BEHAVIOR OF THE HEART RATE DURING RECOVERY [ÜBER BEZIEHUNGEN ZWISCHEN DER HERZFREQUENZ WAHREND ARBEITSLAISTUNG UND IN DER ERHOLUNGSPHASE IN ABHÄNGIGKEIT VON DER LEISTUNG UND DER ERHOLUNGSDAUER; ZUGLEICH EINE BETRACHTUNG ZUM VERHALTEN DER HERZFREQUENZ IN DER ERHOLUNGSPHASE].**

H. P. Millahn and H. Helke (Rostock, U., Physiol. Inst., East Germany).

*Internationale Zeitschrift für Angewandte Physiologie*, vol. 26, Sep. 10, 1968, p. 245-257. 17 refs. In German.

During and after performances of 50, 100, 150, and 200 w. in 45 healthy male subjects the heart rate was continuously measured. Between the recovery pulse rate and the heart rate during exercise the coefficients of correlation, the equations of the regression lines and the coefficients of variation were determined. Fifteen to 30 sec. following exercise the correlations are fixed. With the increase of the duration of recovery the coefficients of correlation decrease. In a range of 50 to 200 w. the values of the coefficients of correlation are independent on the work load. The curve of the recovery pulse rate can be described by summarizing two exponential functions. During the first phase the velocity of recovery measured by the recovery constants and the half time constants is smaller in higher work loads and therefore higher exercise heart rates.

## A69-80045

**OSCILLATIONS OF ACID-BASE EQUILIBRIUM DURING MAXIMUM EXERCISE.**

Roy J. Shephard (Toronto, U., School of Hyg., Dept. of Physiol. Hyg., Canada).

*Internationale Zeitschrift für Angewandte Physiologie*, vol. 26, Sep. 10, 1968, p. 258-271. 19 refs.

Natl. Health and Welfare, Dept. supported research.

Respiratory oscillations of alveolar  $CO_2$  tension were studied during maximum exercise, using (I) a computer simulated nine-slice model of the lungs, (II) a rapid response infra-red gas analyzer sampling at the mouth, and (III) measurements of the  $CO_2$  tension of arterialized capillary blood by the Åstrup apparatus. The computer



calculations indicate oscillations of five to six mm. Hg. in individual slices, with a mean gradient of three to four mm. Hg. between the uppermost and the lowest slice. These oscillations are increased by a slowing of respiratory rate, a decrease of mean alveolar volume, and a gasping pattern of respiration; alterations of dead space, respiratory minute volume, and the blood flow pattern have a minor influence on the size of oscillations. The theoretical mean alveolar CO<sub>2</sub> tension during exercise corresponds to a point on the measured plateau between the middle of the plateau and the end-tidal tension. Oscillations are not sufficient to influence the respiratory control mechanism, owing to the damping influence of the blood stream and intervening tissues. The alveolar-arterial CO<sub>2</sub> tension gradient during heavy exercise amounts to one to two mm. Hg. Much of this gradient is due to the slow rate of reaction between red cells and CO<sub>2</sub>.

**A69-80046****INTENSITY, DURATION AND FREQUENCY OF EXERCISE AS DETERMINANTS OF THE RESPONSE TO A TRAINING REGIME.**

Roy J. Shephard (Toronto, U., School of Hyg., Dept. of Physiol. Hyg., Canada).

*Internationale Zeitschrift für Angewandte Physiologie*, vol. 26, Sep. 10, 1968, p. 272-278. 18 refs.

Natl. Health and Welfare, Dept. supported research.

A group of 39 sedentary subjects were trained on the treadmill, using one of three graded intensities of effort (walking at 3.5 m.p.h., 0% slope, equivalent to 39% of their aerobic power; running at 5 m.p.h., 1% slope, equivalent to 75% of their aerobic power; and running at 5 m.p.h., 6% slope, equivalent to 96% of their aerobic power). Exercise was undertaken one, three, or five times/per wk., and was maintained for 5, 10, or 20 min./session. The main factor influencing the extent of training achieved was the intensity of effort relative to the subject's initial aerobic power. However, training was also influenced by the frequency of exercise and (marginally) by its duration. Some training was achieved even at the lowest intensity of exercise, but the most effective regime involved the combination of maximum intensity, frequency and duration of effort.

**A69-80047****SENSORY MOTOR COORDINATION PROCESSES DURING DIRECTION LOCALIZATION [SENSUMOTORISCHE KOORDINATIONSPORZESSE BEI RICHTUNGSLOKALISATION].**

Anton Hajos (Inst. für Psychol., Marburg, West Germany).

*Zeitschrift für Experimentelle und Angewandte Psychologie*, vol. 15, no. 3, 1968, p. 435-461. 12 refs. In German.

A model was designed for subsystems of sensory localization of direction. The predictions of the model were then critically reflected upon in three different experiments. The model predicts that each direction finding system has a compound assignment to solve. The first in an information processing assignment in which sensory signals relevant for directions as well as for the self movements of receptors are to be transformed into position signals of the effectors. The second assignment consists of predicting motion patterns from sensory signals. These predictions had previously been controlled by active movement. The predicted motion patterns for the various effectors are compared with one another. This comparison of predictions is termed coordination and is a criterion for the unity of subjective space. The functional success of the localization determined previously by active movement is demonstrated in three experiments.

**A69-80048****SIZE CONSTANCY AND GEOMETRIC-OPTICAL ILLUSIONS [GROSSENKONSTANZ UND GEOMETRISCH-OPTISCHE TAUSCHUNGEN].**

Gert Haubensak (Münster, U., Psychol. Inst., West Germany).

*Zeitschrift für Experimentelle und Angewandte Psychologie*, vol. 15, no. 3, 1968, p. 462-466. In German.

Apparent depth seems to be a sufficient but not a necessary condition to evoke size constancy, the necessary condition lying in a submission-dominance relationship between the object to be judged and the surrounding area. When the middle segment of a three-sected line is seen as dominated by the other two segments, it is over-estimated in a way which comes close to size constancy processes. Size constancy and at least some geometrical optical illusions seem to be homologous.

**A69-80049****THERMAL CHANGES IN PALMAR SKIN RESISTANCE PATTERNS.**

Eva Neumann (Gwynedd-Mercy Coll., Dept. of Psychol., Gwynedd Valley, Pa.).

*Psychophysiology*, vol. 5, Sep. 1968, p. 103-111. 17 refs.

In contrast to the usual description of a uniformly low basal skin resistance at the human palmar surface as compared with other parts of the body, the present studies reveal skin resistance patterns (SRPs) with different resistance values at different subregions of palm and forearm. The shape of these patterns is related to the season in which the experiment was performed. Three basic SRPs are described, for winter, summer, and prolonged summer heat spell, respectively: (a) an alternating pattern; (b) an oblique pattern; and (c) a so-called summer reversal pattern. The distinguishing factor for this categorization is the reciprocal electrodermal behavior of the mid-palm and arm regions. The resistance of the palm is relatively low in the winter, intermediate in the early summer and high in a summer heat spell, while the resistance of the arm is high in winter and summer and low in the heat spell. Experimental heating and cooling leads to independent variation of the skin resistance values at different subregions and differs as a function of the basic seasonal SRP. A follow-up study shows that children have a less differentiated pattern, which, at all seasons tested, is similar to the oblique summer pattern of adults. The studies are considered exploratory.

**A69-80050****DEEP INSPIRATIONS AS STIMULI FOR RESPONSES OF THE AUTONOMIC NERVOUS SYSTEM.**

Robert M. Stern and Carol Anshel (Pa. State U., University Park).

*Psychophysiology*, vol. 5, Sep. 1968, p. 132-141. 36 refs.

Contract Nonr 908 (15).

The effects of four types of deep breaths on the latency, the magnitude and the duration of finger volume pulse, heart rate and galvanic skin responses were studied in a quasi-learning situation. The respiratory stimuli were normal inspirations, three times deeper than normal, six times deeper and fast, and six times deeper and slow. Twenty subjects took each type of deep breath in random order six times in response to specific lights. Graphs and statistical tests are presented summarizing the above relationships and two unexpected findings are discussed.

**A69-80051****THE DISPLACEMENT OF STAGES 4 AND REM SLEEP WITHIN A FULL NIGHT OF SLEEP.**

H. W. Agnew, Jr. and Wilse B. Webb (Fla., U., Dept. of Psychol., Gainesville).

*Psychophysiology*, vol. 5, Sep. 1968, p. 142-148. 11 refs.

Stage four typically occurs dominantly in the first third of a normal night of sleep and rapid eye movement (REM) sleep

## A69-80052

occurs dominantly in the last third of the night. In this experiment conditions were imposed to prevent these stages from occurring at their usual peak periods. Stage four sleep was permitted to occur only during the last two h. of sleep and REM was permitted to occur only during the first two h. of sleep. The results show that each stage can be partially displaced to the peak period of the other, but that stage four sleep is elicited more readily late in the sleep period than is REM early during the night.

## A69-80052

### SKIN POTENTIAL, HEART RATE, AND THE SPAN OF IMMEDIATE MEMORY.

Paul E. Thetford, Mary E. Klemme, and Herbert E. Spohn (Menninger Found., Res. Dept., Topeka, Kan.).

*Psychophysiology*, vol. 5, Sep. 1968, p. 166-177. 17 refs. Grant PHS MH 03924.

Relations between orienting response and span of immediate memory were studied by measuring skin potential responses (SPR) and heart rate (HR). Four conditions were studied by presenting letters in a tachistoscope and a 1,000 cycle, 100 db. tone simultaneous on some but not all trials. The conditions (15 subjects in each) were: tone and letters for 10 trials, then letters alone for 10 trials; tone and letters for 20 trials; only letters for 10 trials, followed by letters and tone for 10 trials; and only letters for 20 trials. The results showed: (1) positive SPR habituated and negative did not; (2) tone produced more SP activity; (3) HR showed a shift from acceleration to deceleration over 20 trials, but tone had no influence; (4) tone had no direct influence on span scores; and (5) subjects showed improvement in number of letters reported correctly. There was a significant correlation between span and negative SPR when tone was sounded ( $r = .36$ ).

## A69-80053

### ROLE OF THE STOMATOLOGIST IN THE IDENTIFICATION OF AIR CRASH AND SHIPWRECK VICTIMS [ROLA STOMATOLOGA W IDENTYFIKACJI OFIAR KATASTROF LOTNICZYCH I MORSHICK].

Roman Szeja.

*Lekarz Wojskowy*, vol. 44, Mar. 1968, p. 171-174. 13 refs. In Polish.

The role of the stomatologist was evaluated, and the methods of dental identification at his disposal were analyzed. Teeth by their relative great resistance to destruction and the individuality of their components presented one of the most reliable methods of identification of victims of mass casualties. The establishment by the Air Forces and Navy of files containing detailed the accurate dental records of all enlisted men would facilitate post-mortem identifications.

## A69-80054

### EFFECT OF OXYGEN BREATHING ON THE BACTERIAL FLORA OF THE NASAL AND BUCCAL CAVITIES, INCLUDING THE GINGIVAL POCKETS [WPLYW ODDYCHANIA TLENEM NA FLORE BAKTERYJNA NOSA I JAMY USTNEJ ZE SZCZEGOLNYM UWZGLEDNIENIEM KIESZONEK OKOLOZEBOWYCH].

Michał Jendyk and Henryk Klimek.

*Lekarz Wojskowy*, vol. 44, Mar. 1968, p. 175-181. 8 refs. In Polish.

The effect of oxygen ( $O_2$ ) on the bacterial flora of the nasal and buccal cavities was investigated. In 76 pilots aged 22-25 yr. 30 min. exposure to  $O_2$  at normal pressure and at low pressure increasing gradually to 148 mm. Hg had an inhibiting effect on the bacterial flora of the nasal and buccal mucous membranes. In pilots, who during flights were often required to breath  $O_2$ , the inhibitory effect of  $O_2$  on the bacterial flora could exercise a beneficial influence on the state of the nasal and buccal mucous membranes.

## A69-80055

### THE DIURETIC EFFECT OF ACETYLCHOLINE IN THE CHICKEN.

M. L. Parmelee and M. K. Carter (Tulane U., School of Med., Depts. of Pharmacol. and Physiol., New Orleans).

*Archives Internationales de Pharmacodynamie et de Therapie*, vol. 174, Jul. 1968, p. 108-117. 17 refs.

NASA and La. Heart Assn. supported research.

Acetylcholine, 2.5-7.5  $\mu\text{gm./kg./min.}$ , was infused unilaterally into the renal portal system of hens, and urine was collected according to the technique originally developed by Sperber. Acetylcholine caused significant increases in excretion of water, sodium, chloride and potassium by the kidney on the infused side only. The apparent tubular excretion pattern of PAH increased simultaneously, probably as a result of better closure of the valve which controls venous blood flow to the peritubular area of the kidney. The diuresis was a dose-dependent response and was blocked by atropine, 10  $\mu\text{gm./kg./min.}$  Butyrylcholine infused at comparable levels, 9.6-14.4  $\mu\text{gm./kg./min.}$ , did not cause a diuresis. It had been found that acetylcholine increased the uptake of sodium and oxygen consumption by rat kidney slices, while butyrylcholine had no effect. The results of the present study seem consistent with these *in vitro* effects of acetylcholine and butyrylcholine, and tend to support the hypothesis that acetylcholine produces a diuresis by exerting a direct effect on renal tubular function in addition to any possible vasodilator effect.

## A69-80056

### COMPARATIVE EFFECTS IN HUMAN SUBJECTS OF THREE HYPNOTICS AND PLACEBO ON MENTAL AND MOTOR PERFORMANCE.

H. L. Kaplan, R. B. Forney, F. W. Hughes, and A. B. Richards (Ind. U., School of Med., Dept. of Pharmacol. and Toxicol., Indianapolis).

*Archives Internationales de Pharmacodynamie et de Therapie*, vol. 174, Jul. 1968, p. 181-191. 12 refs.

*Intern. Congr. of Physiol. Sci., 23rd, Tokyo, Sep. 1-9, 1965.*

Abbott Labs. supported research.

The relative effects of ethchlorvynol, glutethimide, secobarbital and placebo on mental and motor performance were measured in subjects aroused after four and eight hr. of drug-induced sleep. Each of eight medical or graduate students received one of the four agents at bedtime on four nonconsecutive nights, according to a double-blind replicated  $4 \times 4$  random plan. Mental performance was measured with a Delayed Auditory Feedback system utilizing nine separate tests. At four hr., there was some impairment of mental activity with glutethimide as compared to each of the other three drug treatments. Less variation in mental performance was evident among the latter drugs. At eight hr. after drug administration, mental acuity was generally better after placebo than after ethchlorvynol, glutethimide or secobarbital. Ethchlorvynol resembled placebo most closely. Attentive motor performance was measured with a Pursuit Meter. At four hr., there was significant motor impairment with glutethimide in two tests when compared to secobarbital and in one test when compared to ethchlorvynol. At eight hr., there was a trend towards impairment of motor performance by secobarbital as compared to each of the other drugs.

## A69-80057

### THE USE OF LIQUID-JUNCTION ELECTRODES IN RECORDING THE HUMAN ELECTROCARDIOGRAM (ECG).

L. A. Geddes, L. E. Baker, and A. G. Moore (Baylor U., Coll. of Med., Houston, Tex.).

*Journal of Electrocardiology*, vol. 1, no. 1, 1968, p. 51-55. 16 refs.

Grant PHS 5-T1-HE 05125 C10.

The electrical behavior of liquid-junction electrodes for recording the electrocardiogram (ECG) was studied in relation to electrode area and input impedance of the ECG apparatus. It was shown that electrodes of the size commonly used (10 mm.) require an input impedance well above three megohms if amplitude loss is to be avoided.

**A69-80058****THE ISCHEMIC T LOOP DURING AND FOLLOWING EXERCISE—A VECTOR-ELECTROCARDIOGRAPHIC (VECG) STUDY.**

Julien H. Isaacs, Morris Wilburne, Harold Mills, Robert Kuhn, Seymour L. Cole, and Herbert Stein (Cedars-Sinai Med. Center, Div. of Med. and Cedars-Sinai Med. Res. Inst., Los Angeles, Calif.). *Journal of Electrocardiology*, vol. 1, no. 1, 1968, p. 57-75. 32 refs.

Grant PHS HE 07335; Roche Labs. and Warner-Lambert Pharm. Co. supported research.

The characteristics of an ischemic T loop were predicted from the ischemic ST segment. These characteristics were compared with T loop characteristics observed during and following a treadmill exercise in 73 subjects with heart disease of which 66 had ischemic heart disease (either angina or healed myocardial infarction). Twenty-one normal subjects were studied for comparison. The Frank vector loops and electrocardiogram (ECG) leads I, AVF, and V3R were monitored continuously before, during, and after exercise. Exercise was terminated at the onset of (1) disabling dyspnea and fatigue, (2) angina, (3) an ischemic ST segment, or (4) at ten min. Results indicated that continuous monitoring of vector loop and axial ECG traces during and following exercise will detect ischemic changes earlier and with greater frequency than continuous ECG monitoring alone.

**A69-80059****EFFECT OF STATE OF AROUSAL ON CLICK-EVOKED RESPONSES IN CATS.**

Warren O. Wickelgren (Yale U., Dept. of Psychol., New Haven, Conn.).

*Journal of Neurophysiology*, vol. 31, Sep. 1968, p. 757-768. 27 refs.

*Am. Physiol. Soc., Fall Meeting, Washington, D. C., 1967.*

Grant NSF G-23584.

The click-evoked response in the central auditory system (cochlear nucleus, superior olive, inferior colliculus, medial geniculate and primary auditory cortex) and in the cerebellar vermis was studied during the sleep-waking cycle in freely moving cats. The acoustic control procedures used in this experiment (earphones, sectioning of middle ear muscles, elimination of data confounded by masking noise and movement of the animals, etc.) resulted in marked constancy in the acoustic input to the auditory system. During the sleep-waking cycle click-evoked responses from cochlear nucleus, superior olive, and inferior colliculus were highly stable, whereas responses from medial geniculate, primary auditory cortex, and cerebellar vermis were highly labile. The presence or absence of the middle ear muscles did not affect the results in this experiment. However, cats with uncut muscles were not studied during rapid eye movement sleep, and there is already evidence that during this state the middle ear muscles contract and attenuate central click-evoked responses. At click rates over six sec., during states of drowsiness and slow-wave sleep, large responses developed at medial geniculate and primary auditory cortex. These augmenting responses were blocked by alerting stimuli or by the animal's own movement. The augmenting responses recorded here to natural auditory stimulation are comparable to those elicited by electrical brain stimulation in acute experiments.

**A69-80060****EFFECTS OF WALKING AND FLASH STIMULATION ON CLICK-EVOKED RESPONSES IN CATS.**

Warren O. Wickelgren (Yale U., Dept. of Psychol., New Haven, Conn.).

*Journal of Neurophysiology*, vol. 31, Sep. 1968, p. 769-776. 15 refs.

*Am. Physiol. Soc., Fall Meeting, Washington, D. C., 1967.*

Grant NSF G-23584.

The click-evoked response in the cat's central auditory system (cochlear nucleus, superior olive, inferior colliculus, medial geniculate, and primary auditory cortex) and in the cerebellar vermis was studied during controlled walking of the cat and during novel flash stimulation. Controls for peripheral acoustic variability included earphones, sectioning of some cats' middle ear muscles, and elimination of data confounded by masking noise and uncontrolled movements made by the cat. Quiet walking by a cat as opposed to quiet resting did not affect click-evoked responses from central auditory system structures in cats with either sectioned or unsectioned middle ear muscles. Cerebellar vermis responses, however, were greatly attenuated during walking. Novel flash stimulation did not affect click-evoked responses from central auditory system structures in cats with sectioned and unsectioned middle ear muscles alike. Cerebellar vermis click-evoked responses, however, were reduced during flash stimulation in informal testing.

**A69-80061****EFFECT OF ACOUSTIC HABITUATION ON CLICK-EVOKED RESPONSES IN CATS.**

Warren O. Wickelgren (Yale U., Dept. of Psychol., New Haven, Conn.).

*Journal of Neurophysiology*, vol. 31, Sep. 1968, p. 777-784. 30 refs.

Grant NSF G-23584.

The click-evoked response in the cat's central auditory system (cochlear nucleus, superior olive, inferior colliculus, medial geniculate, and primary auditory cortex) was recorded during behavioral acoustic habituation in four cats. Controls for peripheral acoustic variability included earphones, sectioning of middle ear muscles, and elimination of data confounded by masking noise and uncontrolled movements made by the cat. The cats were awake throughout the habituation procedure. Responses from cochlear nucleus, superior olive, and inferior colliculus remained stable during behavioral habituation to clicks. Responses from medial geniculate and auditory cortex showed highly significant reductions during behavioral acoustic habituation. Only the late surface-negative component of the cortical response was reduced during habituation in three of the four cats. In the fourth cat both early surface-positive and late surface-negative components were reduced. At the geniculate the earliest peak-to-peak component showed reduction during habituation.

**A69-80062****SHIFT OF THE CARBON DIOXIDE-DISSOCIATION CURVE OF THE BLOOD IN ACUTE RESPIRATORY ACIDOSIS AND ITS CAUSES. 2. STUDIES ON HUMANS [VERÄNDERUNGEN DER KOHLENSÄURE-BINDUNGSKURVE DES BLUTES BEI AKUTER RESPIRATORISCHER ACIDOSE UND IHRE URSACHEN. 2. UNTERSUCHUNGEN AM MENSCHEN].**

Dieter Böning and Karl W. Heinrich (Cologne, U., Inst. für Normale und Pathol. Physiol., West Germany).

*Pflügers Archiv European Journal of Physiology*, vol. 303, Sep. 4, 1968, p. 162-172. 15 refs.

Deut. Forschungsgemeinschaft supported research.

The influence of a short respiratory acidosis on standard bicarbonate and some other blood parameters was investigated in ten humans breathing a gas mixture of 7.5% CO<sub>2</sub> and O<sub>2</sub> for

#### A69-80063

15 min. Before and after the period of hypercapnia the subjects respired pure oxygen. Standard bicarbonate, pH,  $p\text{CO}_2$ , plasma protein- and hemoglobin concentrations, hematocrit and electrolyte concentrations were determined in nearly arterialized venous blood and plasma. The plasma values were measured after anaerobic sampling of blood and after equilibration of blood with nearly 40 mm. Hg  $p\text{CO}_2$  at 38° C. (conditions of standard bicarbonate). During the respiratory acidosis venous pH dropped from 7.40 to 7.28. Standard bicarbonate concentration decreased about one mval./l. compared with the preceding period of oxygen breathing. The hemoglobin content of the blood increased about 0.4%, the hematocrit about 1.5%. The concentrations of electrolytes in whole blood remained almost unchanged. In plasma water the sodium concentration increased about five mval./l. while in erythrocyte water the sodium concentration decreased six mval./l. and the chloride concentration increased four mval./l. After equilibration with nearly 40 mm. Hg  $p\text{CO}_2$ ,  $\text{Na}^+$  ions shifted back to the cells and  $\text{Cl}^-$  ions back to the plasma. Thus the excess of alkali ions in the plasma was diminished and less bicarbonate could be formed. The main cause of the electrolyte shifts is probably changed activity of the ion pumps in the cell membranes.

#### A69-80063

##### CRITICAL FLICKER FREQUENCIES IN FLICKER PERIMETRY.

Ernst Wolf, Angela M. Gaeta, and Sandra E. Geer (Retina Found., Dept. of Retina Res.; Mass. Eye and Ear Infirmary, Dept. of Ophthalmol.; and Harvard Med. School, Boston, Mass.). *Archives of Ophthalmology*, vol. 80, Sep. 1968, p. 347-351. Grant PHS B-1482.

Flicker fields from 270 individuals between 6 and 95 yr. of age were grouped into nine age ranges, each covering a decade and containing 30 individuals. For each decade, mean critical flicker frequencies were computed for 49 points of the visual field situated on the horizontal, vertical, and oblique meridians from 0° to 60°. These were presented in nine tables of standard flicker frequencies. For each field point the confidence limits have been statistically determined and entered into the tables. These values should be applied in field plots to determine the boundary lines between retinal regions of normal and abnormal functions.

#### A69-80064

##### VERY HIGH FREQUENCY AUDIOMETRIC TECHNIQUE.

Lawrence Vassallo, Joseph Sataloff, and Hyman Menduke (Jefferson Med. Coll. and Hosp., Philadelphia, Pa.). *Archives of Otolaryngology*, vol. 88, Sep. 1968, p. 251-253. 6 refs.

Threshold measurements at 4,000 and 8,000 Hz. were performed on 42 subjects with a standard manual audiometer and a special high frequency audiometer that also generated 4,000 and 8,000 Hz. tones. Correlations of thresholds obtained with the two instruments and their associated techniques were significant at both test frequencies for the male group. Correlations for the female group were lower (but still significant) and this was attributed to the small range of loss for this group. It is suggested that the technique in obtaining thresholds at the frequencies above 8,000 Hz. with the high frequency instrument can be considered satisfactory.

#### A69-80065

##### LONG-TERM EFFECTS OF SOCIAL ISOLATION IN NONSOCIAL ADAPTED RHESUS MONKEYS.

G. D. Mitchell and D. L. Clark (Wis., U., Reg. Primate Res. Center, Madison). *Journal of Genetic Psychology*, vol. 113, Sep. 1968, p. 117-128. 13 refs.

Grant NIH MH-11894.

Four surrogate reared monkeys, socially isolated between three and nine mo. of age and who had been well adapted to the postisolation test room, were compared with four similarly raised nonisolated controls with four feral mothered subjects. Subjects from all three groups were tested at approximately 18 mo. of age in a nonsocial situation in a series of social pairings with three stimulus strangers of equal age. It was concluded: (1) Monkeys raised without a real mother and with only 140 to 147 hr. of peer experience during the first year did not redirect their hostility from a species-mate in an appropriate manner. (2) Total social isolation led to a restricted ability to form normal dominance relationships with social partners. The isolates were immature in their play behavior and emotional in social interactions. (3) Continuing adaptation of the isolates to the postisolation test room lowered the level of nonsocial disturbance. These animals manually explored more than the nonisolates. There was no evidence of an emergence phenomenon. (4) Monkeys who received relatively little social experience during the first year displayed more disturbance behaviors, such as bizarre movements, crouching, rocking, and digit sucking, when compared to real mother-peer reared animals. They also exhibited social hostility and assertive play more frequently than did the more adequately socialized animals, but showed infrequent and inappropriate sexual behavior.

#### A69-80066

##### THE STEREOCHEMISTRY OF DESATURATIONS OF LONG-CHAIN FATTY ACIDS IN *CHLORELLA VULGARIS*.

L. J. Morris, R. V. Harris, W. Kelly, and A. T. James (Unilever Res. Lab., Div. of Biochem., Colworth House, Sharnbrook, Bedford, Great Britain).

*Biochemical Journal*, vol. 109, Oct. 1968, p. 673-687. 14 refs.

A study was made of the stereospecificity of hydrogen removal in the sequential desaturations performed by intact cells of *Chlorella vulgaris* in the biosynthesis of oleic acid, linoleic acid and  $\alpha$ -linolenic acid. By use of erythro- and threo-9,10- $^2\text{H}_2$ -, 12,13- $^2\text{H}_2$ - and -15,16- $^2\text{H}_2$ -labelled precursors, it was demonstrated that the pair of hydrogen atoms removed from each of these positions had the *cis* relative configuration. That the hydrogen atoms removed in oleic acid and linoleic acid formation were of the D absolute configuration was proved by use of D- and L-9- $^3\text{H}$ - and -12- $^3\text{H}$ -labelled precursors. The presence of a substantial kinetic isotope effect of deuterium at both positions of the putative double bond was indicated, suggesting that the mechanism of desaturation involves simultaneous concerted removal of the pair of hydrogen atoms.

#### A69-80067

##### STUDIES ON SWEAT LOSSES OF NUTRIENTS. 3. CALCIUM, MAGNESIUM, AND CHLORIDE CONTENT OF WHOLE BODY CELL-FREE SWEAT IN HEALTHY UNACCLIMATIZED MEN UNDER CONTROLLED ENVIRONMENTAL CONDITIONS.

O. D. Vellar and R. Askevold (Oslo, U., Inst. of Hyg., Norway). *Scandinavian Journal of Clinical and Laboratory Investigation*, vol. 22, no. 1, 1968, p. 65-71. 38 refs.

Aals legat (Med. Fac., Oslo, U.) and Aktieselskapet Borregaards Forskningsfond supported research.

Calcium, magnesium, and chloride contents of whole body cell-free sweat were determined in 27 healthy adult men during one hr. of profuse sweating. The results were correlated mutually and with the corresponding serum levels, body surface area and sweat rate. Results obtained in different seasonal periods (winter vs. spring-summer) were also compared. The mean sweat concentration of calcium was 0.33 mEq./l., of magnesium 0.13 mEq./l. and of chloride 50 mEq./l. No seasonal variations were found. The sweat rate was directly correlated with the concentration of sweat chloride, inversely correlated with sweat calcium, and not

correlated with sweat magnesium. No mutual correlations were found between the three elements, nor with the corresponding serum levels or body surface area. The results of the study emphasize the necessity of considering dermal losses when balance experiments are performed, although values for sweat calcium and magnesium were lower than previously found.

**A69-80068**  
**ARTIFICIAL ACCLIMATIZATION TO HEAT IN CONTROL SUBJECTS AND PATIENTS WITH CHRONIC CONGESTIVE HEART FAILURE AT BED REST.**

G. E. Burch and A. Ansari (Tulane U., School of Med., Dept. of Med. and Charity Hosp., New Orleans, La.)  
*American Journal of the Medical Sciences*, vol. 256, Sep. 1968, p. 180-194. 16 refs.  
 PHS, Rudolph Matas Mem. Fund, and Rowell A. Billups Fund supported research.

Five pairs of subjects were studied at bed rest for artificial acclimatization to heat in a climatic laboratory at Charity Hospital of Louisiana. Each pair included a patient with congestive heart failure (CHF) and a control subject without heart disease. All subjects were studied under identical environmental conditions. The duration of the studies varied from 8 to 18 days. Criteria for defining the acclimatized state are given and the results are presented and discussed. Except for the first two pairs of subjects, tolerance was limited to a maximal environment of 90° F. and 41% RH. In all five patients with congestive heart failure, tolerance to heat was much reduced as compared to control subjects and none of the patients with CHF showed evidence of acclimatization to the hot, dry environment (90° F. and 41% RH). The inability of patients with CHF to acclimatize to heat even at bed rest is discussed in light of certain cardiovascular physiologic changes required for heat acclimatization. It is concluded that such patients cannot depend upon the process of acclimatization while living in tropical or subtropical climates. Measures such as air-conditioning and other means of facilitating heat loss are necessary for lessening the cardiovascular burden and improving cardiac function.

**A69-80069**  
**GENETIC EFFECT OF STATIC ELECTRICITY [GENETICHESKII EFEKTI STATICHESKOGO ELEKTRICHESTVA].**  
 A. P. Dubrov, I. A. Ostriakov, and V. D. Turkov (USSR, Acad. of Sci., Inst. of Gen. Genetics, Moscow).  
*Doklady Akademii Nauk SSSR*, vol. 178, no. 1. 1968, p. 216-217. In Russian.

The effect of constant negative or positive electric potentials on the cytogenetic changes occurring during growth in the root cells of *Allium cepa* was studied. Analysis of the data showed that positive potentials induced a greater rate of chromosome aberrations than negative potentials.

**A69-80070**  
**ON THE NUMBER OF REPRODUCTIVE CYCLES IN PARAMECIA AFTER IRRADIATION AND THEIR SURVIVAL TIME [O CHISLE TSIKLOV RAZMNOZHENIIA PARAMETSII V POSTRADIATSIONNYI PERIOD I SROKAKH IKH GIBELI].**

I. B. Bychkovskaia and G. K. Ochinskaia (Central Sci.-Res. Rentgenol.-Radiol. Inst., Moscow, USSR).  
*Doklady Akademii Nauk SSSR*, vol. 178, no. 1. 1968, p. 222-225. 11 refs. In Russian.

The survival rate, average survival time and reproduction rate of gamma irradiated *Paramecium caudatum* were studied. The results showed that the survival time in irreversibly affected paramecia was not determined by the number of reproductive cycles, the changes in the reproductive processes of paramecia surviving irradiation were insignificant, and that the radiation injury primarily affected cell viability.

**A69-80071**  
**THE EFFECT OF PHYSICAL STRESS ON CORTICAL AND CEREBELLAR ELECTRICAL ACTIVITIES IN SYMPATHECTOMIZED CATS AND RABBITS [VLIANIE FIZICI ESKOI NAGRUZKI NA KORTIKAL'NUIU I TSEREBELLIARNUIU ELEKTRICHESKUIU AKTIVNOST' DESIMPATIZIROVAN-NYKH KOSHEK I KROLIKOV].**

E. N. Klenov, N. G. Savvin, and D. I. Popova (USSR, Acad. of Sci., I. M. Sechenov Inst. of Evolutionary Physiol. and Biochem., Leningrad).

*Fiziologicheskii Zhurnal SSSR*, vol. 54, Jan. 1968, p. 24-32. 17 refs. In Russian.

The bioelectrical activity of the cerebral cortex and cerebellum was studied in sympathectomized and intact cats and rabbits. Long-term changes in the cortical rhythms were observed in the sympathectomized animals at rest, with greater changes during physical work. Variations in the bioelectrical activity of the sensory-motor cortex after physical work were characterized by the appearance of prolonged slow electroencephalographic patterns, a low resistance of fast rhythms and a protected reduction of the background activity. The most pronounced change in the cerebellar electrical activity after sympathectomy was the appearance of slow synchronous rhythms. The data obtained confirmed that the sympathetic innervation was directly related to the regulation of the bioelectrical activity of the central nervous system during rest and to changes during muscular work.

**A69-80072**  
**ELECTROMYOGRAPHIC STUDIES ON THE INTERRELATIONSHIPS BETWEEN THE CENTERS OF ANTAGONIST MUSCLES DURING LOCAL VIBRATION [ELEKTOMIOGRA-FICHESKII ANALIZ VZAIMOOTNOSHENII TSENTROV ANTAGONISTICHESKIKH MYSHTS PRI VOZDEISTVII MESTNOI VIBRATSII].**

S. I. Soroko (Sanit.-Hyg. Med. Inst., Dept. of Normal Physiol., Leningrad, USSR).

*Fiziologicheskii Zhurnal SSSR*, vol. 54, Jan. 1968, p. 33-38. 21 refs. In Russian.

The effect of local vibration of different frequencies on the interaction of the monosynaptic and polysynaptic reflex centers of antagonist muscles was studied electromyographically in rabbits. Rhythmic electrical responses were initiated in the muscle subjected to vibration and in its antagonist. The stimulation of the antagonist muscle reflex occurred through a polysynaptic arc. The effect of local vibration reinforced the reciprocal inhibitory effect of the more labile extensor reflex arcs on less labile flexor arcs. The use of drugs like stychnine during the vibration reinforced the reciprocal influence of olsynaptic reflex arcs of antagonist muscles on monosynaptic reflexes decreasing the lability of the latter. The drug promedol (trimeperidine) by disturbing the relationship between the reflex arcs of antagonist muscles increased the functional mobility of monosynaptic reflex arcs during their stimulation by vibration.

**A69-80073**  
**INVOLUTIONAL CHANGES OF VEGETATIVE FUNCTIONS UNDER MUSCULAR STRESS [INVOLIUTSIONNYE IZMENENIIA VEGETATIVNYKH FUNKTSII PRI MYSHECHNYKH NAGRUZKAKH].**

V. M. Volkov (Inst. of Physics. Cult., Dept. of Physiol., Smolensk, USSR).

*Fiziologicheskii Zhurnal SSSR*, vol. 54, Jan. 1968, p. 109-112. 17 refs. In Russian.

The physical work capacity, the responses and the interaction of the respiratory and cardiovascular functions during muscular work were studied in young and elderly subjects respectively aged 18-20 and 50-60 yr. The subjects exercised until the onset of fatigue. The respiratory minute volume, rate and depth of respiration,

## A69-80074

the blood oxygenation, the oxygen consumption, the pulse rate, and the arterial blood pressure were monitored during the exercises, and the muscular work efficiency was measured. The involuntional changes in elderly subjects were evident under physical stress by a diminished response of all the parameters: a reduction of the functional capacity of the muscular activity; a decrease in the coordination efficiency during exercise, an increase of exertion and a deterioration in the relationship between the respiratory function and blood circulation during the recovery period, a slowing down in the speed of recovery, a lag in repaying the oxygen debt incurred and marked changes of the homeostatic mechanisms.

## A69-80074

**PHASIC ANALYSIS OF THE CARDIAC CYCLE IN MAN BY THE ULTRASONIC DOPPLER VALVULOCARDIOGRAPHY [FAZOVYI ANALIZ SERDECHNOGO TSIKLA U CHELOVEKA PO UL'TRAZVUKOVOI DOPPLER-VAL'VULOKARDIOGRAFI].**

IU. D. Safonov (Med. Inst., Dept. of Hosp. Therapy, Voronezh, USSR).

*Fiziologicheskii Zhurnal SSSR*, vol. 54, Jan. 1968, p. 113-119. 16 refs. In Russian.

Complete analysis of the phases of the cardiac cycle were made selectively for the right and left sides of the heart. Explanation of the mechanism of the cardiac cycle events preceding the isometric ventricle contraction was presented. The significance of this new method for diagnostic purposes was demonstrated and its use in clinical work and physiological research was recommended.

## A69-80075

**SOME ASPECTS OF BRAIN NITROGEN METABOLISM IN RATS AT VARIOUS INTERVALS AFTER EXPOSURE TO HIGH PRESSURE OXYGEN [NEKOTORYE STORONY AZOTNOGO OBMENA MOZGA KRYV V RAZNYE SROKI POSLE DEISTVIA POVYSHENNOGO DAVLENIIA KISLORODA].**

Z. S. Gershenovich and M. M. Gabibov (Rostov-on-Don State U., USSR).

*Doklady Akademii Nauk SSSR*, vol. 178, no. 6, 1968, p. 1430-1431. 10 refs. In Russian.

The variations in the content of ammonia, glutamine, glutamic, aspartic and gamma -aminobutyric acids were studied in the brain of mature rats, at different intervals after exposure to six atm. of pure oxygen. The exposure induced sharp and prolonged disturbances in the brain nitrogen metabolism. The restoration of processes coordinating binding and release of ammonia in the animals surviving hyperoxia was very slow. It seemed that the difficulty of adapting to high oxygen pressure was due to the intensity and duration of brain metabolism disorders caused by oxygen poisoning. Repeated exposures to high oxygen pressure could induce an adaptation or a cumulation of pathological damages in the central nervous system.

## A69-80076

**DYNAMICS OF MAXIMUM OXYGEN CONSUMPTION AND OXYGEN PULSE IN HIGHLY TRAINED ATHLETES [DINAMIKA MAKSIMAL'NOGO POTREBLENIIA KISLORODA I KISLOROD-PUL'SA U VYSOKOKVALIFITSIROVANNYKH SPORTSMENOV].**

S. V. Khrushchev, Z. Izrael', and N. A. Khrushcheva.

*Teoriia i Praktika Fizicheskoi Kul'tury*, vol. 31, Jan. 1968, p. 36-41. 27 refs. In Russian.

The maximum oxygen consumption (MOC), maximum oxygen pulse (MOP), and their relationship to the absolute and relative heart size were studied in 378 highly trained athletes, aged 18-35 yrs., exercising on a bicycle ergometer. The average values of MOC, MOP, and absolute and relative heart size were significantly

higher in athletes than in nonathletes. This was due to the morphological and functional adaptation of the body to systematic physical exertion. The average data on MOC and MOP obtained during exercises on a bicycle ergometer were greater during maximum exertion than the corresponding data in steady state conditions. The values of MOC and MOP were closely related to the absolute and relative size of the heart. By correlating the dynamics of MOC and MOP with the data on the absolute and relative size of the heart the range of the athletes' functional capacity could be evaluated more objectively. Alterations between the morphological and functional heart adaptation indices could be determined in time, and it would help in the planning of future physical training programs.

## A69-80077

**CORRELATION BETWEEN THE WORKLOAD AND THE RATE OF ENERGY METABOLISM AT REST DURING THE TRAINING MICROCYCLE [OSOOTNOSHENII MEZH DU NAGRUZKOI I UROVNEM OBMENA ENERGI I V POKOE V TRENIROVOCHNOM MIKROTSIKLE].**

L. A. Siryk (All-Union Sci-Res. Inst. of Phys. Cult., Moscow, USSR).

*Teoriia i Praktika Fizicheskoi Kul'tury*, vol. 31, Jan. 1968, p. 42-44. In Russian.

A discussion was presented on the effect of workloads during training on the rate of energy metabolism at rest, and the influence of the functional state of the body (based on energy expenditure at rest) on work capacity in a given day. The study was based on data collected (1963-1965) during the training of 30 olympic athletes. The data was analyzed mathematically and the results were presented. A gradual increase in loads from mild to moderate was accompanied by an increase in the rate of energy metabolism at rest the following day, and the work capacity was also slightly increased. Moderate workloads maintained the stability of the metabolic rate at rest, and was the optimum background for the performance of large loads. Performance of heavy workloads produced a decrease of energy expenditure at rest, and led to a higher performance efficiency.

## A69-80078

**PNEUMOTONOMETRIC INVESTIGATION OF ATHLETES [OPYT PNEUMOTONOMETRICHESKOGO OBSLEDOVANI IA SPORTSMENOV].**

KH. A. Shchakson (S. M. Kirov Inst. of Advan. Training of Physicians, Leningrad, USSR).

*Teoriia i Praktika Fizicheskoi Kul'tury*, vol. 31, Jan. 1968, p. 46-48. 22 refs. In Russian.

A pneumotonometric method was used to study the contraction strength of expiratory muscles in 148 athletes. Marked differences in the pneumotonometric indices were conditioned by the state of physical fitness. The indices were related to the kind of sport practiced and the length of training. Pneumotonometry would be a valuable tool in sport medicine to determine the strengthening of expiratory muscles.

## A69-80079

**A DEVICE TO RECORD THE SENSITIVITY OF THE VESTIBULAR SYSTEM [USTANOVKA DL IA REGISTRATSII CHUVSTVITEL'NOSTI VESTIBULIARNOGO ANALIZATORA].**

O. P. Panfilov and G. P. Grigor'ev (Leningrad Sci-Res. Inst. of Phys. Cult., USSR).

*Teoriia i Praktika Fizicheskoi Kul'tury*, vol. 31, Jan. 1968, p. 48-51. In Russian.

A device to determine the absolute (perception threshold) and relative discrimination sensitivity of the vestibular system was

presented and described. The device consisted of a modified version of the barany chair and its recording apparatus. Its use for evaluation of the functional state of the vestibular system in athletes was recommended.

**A69-80080****THE CARBON-DIOXIDE COMPENSATION POINTS IN THE GASEOUS EXCHANGE OF PLANTS [OB UGLEKISLOTNOM KOMPENSATSIONNOM PUNKTE GAZOIBMENA U RASTENII].**

V. L. Voznesenskii (USSR, Acad. of Sci., V. L. Komarov Botan. Inst., Leningrad).

*Botanicheskii Zhurnal*, vol. 53, May 1968, p. 586-598. 48 refs. In Russian.

Based on analysis of the literature and experimental data, the relationships between plant (including *Chlorella*) photosynthesis and respiration were investigated, by studying gaseous exchange. In a closed system with an illuminated assimilating plant, the carbon dioxide (CO<sub>2</sub>) concentration resulting from the dynamic equilibrium between the photosynthesis rate and CO<sub>2</sub> released was determined by the influence of environmental conditions (light, temperature, etc.). It was found that CO<sub>2</sub> concentration in a closed system containing an illuminated *Chlorella* suspension, in favorable conditions, could decrease to zero. Studying the compensation points of different plants it was impossible to determine if respiration in the presence of light was normal or inhibited. The CO<sub>2</sub> assimilation process in illuminated green cells went on up to zero concentration, i.e. no initial threshold of CO<sub>2</sub> concentration was necessary in photosynthesis.

**A69-80081****THE FEATURES OF CHLOROPHOS TOXICITY FOR MICE IN VARIOUS THERMAL CONDITIONS AND PHYSICAL STRAIN [KHARAKTERISTIKA TOKSICHNOSTI KHLOOROFOSA DLIA MYSHEI V RAZLICHNYKH USLOVIAKH TEPLOVOGO VOZDEISTVIA I FIZICHESKOI NAGRUKI].**

P. P. Denisenko, M. M. Ostrovskii, and K. A. Lisitsina (Leningrad Sanit.-Hyg. Med. Inst., Central Sci.-Res. Lab., USSR).

*Gigiena i Sanitariia*, no. 8, Aug. 1968, p. 14-18. 5 refs. In Russian.

The authors created various conditions and thermal regimes in four series of tests on 1,400 mice and different physical strains in five series of tests on 629 mice in order to determine the peculiar features of the effect of these factors on the toxicity of chlorophos (dipterex). The finding was that the thermal effect increased the toxicity of chlorophos while the physical strain had the contrary effect. The toxicity of the substance is restored to a statistically significant level with the action of the thermal factor in 30 min. and that of the physical strain in four hr. The authors discussed the question of the mechanism underlining changes of toxicity under conditions of the joint action of chlorophos and that each of the investigated factors.

**A69-80082****DATA FOR HYGIENIC ASSESSMENT OF IMPULSE NOISE [GIGIENICHESKAIA OTSENKA IMPUL'SNOGO SHUMA].**

E. TS. Andreeva-Galanina, G. A. Suvorov, and A. M. Likhnikskii (Leningrad Sanit.-Hyg. Med. Inst., USSR).

*Gigiena i Sanitariia*, no. 8, Aug. 1968, p. 24-29. In Russian.

An attempt is made to elaborate a complex method for assessing impulse noise in industry that would provide the necessary information on all of its parameters. By using a special measuring apparatus it is possible to accomplish a detailed analysis of the kinetic features of impulse noise. The main criteria for proper hygienic assessment of impulse noise are suggested. Since the

intensity serves as the main parameter of both stable and unstable noise, the authors consider it necessary to carry out a comparative evaluation and compare different kinds of noise on condition that the intensity of stable noise corresponds to the average noise intensity for the maximum period of changes of impulse noise.

**A69-80083****STANDARDIZATION OF HIGH FREQUENCY INDUSTRIAL NOISE FOR ADOLESCENTS [O NORMIROVANII VYSOKOCHASTOTNOGO PROIZVODSTVENNOGO SHUMADLIA PODROSTKOV].**

I. I. Ponomarenko (F. F. Erisman Moscow Sci.-Res. Inst. of Hyg., USSR).

*Gigiena i Sanitariia*, no. 8, Aug. 1968, p. 34-38. 8 refs. In Russian.

Investigation of the effect of noise of an octave range with an average frequency of 1,000 c.p.s. and levels of 75, 70, and 65 db. on hearing, the cardiovascular system and central nervous system of adolescents was carried out in a noiseproof chamber. The noise level of 75 db. that is recommended as the maximum permissible level for adult workers was found to produce a pronounced effect on the body functioning of 15 to 16 yr. old boys. A noise of 70 db. caused somewhat lesser shifts in the investigated functions; nevertheless, they were quite significant. The minimal functional changes were noted at the noise level of 65 db. In the case of adolescents the maximum permissible level for noise with the maximum sound intensity in the range of an octave and average frequency of 1,000 c.p.s. is suggested to comprise 65 db. This corresponds to a curve with an index of 65. The question of considering this curve to be permissible for adolescents requires further investigations.

**A69-80084****THE INFLUENCE OF CHLORPROMAZINE ON INTERACTION BETWEEN CONDITIONED AND UNCONDITIONED REFLEXES IN YOUNG RABBITS [O VLIANII AMINAZINA NA VZAIMODEISTVIE USLOVNYKH I BEZUSLOVNYKH REFLEKSOV U KROL'CHAT].**

D. B. Malakhovskaia (USSR, Acad. of Sci., I. M. Sechenov Inst. of Evolutionary Physiol. and Biochem., Leningrad).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 18, Jul.-Aug. 1968, p. 628-635. 29 refs. In Russian.

A conditioned reflex has been elaborated in young rabbits beginning with the age of ten days based on the developing inborn reflex to a stimulation of the postero-lateral surface of the neck. Experiments with preliminary injection of chlorpromazine were made every seven to ten days. A disparity was observed between the forms of conditioned and unconditioned reflexes. The latter was manifested mostly in scratching movements, and the former almost exclusively in shaking movements. Chlorpromazine acted in an inhibitory way both on the conditioned and unconditioned reflexes, its action being most pronounced in the former case. Chlorpromazine did not affect the relationship between the individual kinds of movements in the conditioned reflex, but substantially changed that between the different kinds of movements in the unconditioned reflex. Hence, there was increased disparity between the forms of conditioned and unconditioned reflexes.

**A69-80085****INFLUENCE OF CAFFEINE ON THE FORMATION AND MANIFESTATION OF CONDITIONED REFLEXES TO TIME [VLIANIE KOFEINA NA OBRAZOVANIE I PROIAVLENIE USLOVNYKH REFLEKSOV NA VREMIA].**

N. D. Kostenko (Bashkir U., Dept. of Human and Animal Physiol., Ufa, USSR).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 18, Jul.-Aug. 1968, p. 621-627. 20 refs. In Russian.

A69-80086

The work is devoted to the investigation of caffeine influences on the formation and manifestation of conditioned reflexes to time in rabbits. The Malinovsky motor food method was used. Subcutaneous chronic injections of 0.06 to 0.3 g. of caffeine, detain the formation of conditioned reflexes to time at intermediate stages. The influence of caffeine on an already formed conditioned reflex to time results in partial or complete disinhibition of its inactive phase. The degree of restoration of such a reflex depends on the type of the rabbit's higher nervous activity.

A69-80086

**EVOKED POTENTIALS TO SOUNDS OF DIFFERENT DIRECTION IN THE AUDITORY CORTEX OF THE CAT; COMMUNICATION. 1. FORM OF EVOKED POTENTIALS [VYZVANNYE OTVETY V SLUKHOVOI KORE KOSHKI NA ZVUKI RAZNOGO NAPRAVLENIIA; SOBSHCHEENIE 1. FORMA VYZVANNYKH POTENTIALOV].**

N. I. U. Alekseenko (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Lab. of Anal. Physiol., Moscow).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 18, Jul.-Aug. 1968, p. 642-649. 35 refs. In Russian.

A comparison was made of evoked potentials (EP) in the auditory and the associative cortical areas (medial ectosylvian and medial suprasylvian gyri) in anesthetized cats (amytal-sodium or chloralose) in response to clicks of equal suprathreshold intensity presented monaurally to the right or left ear. In both areas, the EP form changed depending on the side of the acoustic stimulation. The differences consisted of the response in the presence or absence of certain components: the negative phase of the primary response, the preceding negative or positive oscillation, late positive-negative wave, etc.) In the case of binaural stimulation, EP did not combine both forms, but was close to one of them, peculiar to the ipsi- or contralateral stimulus, while the effect from stimulation of the other ear was inhibited. Thus, the spatial-temporal structure of the response in the auditory and associative zones of the cortex may contain information on the side of the acoustic stimulation.

A69-80087

**CHARACTERISTICS OF TEMPORAL SUMMATION AT DIFFERENT LEVELS OF THE VISUAL SYSTEM OF ANESTHETIZED CATS BY THE THRESHOLDS OF PRIMARY EVOKED POTENTIALS [KHARAKTERISTIKI VREMENNOI SUMMATSII NA RAZNYKH UROVNIAXH ZRITEL'NOI SISTEMY NARKOTIZIROVANNOI KOSHKI PO POROGAM VOZNIKNOVENIIA PERVICHNYKH VYZVANNYKH POTENTIALOV].**

I. A. Shevelev and L. Kh. Khiks (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Moscow).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 18, Jul.-Aug. 1968, p. 650-659. 40 refs. In Russian.

Intensity thresholds of emergence of the first and second wave of the primary evoked response to monocular flashes of white light of various durations from 0.1 to 250 msec. were determined simultaneously in the retina, the optic tract, the lateral geniculate body and the visual cortex of the anesthetized cat. A significant difference in threshold, the critical time and degree of summation was revealed at different levels of the visual system. All the indices of temporal summation successively diminish from the retina to the cortex. An assumption has been made that the lowering of the thresholds and the shortening of the critical time of summation in the upper parts of the analyzer is due to the previously found synchronization of the initial afferent flow in the visual system, while the diminished degree of summation is a result of successive horizontal inhibition more sharply pronounced in the visual centers.

A69-80088

**TRANSFORMATION OF THE EVOKED POTENTIAL OF THE RABBIT VISUAL CORTEX INTO A DISCHARGE OF THE WAVE-SPIKE TYPE [O TRANSFORMATSII VYZVANNOGO POTENTIALA ZRITEL'NOI KORY KROLIKA V RAZRIAD TIPY VOLNA-PIK].**

M. S. Myslobodskii (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Moscow).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 18, Jul.-Aug. 1968, p. 660-670. 50 refs. In Russian.

In acute and chronic experiments on rabbits, the activity of single elements of the visual cortex and the changes in spontaneous electroencephalograms and evoked potentials were studied after the administration of metrazol and nembutal, after the section of the brain stem, and destruction of some non-specific structures of the mid- and inter-brain. Conditions of the transformation of the rabbit's alpha-rhythm into a paroxysmal rhythm of the wave-spike type were analyzed. Exalted after-discharges and their spontaneous equivalents were formed after the injection of metrazol on the basis of the complex: slow negative wave-late response of a normal evoked potential of the visual cortex. The morphology, parameters and properties of the complex are similar to the wave-spike discharges. The appearance of exalted after-discharges and their spontaneous equivalents, with a frequency of three/sec., has been discovered after impairments in the midbrain-diencephalic area, induced by means of a stereotaxic canule developed for this purpose, and after electrolytic lesions in the area of the mid-brain, the subthalamus and the hypothalamus. It is assumed that the wave-spike discharge is of a centrosthenic nature.

A69-80089

**STABILIZATION OF REACTIONS OF SINGLE NEURONS OF THE VISUAL CORTEX IN A NONANESTHETIZED RABBIT FOLLOWING REPEATED PHOTIC STIMULATION [STABILIZATSIIA REAKTSII OTDEL'NYKH NEIRONOV ZRITEL'NOI KORY NEANESTEZIROVANNOGO KROLIKA PRI MNOGOKRATNOM SVETOVOM RAZDRAZHENII].**

E. N. Sokolov, V. B. Polianskii, and A. Bagdonas (M. V. Lomonosov Moscow State U., Dept. of Physiol. of Higher Nervous Activity, USSR).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 18, Jul.-Aug. 1968, p. 701-707. 6 refs. In Russian.

Of the 42 investigated visual cortical units of the rabbit which respond to light, only three manifested effects connected with the reflex to time. In most of the units which failed to exhibit a reflex to time, an effect of discharge stabilization was developed in the course of repetition of the rhythmic light. It was manifest in that the probability of appearance of spikes increased at some moments of the interval between stimuli, and decreased at other moments. Such elaborated stabilization of responses was disturbed even if one signal in the series was omitted or by the action of foreign stimuli. An assumption has been made that stabilization of unit responses is due to the involvement of postactivation potentiation of excitatory and inhibitory synapses in the neuronal net with lateral inhibition.

A69-80090

**INTERACTION OF PHOTOPIC AND SCOTOPIC AFFERENT SYSTEMS UPON APPLICATION OF INTENSIVE PHOTIC STIMULI [VZAIMODEISTVIE FOTOPICHESKOI I SKOTOPICHESKOI AFFERENTNYKH SISTEM V USLOVIAXH PRIMENENIIA INTENSIVNYKH SVETOVYKH RAYDRAZHIET-ELI].**

P. A. Korzun and V. I. Shostak (S. M. Kirov Mil.-Med. Acad., Dept. of Normal Physiol., Leningrad, USSR).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 18, Jul.-Aug. 1968, p. 708-711. 14 refs. In Russian.



The interaction of the photopic and scotopic systems of the visual analyzer in human beings was studied upon presentation of intensive photic flashes (duration 2.1 msec., brightness 7.2 - 10<sup>7</sup> nt.). It has been shown that the restoration of light sensitivity of peripheral vision after flashes occurs faster when the central (eight degrees) part of the retina is screened. On the other hand, after a diffuse illumination the central vision is restored slower than after stimulation of the central part of the retina only (six degrees). The data obtained testify to a reciprocal relationship between the photopic and scotopic afferent systems of the visual analyzer under the action on momentary extremely bright flashes. The mechanism of such interaction is discussed.

## A69-80091

**PHYSIOLOGICAL CONTROL OF HUMAN RHYTHMIC MUSCULAR ACTIVITY [O FIZIOLOGICHESKOI REGULIATSII RITMICHESKOI MYSHECHNOI DEIATEL'NOSTI CHELOVEKA].**

R. L. Rabinovich (USSR, Acad. of Pedagogical Sci., Sci.-Res. Inst. of Age Physiol. and Phys. Training, Moscow).

*Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 18, Jul.-Aug. 1968, p. 712-717. 16 refs. In Russian.

A study was made of the causes preventing rhythmical muscular activity in man at high frequency. The movements were performed in one series of investigations by the instruction do as fast as possible, in the other, following a flash of white light, in the third, after photic stimuli of different signal significance. It has been found that the possibility of making movements at high frequency is limited by the system of relaying the stimuli from the sensory part of the brain to the motor ones. As the experimental situation becomes more complicated, the maximum frequency of movements decreases. Analysis of the movement elements has shown that as the frequency of the movements rises, there is a parallel shortening of the duration of the whole reaction and of the interval between two touches. The other elements change regardless of the duration of the reaction. The performance of rhythmic muscular activity in man apparently does not require the elaboration of new nervous connections, since from the very first the movements are made within a wide range of frequencies. Repeated participation in the experiment leads to further increase in the range of the reproducible movement frequencies.

## A69-80092

**THE DISTRIBUTION ANALYSIS OF VENTILATION, PERFUSION, AND OXYGEN DIFFUSING CAPACITY IN THE LUNG, THROUGH CONCENTRATION CHANGES FOR THREE INSPIRATORY GASES. 1. THEORY [DIE VERTEILUNGSANALYSE VON VENTILATION, PERFUSION UND SAUERSTOFF-DIFFUSIONSKAPAZITAT IN DER LUNGE DURCH KONZENTRATIONSWECHSEL DREIER INSPIRATIONSGASE. 1. THEORIE].**

G. Thews and H. R. Vogel (Mainz, U., Physiol. Inst., West Germany). *Pflugers Archiv European Journal of Physiology*, vol. 303, Sep. 17, 1968, p. 195-205. 17 refs. In German.

Landesversicherungsanstalt Rheinland-Pfalz, Speyer supported research.

The theoretical basis is given for an examination method which enables the inhomogeneities of the ventilation-perfusion ratio,  $\dot{V}_A/\dot{Q}$ , as well as the diffusing capacity-perfusion ratio,  $D_L/\dot{Q}$  in the human lung to be determined. In addition, the concentrations of three inspiratory gases with different diffusing characteristics, e.g. CO<sub>2</sub>, O<sub>2</sub>, and He, must be suddenly varied, and the subsequent alveolar mixing processes followed. The solutions of the differential equations for the three mixing processes show that their time constants depend to a varying degree on the alveolar ventilation,  $\dot{V}_A$ , the lung perfusion,  $\dot{Q}$ , and the diffusing capacity,  $D_L$ . Hence, the functional distributions of  $\dot{V}_A$ ,  $\dot{Q}$ , and  $D_L$  can be calculated from

the time constants. These distribution curves then provide the basis for the determination of the diagnostically important components of the alveolar-arterial pressure difference, AaD, for oxygen and carbon dioxide. In this way, the AaD<sub>Distr. 1</sub>, which is to be attributed to distribution irregularities in  $\dot{V}_A/\dot{Q}$ , the AaD<sub>Distr. 2</sub>, which depends upon the value and distribution of  $D_L/\dot{Q}$ , and finally, the AaD<sub>sh</sub>, determined by the degree of extrapulmonary shunt, can be found.

## A69-80093

**THE DISTRIBUTION ANALYSIS OF VENTILATION, PERFUSION, AND OXYGEN-DIFFUSING CAPACITY IN THE LUNG, THROUGH CONCENTRATION CHANGES FOR THREE INSPIRATORY GASES. 2. METHOD [DIE VERTEILUNGSANALYSE VON VENTILATION, PERFUSION UND SAUERSTOFF-DIFFUSIONSKAPAZITAT IN DER LUNGE DURCH KONZENTRATIONSWECHSEL DREIER INSPIRATIONSGASE. 2. DURCHFÜHRUNG DES VERFAHRENS].**

H. R. Vogel and G. Thews (Mainz, U., Physiol. Inst., West Germany). *Pflugers Archiv European Journal of Physiology*, vol. 303, Sep. 17, 1968, p. 206-217. In German.

Landesversicherungsanstalt Rheinland-Pfalz, Speyer supported research.

The examination and the evaluation procedure of the method of simultaneous distribution analysis of ventilation, lung perfusion, and O<sub>2</sub> diffusing capacity are described. The test person breathes, in an open spirometric system, a gas mixture (12 vol.% O<sub>2</sub>, 30 vol.% He, and 58 vol.% N<sub>2</sub>), which is suddenly replaced by another inspiration mixture (16 vol.% O<sub>2</sub>, 4.8 vol.% CO<sub>2</sub>, and 79.2 vol.% N<sub>2</sub>). In the subsequent alveolar wash-in and wash-out phase, the end expiratory concentrations are continually followed. The oxygen is analyzed by means of a rapid-measuring platinum electrode, the carbon dioxide by an infra-red absorption recorder, and the helium by an inertia-free catharometer. Simultaneously, the tidal volume is registered with the aid of an integrating pneumotachograph. The evaluation process is designed to enable first of all the determination of the relative values of ventilation, perfusion, and diffusing capacity in four functionally uniform lung compartments. After this, the components of the alveolar-arterial pressure differences for O<sub>2</sub> and CO<sub>2</sub> are calculated. The evaluation process, to be carried out in standardized form, in 11 steps, is explained by means of an example.

## A69-80094

**THE DISTRIBUTION ANALYSIS OF VENTILATION, PERFUSION, AND OXYGEN-DIFFUSING CAPACITY IN THE LUNG, THROUGH CONCENTRATION CHANGES FOR THREE INSPIRATORY GASES. 3. TESTS ON ADOLESCENTS, ELDERLY PEOPLE, AND PREGNANT WOMEN [DIE VERTEILUNGSANALYSE VON VENTILATION, PERFUSION UND SAUERSTOFF-DIFFUSIONSKAPAZITAT IN DER LUNGE DURCH KONZENTRATIONSWECHSEL DREIER INSPIRATIONSGASE. 3. UNTERSUCHUNG VON JUGENDLICHEN, ALTEREN PERSONEN UND SCHWANGEREN].**

H. R. Vogel, G. Thews, V. Schulz, and H. J. von Mengden (Mainz, U., Physiol. Inst., West Germany).

*Pflugers Archiv European Journal of Physiology*, vol. 303, Sep. 17, 1968, p. 218-229. 45 refs. In German.

Landesversicherungsanstalt Rheinland-Pfalz, Speyer supported research.

Fourteen adolescents with healthy lungs, six elderly people with chronic emphysema bronchitis, and ten pregnant women with healthy lungs, were examined by using the method of distribution analysis of ventilation,  $\dot{V}_A$ , perfusion,  $\dot{Q}$ , and O<sub>2</sub> diffusing capacity  $D_L$ . Besides the distribution curves for the function values,  $\dot{V}_A$ ,  $\dot{Q}$ , and  $D_L$ , this method also furnishes the following average values,

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which were obtained throughout the lung: the ventilation-perfusion ratio, the O<sub>2</sub> diffusing capacity-perfusion ratio, the alveolar, end capillary, and arterial O<sub>2</sub> and CO<sub>2</sub> pressures, and the components of the alveolar-arterial pressure differences, as well as the absolute values for the alveolar ventilation, lung perfusion, O<sub>2</sub> diffusing capacity and the extrapulmonary shunt component. The essential test results were summarized.

**A69-80095****A PHYSIOLOGICAL SCHEME AND MATHEMATICAL MODEL OF TEMPERATURE REGULATION IN MAN.**

C. H. Wyndham and A. R. Atkins (South Africa, Chamber of Mines, Human Sci. Lab., Johannesburg).

*Pflugers Archiv European Journal of Physiology*, vol. 303, Aug. 21, 1968, p. 14-30. 26 refs.

Mean skin temperatures, rectal temperatures and sweat rates were measured on four highly acclimatized subjects. They were exposed for 180 min. to 16 different combinations of four metabolic rates and four air temperatures, ranging from cold (10°C.) to hot (49°C.). Mean sweat rates for the second hour were plotted against mean rectal temperatures for four different levels of skin temperature and vice-versa. These graphs indicate, firstly, that sweat rate does not increase until rectal temperature rises above a threshold value of 36.5°C.; thereafter the increase in sweat rate depends upon the level of mean skin temperature, being greater the higher the mean skin temperature. Secondly, sweat rate does not increase markedly until mean skin temperature rises above 33°C. but the increase in sweat rate above 33°C. depends upon the level of rectal temperature, being greater the higher the rectal temperature. The interrelated effects upon sweat rate of mean skin temperature and core temperature can be explained by means of a relatively simple physiological system comprising temperature sensors in the hypothalamus and skin, and a heat loss and a heat conservation integrating center. Mathematical equations have been developed to express the relationships between sweat rate, core, and mean skin temperature for cool conditions, but these relationships are so complex that it is preferable to use an analogue computer for these purposes.

**A69-80096****RESPIRATORY VARIATIONS OF BARORECEPTOR REFLEX TRANSMISSION AND THEIR EFFECTS ON SYMPATHETIC ACTIVITY AND VASOMOTOR TONE [UBER DIE ABHANGIGKEIT DER PRESSORECEPTORISCHEN HEMMUNG DES SYMPATHICUS VON DER ATEMPHASE UND IHRE AUSWIRKUNG IN DER VASOMOTORIK].**

H. Sella, P. Langhorst, D. Richter, and H. P. Koepchen (Munich, U., Physiol. Inst., West Germany).

*Pflugers Archiv European Journal of Physiology*, vol. 302, Aug. 13, 1968, p. 300-314. 29 refs. In German.

Deut. Forschungsgemeinschaft supported research.

Respiratory variations of baroreceptor reflex transmission and their effects on sympathetic activity and vasomotor tone was investigated in dogs. The reflex effects of short bilateral sinus nerve stimulation are dependent on the time of stimulation within the respiratory cycle. Stimulation during the expiratory phase produces greater vasodilatation in the perfused m. gracilis and stronger inhibition of lumbar sympathetic activity than does stimulation during the inspiratory phase. The time course of reflex sympathetic inhibition during the respiratory cycle, measured by the reflex pause of the sympathetic activity after sinus nerve stimulation, is described. Continuous stimulation of both sinus nerves intensifies the respiratory grouping of sympathetic activity. This phenomenon can be explained by the respiratory oscillation of reflex transmission. The respiratory grouping of sympathetic activity and the respiratory vasomotor oscillations cannot be abolished by baroreceptor

dénervation and/or elimination of respiratory movements with neuromuscular blocking agents. If the baroreceptor nerves are intact, the respiratory variations are modified also by respiratory blood pressure waves. The significance of the findings with respect to the central functional organization of respiratory and cardiovascular centers, and the various factors responsible for the respiratory grouping of sympathetic activity are discussed.

**A69-80097****REACTIONS OF VENOUS TONE IN CAPACITANCE VESSELS OF THE SKIN UNDER PASSIVE AND ACTIVE ORTHOSTATIS [VENENTONUSREAKTIONEN IN KAPAZITIVEN HAUTGEFASSEN BEI PASSIVER UND AKTIVER ORTHOSTASE].**

H. Paessler, M. Schlepper, K. W. Westermann, and E. Witzleb (Münster, U., Gollwitzer-Meier-Inst., Physiol. Abt., Bad Oeynhausen, West Germany).

*Pflugers Archiv European Journal of Physiology*, vol. 302, Aug. 13, 1968, p. 315-332. 32 refs. In German.

Experimental subjects, fastened by means of a parachute harness to a tilt-table, were subjected to passive orthostatis. With assumption of the vertical position, the venous tone manifested a very marked initial constrictive reaction. With continued orthostatis, the values for venous tone remained regularly above those recorded in the horizontal position. While heart rate as a rule increased during the experiments, a considerable decrease in pulse was observed in most cases, with the onset of syncopal symptoms. Whereas respiratory rate increased, tidal volume demonstrated relatively small and variable changes. With the subjects standing in a tank, active orthostatis was effected by modification of gravitational effect on the lower half of the body resulting from hydrostatic pressure alterations. With reduction of gravity effect, the venous tone decreased in direct relation to the water level, and attained, after discontinuance of filling, a constant value. With decrease then of the water level, venous tone increased and, in the majority of cases, surpassed the values observed in the control period. In contrast, the peripheral venous pressure behaved in the opposite manner, increasing with a rising water level, and decreasing with a falling level. The significance of venous tone adjustments for position-dependent circulatory regulation, and the responsible mechanisms thereof, are discussed.

**A69-80098****COLD TREMOR IN UNANESTHETIZED, CHRONICALLY SPINALIZED RABBITS AS COMPARED WITH COLD SHIVERING IN INTACT ANIMALS [KALTETREMOR WACHER, CHRONISCH SPINALISierter KANINCHEN IM VERGLEICH ZUM KALTZITTERN INTAKTER TIERE].**

Mitsuo Kosaka and Eckhart Simon (Max-Planck-Ges., W. G. Kerckhoff-Inst., Bad Nauheim, West Germany).

*Pflugers Archiv European Journal of Physiology*, vol. 302, Aug. 13, 1968, p. 333-356. 26 refs. In German.

Motor activity was evoked in unanesthetized rabbits by external cooling and by selective cooling of the lower thoracic and lumbosacral spinal cord, both in intact animals and in animals chronically spinalized at Th2-Th8. The onset and the pattern of this cold induced activity were observed by means of electromyographic recordings obtained from the lumbar dorsal trunk muscles. Initiation of motor activity under external cooling occurred, in average, at the same core temperature in intact and in spinalized rabbits. The initial state of increased motor activity in spinal rabbits corresponded to the preshivering tone, which is reported from intact animals. Visible shivering was observed in intact rabbits, but was not found in spinalized animals. Threshold temperature of motor activity during spinal cord cooling was lower in spinal rabbits than in intact animals. Visible shivering was observed in intact as well as in

spinalized rabbits. The pattern of fully developed motor activity consisted of phasic and tonic electromotor discharges. The phasic component was found to be slightly reduced in spinal animals as compared to intact animals. It was confirmed that cold induced motor activity is composed to a similar extent of grouped discharges under either cooling method, both in intact and spinalized rabbits.

**A69-80099****THE CENTRAL NERVOUS SPINAL MECHANISM OF COLD SHIVERING [DER ZENTRALNERVOSE SPINALE MECHANISMUS DES KALTEZITTERNS].**

Mitsuo Kosaka and Eckhart Simon (Max-Planck-Ges., W. G. Kerckhoff-Inst., Bad Nauheim, West Germany).

*Pflügers Archiv European Journal of Physiology*, vol. 302, Aug. 13, 1968, p. 357-373. 29 refs. In German.

Cold induced tremor was evoked in unanesthetized, intact and chronically spinalized rabbits by external cooling and by selective spinal cord cooling. This cold induced motor activity was analyzed with respect to the occurrence of grouped discharges in the electromyogram of the lumbar dorsal trunk muscles and to their range of frequencies. In average, grouped discharges were observed more often in intact than in spinalized rabbits. Grouped discharges occurred to a greater extent under spinal cord cooling than under external cold in both groups of animals. There was, however, considerable overlapping of the individual results in the different groups of experiments. The frequencies of the grouped discharges ranged between 6 and 30 c.p.s., both in intact and in spinalized rabbits. Mean frequency was lowest in spinalized rabbits under external cold and was highest in spinalized rabbits under spinal cord cooling. The differences between the mean frequencies in intact and spinalized animals were, however, not greater than three c.p.s. under both cooling methods. The results indicate that the range of frequencies of the cold induced tremor produced by the isolated spinal cord is identical with that produced by the intact central nervous system. This finding of the spinal genesis of cold tremor offers the conclusion that the rhythm of cold shivering originates within the areas of the motoneuron pools.

**A69-80100****THE ROLE OF RETINAL ORIENTATION IN THE EGOCENTRIC ORGANIZATION OF A VISUAL STIMULUS.**

D. A. Begelman (Fairfield Hills Hosp., Psychol. Serv., Newtown, Conn.).

*Journal of General Psychology*, vol. 79, Oct. 1968, p. 283-289. *Eastern Psychol. Assn., 37th Ann. Meeting, New York City, Apr. 1966.*

When the effects of frame-of-reference and gravitational cues are controlled, orientation of visual stimulus is influenced primarily by egocentric cues supplied by the direction of body axes. Orientation with respect to the self, however, is an unambiguous concept only when all body parts are in alignment. It was shown that a head-body conflict situation may be correlated with contrasting orientations of stimuli although gross retinal orientation is held constant. This finding was interpreted as proof for the fact that retinal orientation is not a necessary condition for perceptual organization in accordance with egocentric cues.

**A69-80101****A SERIAL POSITION EFFECT IN NUMBER-RECOGNITION.**

H. B. G. Thomas.

*Journal of Experimental Psychology*, vol. 78, Sep. 1968, p. 8-14. 12 refs.

A recognition-memory task was used to investigate the handling of the numbers 0-99. Of these 100 integers, 20 critical primes and 20 critical composite numbers, matched approximately for size and distributed across target-list positions on a Latin-square design, were compared. The number of recognition-failures  $n_1$  on

a number of  $X_1$  is found to be determined largely by the serial position of  $X_1$  in the sequence 0, 1 ... 99 and shows a typical serial position effect. A mathematical model, described elsewhere, fits this serial position curve well. However for composite numbers, but not primes, recognition-failures on individual items show a significant amount of additional variability not accounted for by the serial position effect. The implications of these findings are discussed.

**A69-80102****DISCRETE-TRIAL INSTRUMENTAL PERFORMANCE RELATED TO REWARD SCHEDULE AND DEVELOPMENTAL LEVEL.**

Thomas J. Ryan, Christopher Orton, and June B. Pimm (Carleton U., Ottawa, Canada).

*Journal of Experimental Psychology*, vol. 78, Sep. 1968, p. 31-37. 17 refs.

*Soc. of Res. in Child Develop. Conv., New York, Mar. 1967.*

Grants NRC APB-2 and OMHF 79.

One-hundred twenty subjects at each of six developmental levels performed an instrumental level-pulling task. Six reward groups (0%, 10%, 30%, 50%, 70%, 100%) were formed within each age level and measures of response speed were taken. The typical finding of faster response speeds for partially as compared with continuously rewarded groups was not evident across all ages. Furthermore, some partial reward schedules other than 50% also lead to more vigorous responding as compared with 100% reward. In terms of frustration theory, it was suggested that desire to win and problem-solving strategies employed at different age levels, as well as expectancy for reward, may all play important roles in determining reaction to nonreward.

**A69-80103****PSYCHOLOGICAL REFRACTORINESS WITH VARYING DIFFERENCES BETWEEN TASKS.**

Thomas C. Way and Robert Gottsdanker (Calif., U., Santa Barbara).

*Journal of Experimental Psychology*, vol. 78, Sep. 1968, p. 38-45. 11 refs.

Grant NIMH MH 10447-02

Two experiments on psychological refractoriness (PR) were conducted, each with eight different adult human subjects. PR was estimated by the increase in mean reaction time to the second of two choice tasks when the intersignal interval was reduced from 900 to 100 msec. Thus measured, PR was greater for a second task opposite in direction to the first than for one which was perpendicular. This held whether or not the perpendicular task required a revision of signal-response coding. Conclusions were that PR: (a) is a function of the differences between the two tasks; (b) is dependent on antagonism between common elements of the two tasks rather than on unrelatedness or absence of common elements; and (c) is capable of being analyzed into components representing signal antagonism and response antagonism. It was also found that response antagonism increased  $RT_1$ , showing that the first response may be affected by second signal, contrary to the storage hypothesis of PR.

**A69-80104****ALPHA RHYTHM AND TIME JUDGMENTS.**

C. F. Legg (Cambridge, U., Great Britain).

*Journal of Experimental Psychology*, vol. 78, Sep. 1968, p. 46-49. 6 refs.

Previous studies have indicated correlations between time judgments and certain characteristics of the electroencephalogram (EEG). Here, using intervals between .5 and 8 sec., no significant

**A69-80105**

correlations were found between judgment lengths and mean alpha rate or "alpha index." Reliable if weak associations between judgments and aspects of concurrent EEG may yet be established.

**A69-80105**  
**SHORT-TERM MEMORY FOR INDIVIDUAL VERBAL ITEMS AS A FUNCTION OF METHOD OF RECALL.**

Henry Loess and Richard Harris (Wooster, Coll., Ohio).  
*Journal of Experimental Psychology*, vol. 78, Sep. 1968, p. 64-69. 11 refs.  
Grants NIMH MH 08537-03 and NSF GY 2536.

Two experiments were conducted to evaluate different methods of recall in short-term memory. Each experiment contained 96 subjects divided into four subgroups. The stimuli were word triads, each containing words from three common taxonomic categories. The subject saw a triad for 1.5 sec., followed by a series of random digits designed to minimize rehearsal. Retention was measured after nine sec. In Exp. I, experimental subjects were provided with the appropriate category names at the beginning of a recall interval. Performance was not superior to control subjects who were told simply to recall. In Exp. II, experimental subjects received category cues after an initial period of free recall. Under these conditions performance was superior to control subjects who had the same total time to recall but no special cues. The results are discussed in terms of (a) opposing facilitative and interfering effects of the recall cues, and (b) different methods of retrieval from short-term and long-term memory.

**A69-80106**  
**SIGNAL PROCESSING TIME AS A FUNCTION OF AGING.**

J. Richard Simon.  
*Journal of Experimental Psychology*, vol. 78, Sep. 1968, p. 76-80. 9 refs.

Old and young subjects pressed a right- or left-hand key in response to the onset of one of a pair of lights. In Exp. I, a warning light indicated the approaching onset of the stimulus light but also communicated the rule governing the ensuing response; i.e., respond with key on the same or opposite side as the stimulus light. The interval (PI) between warning and stimulus lights was short (100 msec.) in one block of trials and long (1.5 sec.) in another. The difference in RT between the two blocks reflected the time the subject required to process the information in the warning light. Results indicated that signal processing time increased as a function of aging. In Exp. II, normal reactions were unaffected by PI, but reversed reactions were slower on short than on long PI trials.

**A69-80107**  
**CONTINUING AND REVERSING THE DIRECTION OF RESPONDING MOVEMENTS: SOME EXCEPTIONS TO THE SO-CALLED "PSYCHOLOGICAL REFRACTORY PERIOD".**

John Brebner (Dundee, U., Great Britain).  
*Journal of Experimental Psychology*, vol. 78, Sep. 1968, p. 120-127. 5 refs.

Delays in responding to a signal to continue or to reverse the direction of a response movement were calculated where the signal arrived shortly before the response movement to a prior signal began. The results indicate that the processing of signals conveying instructions to continue a responding movement is not delayed even when the second signal arrives during reaction time to the first signal. More surprisingly, without being entirely conclusive, the data suggest that signals to reverse the direction of movement may also be processed without delays. This evidence indicates the selective nature of the "gating process," by which ongoing activity of the decision mechanism is assumed to be protected from the arrival of further signals.

**A69-80108**  
**VOLUNTARY CONTROL OF FRAME OF REFERENCE AND SLOPE EQUIVALENCE UNDER HEAD ROTATION.**

Fred Attneave and Kathleen W. Reid (Ore., U., Eugene and Portland).  
*Journal of Experimental Psychology*, vol. 78, Sep. 1968, p. 153-159.  
Grant AFOSR 973-66.

Transfer studies show that people normally associate responses with physical rather than retinal stimulus orientations. In this study experimental subjects were instructed to adopt a head-anchored reference system ("Think of the top of your head as up.") with heads tilted, during either initial learning or transfer. These instructions strongly facilitated transfer based on retinal invariance with head position changed. Moreover, faster response to retinal verticals and horizontals than to retinal diagonals with head tilted, prior to transfer, was significantly predictive of superior performance on the transfer task, which required same response to same retinal stimulus with head upright. Conclusions: (a) Invariance of perceived or phenomenal slant (rather than either physical or retinal slant) is the critical determinant of transfer. (b) Likewise, lines perceived as vertical and horizontal tend to evoke faster responses than those perceived as obliques. (c) Phenomenal slant depends on the orientation of a frame of reference, which is subject to voluntary as well as proprioceptive control.

**A69-80109**  
**VESTIBULAR UNITS INFLUENCED BY LABYRINTHINE AND CEREBRAL NYSTAGMOGENIC IMPULSES.**

Ermanno Manni and Maria Letizia Giretti (Sassari, U., Inst. of Human Physiol., Sardinia, Italy).  
*Experimental Neurology*, vol. 22, Sep. 1968, p. 145-157. 34 refs.  
*North Italy ORL Soc., 26th Meeting, Genova, Mar. 3, 1968.*

Units activated by thermic stimulation of the labyrinth were isolated in vestibular nuclei, and particularly in the lateral, of curarized guinea pigs. All such units were also strikingly influenced by the low-frequency electrical stimulation of the cerebral nystagmogenic center located in the temporoparietal region. Different patterns of activation and inhibition of the vestibular units were described after labyrinthine and cerebral nystagmogenic stimulations. The relationships of such responses to the eye nystagmus were investigated by recording simultaneously the vestibular unitary discharge and the action potentials of a few fibers of an oculomotor nerve. Thus a convergence of labyrinthine and cerebral nystagmogenic impulses on the vestibular nuclei was demonstrated. The conclusion was reached that the vestibular nuclei are involved also in the mechanism of the eye nystagmus brought about by electrical stimulation of the cerebral cortex.

**A69-80110**  
**BODY MOTILITY DURING SLEEP AND ITS RELATION TO THE K-COMPLEX.**

Jon F. Sassin and Laverne C. Johnson (U.S. Navy Med. Neuropsychiat. Res. Unit, San Diego, Calif.).  
*Experimental Neurology*, vol. 22, Sep. 1968, p. 133-144. 29 refs.

*Western EEG Soc., Meeting, Park City, Utah, Feb. 20-23, 1968.*  
Grant NSF GB 6008 and U.S. Navy supported research.

All-night polygraphic recordings were made on five normal human male subjects for two nights to study body motility quantitatively in relation to the sleep electroencephalogram. Body movements were significantly related temporally to preceding K-complexes during stage 2 sleep with a mean latency of 2.52 sec. for 396 movements scored. This relationship was consistent for both nights one and two. The rate of body movements per min. was significantly lower in slow-wave sleep than in any other stage and was not different in stage two and rapid eye movement (REM).

Movements in slow-wave sleep were more extensive and usually occurred at the end of periods, often heralding a change of stage. Brief isolated twitches of extremities were predominantly observed in stage REM. In all stages, movements of the face and mouth alone were frequent. An attempt was made to unify the known relations of K-complexes, body movements and autonomic activity and to organize them with respect to subcortical origins and electrophysiologic mechanisms.

#### A69-80111

##### ARE THERE NEURONS DETECTING DIRECTION OF SOUND SOURCE MOTION?

Jacob A. Altman (USSR, Acad. of Sci., Pavlov Inst. of Physiol., Lab. of Physiol. of Hearing, Leningrad).

*Experimental Neurology*, vol. 22, Sep. 1968, p. 13-25. 32 refs.

The activity of inferior colliculus single neurons was recorded extracellularly in cats anesthetized with chloralose and urethane. Binaurally presented trains of clicks were used as a sound signal, the time interval within each pair of clicks being diminished and then raised gradually. The use of the signal, which has some special features of a moving sound, models motion of the sound from one ear to the midline and backwards. It was possible to isolate units, which can fix some special features of this signal and respond to the direction of sound motion with a specific response. Different types of responses of these neurons are presented.

#### A69-80112

##### PERIPHERAL PATHWAY OF EYE MUSCLE PROPRIOCEPTION.

E. Manni, R. Bortolami, and C. Desole (Sassari, U., Insts. of Human Physiol. and Vet. Anat., Sardinia, Italy).

*Experimental Neurology*, vol. 22, Sep. 1968, p. 1-12. 40 refs. *French Physiol. Soc., Ann. Meeting, Milan, Jun. 7-10, 1967.*

The peripheral pathway of eye muscle proprioception was investigated in pigs, cats and sheep. A cellular pool containing the soma of the afferent fibers from the spindles of the extraocular muscles was found in the medial dorsolateral part of the semilunar ganglion of pig. In this regard there were no differences between pigs and sheep. But no responses to stretching extraocular muscles of the cat were found in the semilunar ganglion. In another group of animals, experiments were carried out in order to trace the course of the afferents from the eye muscle spindles to enter the brainstem. Responses to the stretch of the extraocular muscles were recorded from the trigeminal root in both sheep and pigs, but this was not the case for root of the oculomotor nerve. Section of an ophthalmic branch of the trigeminal nerve immediately distal to the semilunar ganglion abolished such responses and was followed by degeneration of the spindles of the extraocular muscles in pigs and sheep. The ganglionic responses persisted after sectioning the connections between the oculomotor nerve and the ophthalmic branch of the level of the cavernous sinus. Intracranial section of the oculomotor nerve did not provoke degeneration of the eye muscle spindles. The conclusion was reached that the proprioceptive cells contained in the semilunar ganglion of pig and sheep have a central process which enters the brain stem through the trigeminal root, while the peripheral one courses through the ophthalmic branch and reaches the extraocular muscles.

#### A69-80113

##### AUDITORY EVOKED RESPONSES: INTRACRANIAL AND EXTRACRANIAL AVERAGE EVOKED RESPONSES.

Gastone G. Celesia (Wis., U., Med. Center, Dept. of Neurol. and Veterans Admin. Hosp., Madison).

*Archives of Neurology*, vol. 19, Oct. 1968, p. 430-437. 19 refs.

Grant PHS NB 03360.

Average evoked potentials to auditory stimulation were recorded from the cortex of cats. Responses were obtained from

every cortical region explored. Responses from the auditory cortical areas proved to have a specific morphology which permitted their differentiation from volume conducted events. In animals with chronically implanted electrodes simultaneous recording of auditory responses from the scalp and the cortex was carried out. In alert animals, the evoked potentials obtained from the scalp did not correlate with cortical responses. During light sleep, barbiturate and deep chloralose anesthesia, the extracranial response clearly reflected potentials originated from the cortex. Relevance of these findings to human auditory evoked responses is discussed.

#### A69-80114

##### A CIRCADIAN RHYTHM OF NOREPINEPHRINE REGIONALLY IN CAT BRAIN: ITS RELATIONSHIP TO ENVIRONMENTAL LIGHTING AND TO REGIONAL DIURNAL VARIATIONS IN BRAIN SEROTONIN.

Donald J. Reis, Marlene Weinbren, and Anthony Corvelli (Cornell U., Med. Coll., Dept. of Neurol., New York, N. Y.).

*Journal of Pharmacology and Experimental Therapeutics*, vol. 164, Nov. 1968, p. 135-145. 27 refs.

Grants PHS NB-06911, PHS NB-04876, and PHS 1-K3-NB-31756.

There is a 24 hr. (circadian) cycle of norepinephrine concentration in certain regions of the cat brain and spinal cord, including the cervical cord, pons, region of the substantia nigralateral tegmentum, anterior hypothalamus and region of the tuber cinereum, and also of the norepinephrine content of the pineal gland of the cat. A biphasic or ultradian rhythm of norepinephrine concentration is found in the superior colliculus and possibly in the lateral thalamus. Changes in norepinephrine concentration range up to four-fold. No sex difference in regional norepinephrine concentrations occurs in the cat. The norepinephrine rhythms in different regions of the cat brain, cervical cord and pineal gland are asynchronous, peaking at different times and having different forms. Although the norepinephrine rhythm in the cat pineal gland depends on a rhythm of environmental lighting and is therefore exogenous, the norepinephrine rhythms in the cervical cord and in the anterior hypothalamus persist during 24 hr. of light and thus appear to be endogenous. A diurnal cycle of serotonin occurs in the inferior colliculus and in the red nucleus-medial tegmental region between 0700 and 1900 hr., but not in regions in which norepinephrine rhythms are found at the same time. The serotonin rhythm is therefore independent of the norepinephrine rhythm regionally in the cat brain.

#### A69-80115

##### HYPOCALCEMIC EFFECT OF IMIDAZOLE IN RATS.

Herbert Wells and Weldon Lloyd (Harvard School of Dental Med., Dept. of Clin. Dentistry, Boston, Mass.).

*Endocrinology*, vol. 83, Sep. 1968, p. 521-529. 25 refs.

Grants NIDR DE-01969 and NIDR DE-02509.

Marked hypocalcemia, enhanced by feeding a low calcium diet, followed ip. (400 mg./kg.) or oral (800 mg./kg.) administration of imidazole to rats. Imidazole also caused a fall in serum phosphorus. The drug retained its hypocalcemic effect after removal of the parathyroid glands, both the parathyroid and thyroid glands, or the kidneys, indicating that the presence of these organs is not necessary for its action. In parathyroidectomized rats, administration of imidazole antagonized the hypercalcemic effect of parathyroid extract. The hypocalcemic action of imidazole was partially prevented by prior administration of isoproterenol and theophylline. Histamine HC1 (662 mg./kg., sc.) also had a hypocalcemic effect. In light of the fact that imidazole activates adenosine 3',5'-phosphodiesterase, the enzyme which degrades cyclic 3',5'-adenosine monophosphate (cyclic AMP), the present results suggest that the actions of thyrocalcitonin and parathyroid hormone may involve cyclic AMP.

A69-80116

A69-80116

**MEDICAL CONSIDERATIONS FOR PATIENTS IN COMMERCIAL AIR TRAVEL.**

Robert B. Stonehill and Raymond H. Murray (Ind. U., School of Med., Indianapolis).

*Journal of the Indiana State Medical Association*, vol. 61, Oct. 1968, p. 1395-1398. 10 refs.

Approximately three percent of airline passengers are ambulatory patients. As the popularity of air travel increases, more and more ambulatory patients will fly. They should and will turn to their physicians for advice. In evaluating such a patient, the physician should formulate an opinion of the patient's ability to travel by air utilizing the equipment and technics available to him in office practice. With few exceptions, the medical problems peculiar to air travel are similar to medical problems in general. An understanding of these will greatly aid in evaluation of the patient. Most patients who can travel at all, can travel by air more comfortably and with less exhaustion.

A69-80117

**NON-THERMAL EFFECT OF MICROWAVE RADIATION *IN VITRO* ON PERITONEAL MAST CELLS OF THE RAT**

Wojciech Sawicki and Kazimierz Ostrowski (School of Med., Dept. of Histol. and Embryol., Warsaw, Poland).

*American Journal of Physical Medicine*, vol. 47, Oct. 1968, p. 225-234. 19 refs.

Peritoneal cell suspensions were irradiated *in vitro* with microwaves of density power three mw./cm<sup>2</sup>. The irradiated mast cells remained alive, but their ability for metachromatic staining was markedly reduced. The dry mass of mast cells, as well as their diameter, diminished by 50 to 65%. Irradiation with microwaves caused also a two- to threefold reduction of sodium S<sup>35</sup>-sulfate uptake by the mast cells.

A69-80118

**SIMPLE METHOD FOR PREPARING AND IMPLANTING FINE WIRE ELECTRODES.**

T. Gaines Parker (Veterans Admin. Hosp., Physiometrics Res. Lab., Houston, Tex.).

*American Journal of Physical Medicine*, vol. 47, Oct. 1968, p. 247-249.

A simple method for preparing and implanting fine wire electrodes into the muscles of experimental subjects is presented. The technique involved pre-soldering the amplifier connection to the electrode before implanting. Implantation is accomplished by inserting a hypodermic needle, to which the wire is connected, perpendicular to the skin into the desired muscle site. The wire remains in the muscle upon withdrawal of the needle. This technique involves no discomfort or curtailment of normal activities.

A69-80119

**MAGNITUDE OF EXPERIMENTAL EFFECT AND A TABLE FOR ITS RAPID ESTIMATION.**

Herbert Friedman (William and Mary Coll., Williamsburg, Va.).

*Psychological Bulletin*, vol. 70, Oct. 1968, p. 245-251. 9 refs.

NASA Grant NGR 47-006-028 and Grant NIH GM 13031.

Sample size as well as probability values must be taken into account in the interpretation of experimental data. A correlation between group membership and the dependent variable explicitly describes the effectiveness of the independent variable. A table is provided which gives values of this measure directly from the sample size and t, z, F, or  $\chi^2$  values. Equivalents of this measure are also provided both in terms of the difference between means and a measure of misclassification. The table may be used as a power table and is suited for dealing with several problems of experimental procedure and tactics. Decisions concerning acceptance of null or alternative hypotheses may be aided by the use of this measure.

A69-80120

**AN EXAMPLE OF BAYESIAN HYPOTHESIS TESTING: THE PERCEPTION OF ROTARY MOTION IN DEPTH.**

Gordon F. Pitz (Southern Ill. U., Carbondale).

*Psychological Bulletin*, vol. 70, Oct. 1968, p. 252-255. 5 refs.

The Bayesian method of employing likelihood ratios is illustrated in an analysis of an experiment reported by Hershberger, supposedly disconfirming a theory proposed by Day and Power. The original experiment produced results significant at the .02 level when using a one-tailed test; it is shown that, by interpreting these results as evidence against the null hypothesis, one is making certain strong assumptions that should be recognized. In fact, the Bayesian analysis suggests that the null hypothesis is not discredited nearly as much as is suggested by the classical significance level.

A69-80121

**VERBAL TRANSFORMATION EFFECT AND AUDITORY PERCEPTUAL MECHANISMS.**

Richard M. Warren (Wis. U., Milwaukee).

*Psychological Bulletin*, vol. 70, Oct. 1968, p. 261-270. 35 refs.

Grant NIH NB 05998.

Continued listening to recorded repetitions of a single word or phrase induces illusory changes. These "verbal transformations" (VT's) may range from a word that rhymes with the actual stimulus to extreme phonetic distortions. The VT effect has revealed semantic and phonetic aspects of verbal organizational processes. It is suggested that the strategies employed for the perception of connected discourse change in a regular manner throughout the normal life span. Some aspects of VT's appear related to other perceptual phenomena including aphasia and both auditory and visual illusions induced by unchanging patterns of sensory input.

A69-80122

**DYNAMIC INTERACTIONS IN RETINAL RECEPTIVE FIELDS.**

L. Maffei and L. Cervetto (C.N.R., Lab. di Neurofisiol., Pisa, Italy).

*Vision Research*, vol. 8, Oct. 1968, p. 1299-1303.

Contract AF F6 105267, C 0028.

Recordings were made from optic tract single fibers in unanesthetized cats (pretrigeminal preparation). Each retinal ganglion cell was activated by two spots of light within the receptive field, where one spot was positioned in the center and the other in the periphery of the receptive field. The two spots were separately or simultaneously sinusoidally modulated. The results suggest that with the experimental conditions which were used, the ganglion cell approximates a linear operation in the integration of dynamic signals coming from the antagonistic regions of receptive field.

A69-80123

**MORTALITY OF ALTITUDE-EXPOSED MICE INFECTED WITH *PASTEURELLA TURLARENSIS*.**

Robert J. Ball and Jerome P. Schmidt (USAF School of Aerospace Med., Biosci. Div., Brooks AFB, Tex.).

*Applied Microbiology*, vol. 16, Oct. 1968, p. 1451-1453.

The influence of reduced barometric pressure equivalent to an altitude of 18,000 ft. on the susceptibility of mice to turalaremia was investigated by exposing groups of animals to the test environment before, after, or before and after intraperitoneal inoculation of 225 colony-forming units of *Pasteurella tularensis*. Similarly infected control animals were not exposed to the experimental environment. Two measurements of mortality were employed: (i) the day on which 50% of the mice were dead; and (ii) the number of dead mice on the eighth day. Continuous altitude exposure for 14 days prior to infection had no effect on host susceptibility but exposure after infection significantly increased mortality ( $P < 0.001$ ).

**A69-80124**  
**EVALUATION OF A COMMERCIAL AIR FILTER FOR REMOVAL OF VIRUSES FROM THE AIR.**

P. Roelants, B. Boon, and W. Lhoest (Rech. et Ind. Thérap., R.I.T., Rixensart, Belgium).

*Applied Microbiology*, vol. 16, Oct. 1968, p. 1465-1467. 5 refs.

The effectiveness of a commercial absolute air filter for removal of viruses from air was tested with an actinophage, under the usual conditions of a laminar airflow clean room. A new method of dry phage dispersion is described. The filter showed an average reduction of 99.996% of airborn actinophage.

**A69-80125**  
**IDENTIFICATION OF PSEUDOMONAS SPECIES ISOLATED FROM HOSPITAL ENVIRONMENT AND HUMAN SOURCES.**

Vera L. Sutter (Calif., U., San Francisco Med. Center, School of Dentistry, San Francisco).

*Applied Microbiology*, vol. 16, Oct. 1968, p. 1532-1538. 19 refs.

Grant PHS CC-00092.

Methods and procedures are described for the identification of aerobic pseudomonads isolated from clinical specimens. Fluorescence is used as a means of primary differentiation. Final identification is based on the observation of characteristics such as flagellation, storage of intracellular fat, growth at 4°C. and at 41°C., denitrification, gelatin hydrolysis, arginine dihydrolase activity, and oxidase activity. The value of this schema to the diagnostic laboratory is discussed.

**A69-80126**  
**THE EFFECT OF PROLONGED EXERCISE ON THE COMPONENTS OF THE BLOOD FIBRINOLYTIC ENZYME SYSTEM.**

N. B. Bennett, C. Marie Ogston, and D. Ogston (Aberdeen, U., Dept. of Med., Great Britain).

*Journal of Physiology*, vol. 198, Sep. 1968, p. 479-485. 18 refs.

The levels of the blood components of the fibrinolytic enzyme system were measured before, during and after a four hr. period of exercise in eight subjects. Mean plasminogen activator level rose progressively over the first three hr. with little further change during the fourth hr. of exercise. Following the period of exercise there was a rise in a circulating anti-activator which was still present 20 hr. after completion of the exercise. There was no alteration in the mean blood level of plasminogen, fibrinogen, anti-plasmin or a serum inhibitor of plasminogen activation during or following the exercise. The significance of the findings in relation to the mechanism of interaction of the components of the fibrinolytic system is discussed.

**A69-80127**  
**EUSTACHIAN TUBE FUNCTION.**

Karl H. Siedentop, M. Eugene Tardy, and Lee R. Hamilton (Ill., U., Med. Center, Dept. of Otolaryngol., Chicago).

*Archives of Otolaryngology*, vol. 88, Oct. 1968, p. 386-395. 10 refs.

Grant PHS 5 T1 NB05229.

A method of measuring eustachian tubal function slightly modified by Miller is described. Measurements were made on 244 ears with chronic otitis media and five normal controls. Eustachian tubal function was classified according to Miller and also according to our modified scheme that emphasizes the effectiveness of each swallow. The results show good comparison with Miller's. Tubal function is better in ears with normal mucosa than in ears with diseased mucosa. There are, however, ears with normal mucosa and impaired tubal function and vice versa. Seventeen ears, under antibiotic treatment, were repeatedly tested before tympanoplasty. No variation of eustachian tubal function was found either in overall

direction of change or in relation to specific mucosal changes. The hypothesis that good tubal function is a prerequisite for successful tympanoplasty surgery was proven valid. Therefore, presurgical evaluation of the patient should include testing of eustachian tubal function.

**A69-80128**  
**CORTICAL AUDIOMETRY: POTENTIAL PITFALLS IN TESTING.**

D. Thane R. Cody and Donald W. Klass (Mayo Clin. and Mayo Found., Sect. of Otolaryngol. and Rhinol. and Clin. Electroencephal., Rochester, Minn.).

*Archives of Otolaryngology*, vol. 88, Oct. 1968, p. 396-406. 10 refs.

Grant NIH NB-6306

Various conditions and changes in tone-pulse parameters were investigated in order to determine their influence on the accuracy of cortical audiometry, and the following conclusions have been reached: (1) Accuracy improves with test experience; (2) precise location of the active electrode at the vertex is not necessary for accurate results; (3) spontaneous nystagmus and caloric-induced nystagmus do not significantly influence the sound-evoked vertex response; (4) when responses to 50 tone pulses are being averaged, a rate of one every two sec. yields more accurate results than a rate of one every sec.; (5) temporary shift of threshold may cause marked fatigue in the vertex response and is a potential source of error; (6) a tone-pulse rise time just long enough to avoid a click artifact is the easiest to employ; and (7) sleep studies are more difficult than awake studies owing to the frequent appearance of large artifacts in the recordings, no clear relationship between vertex-response latency and stimulus intensity, and loss of accuracy if the test is performed during light sleep. If the potential pitfalls that have been discussed are avoided, cortical audiometry can be of immense value clinically in the otologic assessment of infants, children mentally retarded persons, patients with certain central nervous system disorders and patients with functional hearing loss.

**A69-80129**  
**METABOLISM OF PHENOLIC ACIDS BY THE RAT INTESTINAL MICROFLORA.**

Ronald R. Scheline (Bergen, U., Dept. of Pharmacol., Norway).

*Acta Pharmacologica et Toxicologica*, vol. 26, no. 2, 1968, p. 189-205. 23 refs.

The metabolism of a number of phenolic phenylacetic, phenylpropionic and cinnamic acids by the rat intestinal microflora was studied. Reduction of the double bond in o-coumaric, m-coumaric, p-coumaric, caffeic, isoferulic and ferulic acids was observed. Dehydroxylation of homoprotocatechuic and hydrocaffeic acids to the corresponding m-hydroxy acids was found. These m-hydroxy acids were also formed from phenolic acids capable of being metabolized to homoprotocatechuic or hydrocaffeic acids. Decarboxylation of phenylacetic and cinnamic acids containing a free p-hydroxyl group was observed. This reaction did not take place with the corresponding phenylpropionic acids. Demethylation occurred with the 3-hydroxy-4-methoxy- and 4-hydroxy-3-methoxy-derivatives of phenylacetic, phenylpropionic and cinnamic acids. The significance of the metabolism by the intestinal microflora was studied by administering caffeic acid to rats. m-Hydroxyphenylpropionic acid was a major urinary metabolite was shown to have an intestinal origin. The decarboxylated metabolites, 4-vinylcatechol and 4-ethylcatechol, were detected in the urine as conjugates.

A69-80130

**A69-80130**

**MICROBIOLOGICAL SAMPLING OF SURFACES.**

M. S. Favero (HEW, Dept.) PHS, Natl. Communicable Disease Center, Phoenix, Ariz.), J. J. McDade, J. A. Robertsen (Dow Chem. Co., Biohazards Res. and Develop. Dept., Pitman-Moore Div., Zionsville, Ind.), R. K. Hoffman (Army, Dept., Fort Detrick, Frederick, Md.), and R. W. Edwards (Airtronics, Inc., Dulles Intern. Airport, Washington, D. C.).

*Journal of Applied Bacteriology*, vol. 31, Sep. 1968, p. 336-343. 30 refs.

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

**A69-80131**

**USE OF GERM-FREE MICE FOR TESTING HUMAN ISOLATION SYSTEMS.**

R. D. Barnes, Jean Holliday (London, U., Inst. of Child Health, Dept. of Hematol., Great Britain), and R. Cook (Allington Farm, Porton, Wiltshire, Great Britain).

*Journal of Applied Bacteriology*, vol. 31, Sep. 1968, p. 349-356. 12 refs.

Inst. of Child Health, Hosp. for Sick Children and Camilla Samuel Trust supported research.

Germ-free mice were introduced to test the efficiency and use of a human isolator designed to prevent the entry of viable bacteria. The mice remained free from bacterial contamination for the total period of seven days spent in the isolator. The use of germ-free mice for testing systems of contamination control is discussed.

**A69-80132**

**LIMITATIONS OF THE INITIATION OF GERMINATION OF BACTERIAL SPORES AS A SPORE CONTROL PROCEDURE.**

G. W. Gould, A. Jones, and Carole Wrighton (Unilever Res. Lab., Colworth House, Sharnbrook, Bedford, Great Britain).

*Journal of Applied Bacteriology*, vol. 31, Sep. 1968, p. 357-366. 21 refs.

Germination of spores of *Bacillus coagulans*, *B. cereus* and mixed soil spores in nonnutritive buffer, in rich laboratory median and in foods was accelerated, and the final amount of germination was increased, when germinants were added (e.g. L-alanine L- $\alpha$ -aminobutyric acid, inosine, combinations of L-alanine with ribosides like guanosine and adenosine). Further potentiation of the rate and amount of L-alanine-initiated germination was caused by adding the inhibitor of alanine racemase, o-carbamyl-D-serine. The germination rate always decreased markedly after about the first 10- or 100-fold fall in level of surviving ungerminated spores, in keeping with the concept that populations of bacterial spores are heterogeneous as regards germinability of the individual spores. Although the presence of the germinants and potentiators of germination lowered the levels of spores remaining ungerminated after incubation in various media and foods, a superdormant fraction of the spore populations always remained. The limitations imposed by superdormancy on the use of initiation of germination as a step in spore destruction processes are highlighted, and some difficulties in the study of superdormant spores are discussed.

**A69-80133**

**A SYMPOSIUM ON DRUGS AND SENSORY FUNCTIONS.**

Edited by Andrew Herxheimer (London Hosp. Med. Coll., Dept. of Pharmacol., Great Britain).

London, J. and A. Churchill Ltd., 1968, xiv+338 p. Many refs.

This book contains all but three of the papers presented at the symposium concerned with drugs and sensory functions. The symposium brings together students from various fields not usually associated with each other. The papers cover the subject from the viewpoint of toxicology, pharmacology, physiology and psychology. Discussions are presented at the end of each article. Subject areas include smell, taste, vision, hearing, sleep, hallucinations and dreams. Pertinent articles are abstracted separately.

**A69-80134**

**OTOTOXIC DRUGS.**

Jan Wersäll and P.-G. Lundquist (Karolinska Hosp., Dept. of Otolaryngol., Stockholm, Sweden).

In the book A Symposium on Drugs and Sensory Functions.

London, J. and A. Churchill Ltd., 1968, p. 142-151. 22 refs.

A discussion is presented of the effects and action of some of the ototoxic antibiotics. Damage to the vestibular apparatus, the cochlea and the kidneys is evaluated. These antibiotics included are kanamycin, viomycin, vancomycin, neomycin, streptomycin and dihydrostreptomycin. The cellular effects of these drugs are reported from recent works. These effects differ in the vestibular and cochlear sensory cells. The relationship of the excretion of the drugs and injury to the ear is elucidated. A strong warning is issued against indiscriminate and prolonged use of these antibiotics.

**A69-80135**

**THE PHARMACOLOGICAL BEHAVIOUR OF THE COCHLEAR NUCLEUS.**

I. C. Whitfield (Birmingham, U., Neurocommun. Res. Unit, Great Britain).

In the book A symposium on Drugs and Sensory Functions.

London, J. and A. Churchill Ltd., 1968, p. 167-174. 15 refs.

Grant AFOSR EOAR 63-115.

The neurons of the cochlear nucleus are unaffected by systemic application of a great range of neurally active substances. The afferent inhibitory response is unaffected even by locally applied strychnine or picrotoxin. Local application of acetylcholine excites, and of adrenaline or noradrenaline inhibits, the majority of neurons in the anteroventral cochlear nucleus. The reverse effects have not been seen. Cholinesterase is present in the cochlear nuclei and is probably related to centrifugal pathways. Locally applied acetylcholine lowers the threshold of neurons in the antero-ventral cochlear nucleus to peripheral sound stimuli up to 15 db. A similar result is obtained by direct-current stimulation of the lateral nucleus of the superior olive. Both these effects are blocked by atropine or dihydro-B-erythroidine.

**A69-80136**

**DRUGS INHIBITING MOTION SICKNESS: SOME ELECTRONYSTAGMOGRAPHIC STUDIES OF THE EFFECT OF DRUGS UPON THE LABYRINTH.**

A. J. Philipszoon.

In the book A Symposium on Drugs and Sensory Functions.

London, J. and A. Churchill Ltd., 1968, p. 175-197. 55 refs.

Over-stimulation of the labyrinth is an essential feature of motion sickness. The effects of drugs upon the vestibular have been investigated by electronystagmography. The semicircular canals in rabbits were stimulated on a rotating table. The antihistaminic drug cinnarizine clearly suppressed the nystagmus; chlorpromazine only suppressed the quick nystagmus phase; hyoscine



intensified the nystagmus indicating that its effect in motion sickness cannot be due to inhibition of the labyrinth; pentobarbitone only influenced the nystagmus in doses inducing complete anesthesia. Cupulometry in man clearly demonstrated suppression of post rotatory nystagmus and sensation. The drugs were also tested in rabbits subjected to linear acceleration to stimulate the otoliths. Cinnarizine suppressed the compensatory eye movements; chlorpromazine and hyoscine did not affect them, and pentobarbitone only suppressed them when the rabbit was fully anesthetized. In human subjects cinnarizine also diminished similar compensatory eye movements. Cinnarizine clearly suppressed positional nystagmus in rabbits after unilateral and bilateral labyrinthectomy, but not alcohol nystagmus. None of the drugs influenced the corneo-retinal potential difference.

**A69-80137**  
**CENTRALLY ACTING DRUGS AND AUDITORY FLUTTER.**

G. M. Besser (St. Bartholomew's Hosp., Med. Coll., Depts. of Med. and Pharmacol., London, Great Britain).

In the book A Symposium on Drugs and Sensory Functions. London, J. and A. Churchill Ltd., 1968, p. 199-207. 15 refs.

An analysis was presented of studies concerned with drug effects on the auditory flutter fusion (AFF). These drugs included amphetamine, chlorpromazine, amylobarbitone and diazepam. The depression by the central depressants caused a decrease in AFF greater in magnitude than the decrease in the critical flicker fusion (visual) caused by the same drugs. Amphetamine raised the AFF. Effects of preceding adapting stimuli on the AFF were not altered by the compounds. A discussion followed.

**A69-80138**  
**THE EFFECTS OF DRUGS ON COLOUR VISION.**

Irwin M. Siegel and Geoffrey B. Arden (London, U., Inst. of Ophthalmol., Great Britain).

In the book A Symposium on Drugs and Sensory Functions. London, J. and A. Churchill Ltd., 1968, p. 210-228. 25 refs.

Grant PHS 1 F11 NB 1470-01 VSN.

A critical analysis and review of the characteristics of color vision in relation to mechanisms of drug action is presented. The effects of two drugs, furaltadone and troxidone were studied in humans using psychophysical and electrophysiological techniques. Furaltadone appeared to have acted selectively on the retinal cones tending to cause the subject to lose ability to discriminate light shades of color. This effect was permanent. Troxidone under increased illumination changed peripheral color vision. The effect was apparently cone specific not affecting rod sensitivity. The effect though was reversible.

**A69-80139**  
**DRUGS AND VISUAL THRESHOLDS.**

G. W. Granger and Hisako Ikeda (London, U., Inst. of Ophthalmol., Dept. of Neurophysiol. and Inst. of Psychiat., Dept. of Psychol., Great Britain).

In the book A Symposium on Drugs and Sensory Functions. London, J. and A. Churchill Ltd., 1968, p. 229-244. 13 refs. MRC supported research.

The effect of ethanol on the critical flicker frequency (CFF) was measured. The optical system controlled spectral distribution, angular size and basic stimulus parameters so that drug effects would be as free as possible from extraneous variations at the pre-retinal level. Determinations were made of the threshold over a two to three hr. period. Alcohol dosage ranged from 0.3 g./kg. to 0.8 g./kg. With a single flash of light of high intensity ethanol lengthened the response and increased the amplitude of the beta-wave. The CFF was decreased. When flickering light was used (five flashes/sec.) at high intensity the response to the first

lengthened, and the electroretinogram was suppressed by the ethanol as is the CFF. The electrophysiological data show that ethanol affects the retina between the photoreceptors and the bipolar cell layer by possibly prolonging recovery time of a neural suppressive process initiated by each flash. The cone mechanism is apparently more sensitive to ethanol than the rods. Larger doses of ethanol may affect the cones differently and rods also.

**A69-80140**  
**PROPRIOCEPTION, VISION AND DEPRESSANT DRUGS.**

D. Legge (U. Coll. London, Dept. of Psychol., Great Britain).

In the book A Symposium on Drugs and Sensory Functions. London, J. and A. Churchill Ltd., 1968, p. 245-257. 7 refs.

The effects of nitrous oxide and alcohol on proprioceptive and visual factors during a psychomotor task were studied. Dosage of alcohol was given at the 0.2, 0.4 and 0.6 g./kg. level and the nitrous oxide was 10, 20, or 30% in oxygen. The results do not confirm the hypothesis of a generalized depressant effect, but can be explained that the drug acts specifically on a particular perceptual process. No generalized physiological response is evidenced. A discussion follows.

**A69-80141**  
**MEPROBAMATE AND LIBRIUM ACTION ON THE FORMATION AND EXTINCTION OF FOLLOW-UP REACTIONS [VLIANIE MEPROBAMATA I LIBRIIA NA PROTSESS FORMIROVANIIA I UGASANIIA SLEDOVOI REAKTSII].**

T. A. Klygul' (USSR, Acad. of Med. Sci., Inst. of Pharmacol. and Chemotherapy, Lab. of Psychopharmacol., Moscow).

*Farmakologiya i Toksikologiya*, vol. 31, May-Jun. 1968, p. 259-263. 9 refs. In Russian.

Meprobamate, librium and 4-isopropylpyrazol exercise a distinctly marked depressive action on the duration of follow-up reactions secondary to a single effect of an electrically-induced pain stimulus. An effective action of these substances is strictly contingent upon the time interval lapsed from the moment of applying a one-time pain stimulus, and in this respect resembles the effect of an electric shock. Similar nature of the effect upon the extinction of follow-up reactions produced by an electric shock, meprobamate, librium and 4-isopropylpyrazol suggests the mode of the action exercised by these substances to be associated with their influence upon the initial stages marking formation of these reactions, namely, upon the so-called "recent memory".

**A69-80142**  
**RESERPINE ACTION ON THE BLOOD SUPPLY OF THE HEART [VLIANIE REZERPINA NA KROVOSNABZHENIE SERD TSA].**

G. G. Chickhanov (USSR, Acad. of Med. Sci., Inst. of Pharmacol. and Chemotherapy, Moscow).

*Farmakologiya i Toksikologiya*, vol. 31, May-Jun. 1968, p. 269-273. 25 refs. In Russian.

Reserpine acts biphasically on the coronary circulation: for 60 to 90 min. after its introduction it causes an increase of the coronary circulation rate and oxygen uptake by the heart. In four hr. on the contrary, it diminishes the coronary blood flow and oxygen consumption by the myocardium. It is suggested that the reserpine action on the blood supply of the heart results not only from its peripheral sympatholytic effect but also from its influence on the vasomotor regulation centers.

**A69-80143**  
**THERAPEUTIC EFFECT OF HYPERBARIC OXYGENATION IN ACUTE MYOCARDIAL HYPOXIA CAUSED BY ISADRIN**

A69-80144

**[TERAPEVTICHESKII' EFFEKT GIPERBARICHESKOI OKSIGENATSII' PRI EKSPERIMENTAL'NOI OSTROI GIPOKSII' MIOKARDA, VYZVANNOI IZADRINOM].**

B. R. Grants and M. IA. Melzobs.

*Farmakologiya i Toksikologiya*, vol. 31, May-Jun. 1968, p. 281-284. 9 refs. In Russian.

Experiments carried out on 82 guinea-pigs of both sexes demonstrated a direct therapeutic effect of hyperbaric oxygenation in acute myocardial hypoxia caused by isoproterenol (isadrin). Air and oxygen compression (hyperbaric oxygenation) at 1.25 ata. in terms of oxygen decreases by more than two-fold the lethality rate among guinea-pigs after these have been given injections of a toxic dose (five mg./kg.) of isoproterenol.

A69-80144

**CHLORPROMAZINE ACTION ON THE PULMONARY CIRCULATION AND BRONCHIAL TONICITY [VLIANIE AMINAZINA NA LEGOCHNOE KROVOOBRAZHENIE I TONUS BRONKHOV].**

R. M. Zaslavskaja (USSR, Acad. of Med. Sci., Inst. of Pharmacol. and Chemotherapy and Central Inst. of Advan. Training of Physicians, Moscow).

*Farmakologiya i Toksikologiya*, vol. 31, May-Jun. 1968, p. 287-289. 8 refs. In Russian.

In 30 nembutal anesthetized cats with artificially controlled respiration tests were conducted to study the effect of chlorpromazine on the pulmonary circulation and bronchial tone. The data pointed to a considerable variability of reactions on the part of the pulmonary arterial pressure and pulmonary vessels tone under the effect of chlorpromazine, this having been conditioned by the dependence of these reactions on the initial state of pulmonary hemodynamics and dosages of the drug. Administered in small doses against the background of pulmonary hypertension chlorpromazine tended to reduce the tonicity of pulmonary vessels. Following introduction of large doses of the drug against the background of a normal or reduced resistance of pulmonary vessels this tone was seen to rise. Chlorpromazine failed to affect bronchial tonicity.

A69-80145

**THE EFFECT OF LONG-TERM ADMINISTRATION OF THE PYRAZOLONE SERIES DERIVATIVES ON THE PARTIAL RENAL FUNCTION AND WATER AND ELECTROLYTES METABOLISM [VLIANIE DLITEL'NOGO PRIMENENIIA PROIZVODNYKH PIRAZOLONOVOGO RIADA NA PARTSIAL'NYE FUNKTSII' POCHEK I VODNO-SOLEVOI OBMEN].**

V. I. Ratnikov (Ivanovo Med. Inst., Dept. of Pharmacol., USSR).

*Farmakologiya i Toksikologiya*, vol. 31, May-Jun. 1968, p. 305-308. 12 refs. In Russian.

The effect produced on the partial renal function and water and electrolytes metabolism by the pyrazolone series derivatives used for 45 days both individually and in combination with prednisolone was studied. A long-term administration of amidopyrine and phenylbutazone was found to bring about a diminished filtration, reduction of plasmatic flow and secretory capacity of the tubular epithelium. By using amidopyrine together with prednisolone partial renal functions were deranged to a lesser degree, although on the level of the water and electrolytes metabolism considerable changes could be noted.

A69-80146

**SOME BIOCHEMICAL CHANGES IN THE ANIMAL ORGANISM FOLLOWING ACUTE POLYETHYLENE POLYAMINE POISONING [NEKOTORYE BIOKHMICHESKIE IZMENENIIA V ORGANIZME ZHIVOTNYKH PRI OSTROM OTRAVLENII' POLIETILENPOLIAMIINOM].**

E. A. Soloimskaja (USSR, Min. of Health, Sci.-Res. Inst. of Oncol., Leningrad).

*Farmakologiya i Toksikologiya*, vol. 31, May-Jun. 1968, p. 364-365. In Russian.

Following polyethylene polyamine poisoning of rats and mice a rise of the liver monoaminoxidase and histaminase activity becomes demonstrable. This results in an accelerated oxidative desamidization of tyramine and histamine causing a fall of the said substances in the blood and organs of the poisoned animals. This apparently also produces pathological disturbances which are seen to occur in polyethylene polyamine poisoned animals.

A69-80147

**MODELING OF THE HYPOXIC REACTION BY AN ANALOGUE COMPUTER [MODELOVANI' HYPOXICKE REAKCE ANALOGOVYH POCHITACEM].**

J. Dvořák, J. Cmíral, and I. Krekule.

*Casopis Lékarů Českých*, vol. 107, May 31, 1968, p. 652-654. 5 refs. In Czech.

The authors elaborated on an analogue computer the model of hypoxic reaction and compared its activity with the response of man during a sudden change of the partial oxygen pressure in the external atmosphere—the respiration of pure nitrogen. The model functions satisfactorily. The object of the work is to connect the computer and man in such a way to render it possible to use data from the examined subject for the input of the computer and conversely to influence by the computer the responses of man.

A69-80148

**POST-INSULIN HYPOGLYCEMIC EDEMA OF THE LUNGS IN RATS [POSTINZULINOVY' HYPOGLYKEMICKY' PL'UCNY' EDEM U POTKANOV].**

R. Korec.

*Casopis Lékarů Českých*, vol. 107, May 31, 1968, p. 659-662. 9 refs. In Czech.

In 91 full grown rats of both sexes fasted for 24 hr., determinations were made of the time of onset of convulsions, atonia, death, the blood sugar level after convulsions and atonia as well as the development of edema of the lungs after 40 U/kg. of i.v. administered insulin alone or after premedication with alpha, beta (gamma) adrenolytic drugs—regitine and phenoxybenzamine or dihydroergotoxin. The above adrenolytics eliminate the greater resistance of males against hypoglycemia to the level observed in females. Dihydroergotoxin is unable to prevent post-insulin, hypoglycemic pulmonary edema. Regitine and phenoxybenzamine prevent completely the development of pulmonary edema, the rats die, however, also without pulmonary edema, even during hypoglycemia which is significantly higher than the hypoglycemia during convulsions and atonia after insulin alone or after dihydroergotoxin and insulin. The opinion is expressed that the block of alpha adrenergic receptors prevents normal glucose utilization in the central nervous system.

A69-80149

**THE STUDY OF EFFERENT IMPULSE IN POST-GANGLIONIC SYMPATHETIC FIBERS UNDER THE INFLUENCE OF A SUPER-HIGH FREQUENCY ELECTROMAGNETIC FIELD [ISSLEDOVANIE EFFERENTNOI' IMPUL'SATSII' V POSTGANGLIONARNYKH SYMPATICHESKIKH VOLOKNAKH PRI VOZDEISTVII' SVERKHVYSOCHEK-ASTOTNOGO ELEKTROMAGNITNOGO POLIA].**

M. I. Iakovleva (USSR, Acad. of Med. Sci., Inst. of Exptl. Med. Moscow).

*Bulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 66, Sep. 1968, p. 9-11. 8 refs. In Russian.

The background bioelectric activity recorded in cats in the efferent fibers of the renal, splenic and inferior mesenteric nerves under a single action of super-high frequency field with the intensity of current up to 30 mvt./cm.<sup>2</sup> increases in 50% of cases, and after the influence of super-high frequency field of greater intensities increases in all the cases.

**A69-80150****THE MECHANISM OF DEVELOPMENT OF HYPERCOAGULATION AND HYPERFIBRINOLYSIS IN ACUTE HYPOXIA [K MEKHANIZMU RAZVITIIA GIPERKOAGULIATSII I GIPERFIBRINOLIZA PRI OSTROI GIPOKSII].**

B. I. Kuznik and V. P. Michchenko (Chita Med. Inst., Dept. of Normal Physiol., USSR).

*Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 66, Sep. 1968, p. 29-32. 13 refs. In Russian.

It is shown that in hypoxia in dogs intact vascular walls, especially of the veins, secrete more abundantly tissue-thromboplastic factor and activators of fibrinolysis. This over secretion could explain hypercoagulation and hyperfibrinolysis in acute hypoxia.

**A69-80151****THE TERMINAL BLOOD FLOW BED AFTER TRANSVERSALLY DIRECTED STRESSES [TERMINAL'NOE KROVENOSNOE RUSLO PRI DEISTVII I OPERECHNO NAPRAVLENNYKH PEREGRUZOK].**

V. V. Kupriianov, V. G. Petrukhin, and N. G. Dimitrov (I. I. Pirogov Second Moscow Med. Inst., Dept. of Normal Anat., USSR).

*Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 66, Sep. 1968, p. 113-116. 8 refs. In Russian.

The authors studied the microcirculatory bed of the diaphragm, of the pericardium and of the renal fibrous capsule in 16 dogs subjected to a single stress and in 24 dogs who had added stress after training on a centrifuge. Changes in the microcirculatory bed after stress both in the trained and in untrained animals results in dilatation of the venules, lymphatic vessels, blood and lymphatic capillaries, a decrease of distance between the adjacent veins and the lymphatic vessel valves. Animals sacrificed after three to four days following experiments had a vascular bed indistinguishable from the vascular bed of the control animals. In the trained animals, spasm of the arterioles and the hypertrophy of the muscular fibers of the precapillary sphincters were observed.

**A69-80152****THE METHOD OF STUDY OF THE VESTIBULAR FUNCTION IN RATS [K METODIKE IZUCHENIIA VESTIBULIARNOI FUNKTSII U KRYS].**

I. I. Voinova (USSR, Min. of Health, Inst. of Med.-Biol. Problems, Moscow).

*Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 66, Sep. 1968, p. 121-123. 24 refs. In Russian.

The influence of low ambient temperature was studied in normal rats under acceleration stress and those with previously lowered body temperature to 20° to 25° C. Angular accelerations of 18, 30, 60, 120, 180, 240, 300, 360, 480, 600, 720, 780, and 840 deg./sec. were used at exposure times of about one hr. Rats with normal body temperature showed a drop in rectal temperature to 10 to 15° C. under acceleration. Precooled rats showed no further drop in rectal temperature under acceleration stress. Duration of nystagmic movements were noted and correlated with the temperature effects.

**A69-80153****THE EFFECT OF THE OPERATOR'S HANDEDNESS ON SOME DIRECTIONAL STEREOTYPES IN CONTROL-DISPLAY RELATIONSHIPS.**

Alphonse Chapanis and Bernard A. Gropper (Johns Hopkins U., Dept. of Psychol., Baltimore, Md.).

*Human Factors*, vol. 10, Aug. 1968, p. 303-319. 11 refs.

Contract Nonr-4010(03).

Recommendations about preferred directions of movement for controls and displays are based almost exclusively on right-handed persons. This experiment has studied some common control-display movement stereotypes to find out if these stereotypes are equally valid for left and right-handed subjects. Our apparatus presented a scale that could be oriented horizontally or vertically. The numbers on the scale increased either right-to-left or left-to-right for the horizontal scales, or up-to-down or down-to-up for the vertical scales. The linkage between the movement of a control knob and the movement of the hairline on the scale was reversible so that a clockwise rotation of the knob could be made to move the hairline toward either end of the scale. We recorded (1) the direction of the first movement made by the subject on each trial, (2) the total number of reversal movements made on each setting, (3) the time taken to make a setting, and (4) the actual setting made (and so, of course, setting errors). We tested 64 subjects, 32 left-handed and 32 right-handed, each using his preferred and non-preferred hands. Significant differences were found in the time to make settings, the number of reversal movements, and errors in initial direction of movement as functions of handedness and the various apparatus relationships. In addition to overall differences between the performance of the left- and right-handed subjects, the two groups behaved differently on some measures when using their preferred and non-preferred hands.

**A69-80154****AIRBORNE DISPLAYS FOR FLIGHT AND NAVIGATION.**

Stanley N. Roscoe (Hughes Aircraft Co., Display Systems Dept., Culver City, Calif.).

*Human Factors*, vol. 10, Aug. 1968, p. 321-332. 8 refs.

This paper deals with certain types of airborne displays, specifically, those used in navigating and flying aircraft. Consideration is given to the nature of the crew's flight task, to certain principles of flight display, and to some of the experimental evidence bearing on principles of display.

**A69-80155****COMPONENT-TOTAL TASK RELATIONSHIPS: SIMPLE AND SEQUENTIAL PRACTICE EFFECTS.**

Albert Zavala and Arlene M. Geist (Am. Inst. for Res., Washington, D. C.).

*Human Factors*, vol. 10, Aug. 1968, p. 333-343. 11 refs.

Contract DA-49-193-MD-2632.

The Complex Coordinator was used to examine simple and sequential practice effects on component-total task relations. Part-tasks were three single-level (one rudder and two stick control) tasks, and three double-level (one stick-stick and two rudder-stick) tasks. Of 126 paid male volunteers, 63 practiced first on a part-task then on the total task, and 63 practiced in the reverse sequence. In each of these groups, seven sub-groups of nine subjects each were assigned randomly to each of the six part tasks and to the total task. Two sessions of five (two-min.) trials were given, with a 15 min. rest between sessions. All groups improved across trials and across sessions, regardless of the task practiced first. However, the single-level rudder task facilitated total practice most. Also, practice on the most difficult among single and double level tasks, respectively, led to the best total task performance.

## A69-80156

Evidence was also found for distinguishing between multi-limb coordination (coordinated movements of more than one limb, each in a single dimension), and multidimensional coordination (coordinated movements of one limb in more than one dimension).

### A69-80156

#### **PREDICTION OF MUSCULAR ENDURANCE (WORK PERFORMANCE) FROM INDIVIDUAL DIFFERENCES IN INITIAL AND POST TRAINING INCREMENTS IN STATIC STRENGTH.**

Leon E. Smith (Iowa, U., Iowa City) and Donald K. Edwards (Calif., U., Riverside).

*Human Factors*, vol. 10, Aug. 1968, p. 345-350. 12 refs.

Forty college men were given tests for static strength and strength endurance prior to an isotonic strength training program. Experimental results indicate that individual differences in static strength are a poor criterion in the prediction of muscular endurance. Following an increase in static strength resulting from isotonic strength training pre-training static strength and post-training strength increments are not indicative of an individual's performance in a hand grip endurance activity.

### A69-80157

#### **ASSESSMENT OF THE FIDELITY OF DYNAMIC FLIGHT SIMULATORS.**

Samuel Mudd.

*Human Factors*, vol. 10, Aug. 1968, p. 351-358. 9 refs.

The evaluation of dynamic flight simulators is considered from the standpoint of the efficiency and validity of the currently used pilot evaluations and assessment techniques. A set of requirements for an ideal fidelity measurement technique is presented, followed by a comparison of the two general approaches to fidelity measurement, the *analytic* and the *empirical*, with reference to those requirements. A hybrid method which involves the use of pilot psychomotor responses rather than verbal responses is introduced. This technique retains the subjective characteristic of rating scales, but provides information of an analytic nature that is more amenable to engineering analyses. Problems involved in the development of the technique are considered.

### A69-80158

#### **VISUAL FACTORS IN THE DESIGN OF COMPUTER-CONTROLLED CRT DISPLAYS.**

John D. Gould (Intern. Business Machines Corp., Thomas J. Watson Res. Center, Yorktown Heights, N. Y.).

*Human Factors*, vol. 10, Aug. 1968, p. 359-375. 85 refs.

This paper is concerned with the important visual variables that determine image quality on computer-controlled cathode-ray tube displays. A strategy is developed that leads to general conclusions about each variable considered, the recommended range of values is determined on the basis of experimental evidence and is compared with the values presently used on displays. Where discrepancies between these two exist, alternative solutions are mentioned. Conclusions are (i) presently used values of display luminance, chromaticity (color), and resolution are adequate; (ii) several displays flicker; (iii) characters are large enough but may be marginal in terms of number of elements; (iv) luminance contrast is not adequate.

### A69-80159

#### **THE EFFECT OF BREATHING ONE HUNDRED PERCENT OXYGEN ON FOVEAL THRESHOLDS.**

Mary M. Connors (NASA, Ames Res. Center, Moffett Field, Calif.).

*Human Factors*, vol. 10, Aug. 1968, p. 377-384. 18 refs.

This study examined the effects of breathing 100% oxygen at sea level on the luminance thresholds necessary for perception of red (642 nm.), green (521 nm.), blue (468 nm.), and yellow

(584 nm.), and the chromatic and absolute thresholds associated with these dominant wavelengths. Using two highly trained observers, thresholds were measured for one target size and exposure duration by the method of constant stimuli. For the foveal thresholds investigated, no differences were found between the condition of breathing 100% oxygen and breathing normal room air at sea level. There is at least some physiological basis for thinking that vision may improve in a high oxygen environment. At the other extreme, breathing high concentration of oxygen under pressure is known to degrade vision. Evidence relating to the visual effects of high oxygen concentrations is evaluated and conclusions are drawn with reference to the findings of this and other studies.

### A69-80160

#### **INDUCED STEREOSCOPIC MOTION AS AN AID IN THE SEARCH FOR TALL TARGETS.**

Roger J. Weldon, Douglas A. Slingerland, and John T. Myers (Ariz., U., Tucson).

*Human Factors*, vol. 10, Aug. 1968, p. 385-392. 8 refs.

Induced stereoscopic motion, ISM, is apparent movement in tall static objects projecting from a reasonably flat background when viewed stereoscopically. ISM is produced by a smooth but extensive variation of the stereo-base (the separation of camera points) in a pair of moving picture films. The two films are projected by two separate but synchronized projectors onto rear view screens which are placed in the field of view of a stereoscope. In a controlled test it was found that subjects located targets faster and with fewer errors with ISM film than with comparable film in which the stereo-base was fixed at the maximum of the ISM film. This improvement of search is due almost entirely to searches for targets which are difficult to find. Easy targets were always found and found quickly by both methods. ISM is as yet a laboratory production, but plans are being made for developing its field and applicability.

### A69-80161

#### **LUNAR GRAVITY SIMULATION AND ITS EFFECT ON HUMAN PERFORMANCE.**

R. J. Shavelson (Lockheed Missiles and Space Co., Biotechnol. Organ., Sunnyvale, Calif.).

*Human Factors*, vol. 10, Aug. 1968, p. 393-401. 24 refs.

Project Apollo has stimulated extensive research on human performance using a variety of lunar gravity simulators. Based on a survey of the literature, the following conclusions have emerged: (a) existing simulators do not represent a high fidelity simulation of 1/6 g; (b) a validation study of the various simulators is needed; (c) man will be capable of self-locomotion in lunar gravity; (d) man's metabolic rate will be lower in 1/6 g during self-locomotion; (e) man will change his method of performing common Earth tasks when in 1/6 g; (f) psychomotor task decrement in 1/6 g will be observed; and (g) future research should direct itself toward a higher fidelity simulation of the total lunar ecology for study of mission-specific tasks.

### A69-80162

#### **VISUAL DETECTION PROBABILITY OF "SONAR" TARGETS AS A FUNCTION OF RETINAL POSITION AND BRIGHTNESS CONTRAST.**

Leroy L. Vallerie and James M. Link (Dunlap and Assoc., Inc., Darien, Conn.).

*Human Factors*, vol. 10, Aug. 1968, p. 403-411. 8 refs.

A study was carried out in the laboratory to determine the detectability of visual sonar targets as a function of retinal position and brightness contrast using a simulated sonar scope. Nine different retinal positions were investigated under photopic conditions of illumination. The target was approximately square and subtended 24 min. of visual arc on a side. Average peak intensity of the sweep, which formed the target background was 9.12 FL.

The results of the study were presented in terms of probability of detection curves. Equations were developed for determining the probability of detection given the target's normalized brightness intensity, expressed in  $\log \Delta I/I$ , and its angular distance from the point of fixation.

**A69-80163****JOYSTICK DYNAMICS.**

Barbour Lee Perry and H. P. Birmingham (Naval Res. Lab., Washington, D. C.).

*Human Factors*, vol. 10, Aug. 1968, p. 413-418.

In the light of the critical importance of considering the dynamic contributions of system elements to total system performance, the dynamic characteristics of joystick controls are discussed. The transfer functions of four common joystick types are derived, and an example illustrates the effect of joystick design on system performance.

**A69-80164****THE DESIGN FOR AN OPTICAL RATE DISPLAY.**

Patricia Anne Griffin (Naval Res. Lab., Eng. Psychol. Branch, Washington, D. C.).

*Human Factors*, vol. 10, Aug. 1968, p. 419-423.

There is a definite need for optical rate displays, especially in the critical task of landing aircraft. In the course of developing such a display, other unique characteristics evolved that are significant improvements to the information provided by many of the extant position, position error, and rate displays. There are many possible applications and generalizations of the principles utilized for this particular display in this specific problem to other man-machine control problems requiring precise manipulations.

**A69-80165****THE PRIME TECHNICAL INFORMATION SOURCE—THE LOCAL WORK ENVIRONMENT.**

J. D. Hodges, Jr. (North Am. Aviation, Inc., Autonetics Div., El Segundo, Calif.) and B. W. Angalet (McDonnell Douglas Corp., Aircraft Div., Santa Monica, Calif.).

*Human Factors*, vol. 10, Aug. 1968, p. 425-429.

Contract DOD DSA-7-16244.

This paper is a report of one of the conclusions of the DOD User-Needs Study, Phase II—Flow of Scientific and Technical Information Within the Defense Industry (Contract DSA-7-16244). This major study conclusion is that the local work environment is an important and necessary source of scientific and technical information. The current trend, however, is toward greater reliance on this information source; and certain aspects of the informal and formal information system experience seem to be reinforcing the local, informal system utilization and lessening the use of formal systems. The understanding of the needs of the user and an organized effort by the formal system to respond to these needs is the course that must be followed if the technical information system and its personnel are to fill a more meaningful position within the scientific and technical information flow process.

**A69-80166****HUMAN FACTORS EVALUATION OF A COMPUTER BASED INFORMATION STORAGE AND RETRIEVAL SYSTEM.**

Gerald V. Barrett, Carl L. Thornton, and Patrick A. Cabe (Goodyear Aerospace Corp., Akron, Ohio).

*Human Factors*, vol. 10, Aug. 1968, p. 431-436. 5 refs.

The human factors aspects of a computer-based information storage and retrieval system were evaluated in three government intelligence services using questionnaire and interview techniques. It was found that many factors entered into satisfaction with the information system, including familiarity, ease of use, and

importance. Other relevant factors included training in the use of the system, amount and type of information to meet needs in the system, and tolerances of individuals for irrelevant materials in the output of searches. The interaction of these factors is discussed in relation to satisfaction with the system.

**A69-80167****THE SIGNIFICANCE OF PROLONGED CLINOSTATIC HYPODYNAMIA IN THE CLINICAL PICTURE OF NERVOUS DISEASES [ZNACHENIE DLITEL'NOI KLINOSTATICHESKOI GIPODINAMII V KLINIKE NERVNYKH BOLEZNEI] BOLEZNEI].**

T. N. Krupina and A. IA Tizul (USSR, Min. of Health, Inst. Med.-Biol. Problems, Moscow).

*Zhurnal Nevropatologii i Psikiatrii*, vol. 68, no. 7, 1968, p. 1008-1014. 21 refs. In Russian.

Changes of the neuro-vegetative functions were studied in six men (23 to 36 yr.) during a 62-day period of clinostatistical hypokinesia. Their relation to motor activity (physical exercises) was investigated. Three men were in a recumbent position and received apportioned physical loadings (veloergometer for the legs, rubber expander for hands). At the end of the first half of the experiment, those three volunteers who had no physical exercises displayed some neuro-vegetative disturbances, in conjunction with the syndrome of vegetative-vascular dysfunction. At the beginning of the second part of the experiment such phenomena as asthenic symptoms, and changed muscular tone appeared. At the end of the experiment there was a definite hypotrophy of the lower extremity muscles. All these symptoms had a tendency to develop with an increase of the time of the experiment and were much more expressed in subjects not receiving physical exercises. These functional disturbances of the vegetative functions may be explained by the changes in the character and level of the proprio-interoangioreceptive and sensorial afferentation, by the disintegration of the afferent efferent interrelationships and the development of functional-dynamical changes in central nervous system.

**A69-80168****MENTAL STATES IN PROTRACTED HYPOKINESIS [PSIKHICHESKOE SOSTOIANIE PRI DLITEL'NOI GIPOKINEZII].**

I. A. Maslov (USSR, Min. of Health, Inst. of Med.-Biol. Problems, Moscow).

*Zhurnal Nevropatologii i Psikiatrii*, vol. 68, no. 7, 1968, p. 1031-1034. 10 refs. In Russian.

Mental changes were studied in six normal male subjects in the age group from 23 to 36 yr. All six subjects were put on a bed regimen for 62 days. Three of them daily accomplished a special complex of physical exercises in a lying position. In all the subjects the main form of mental changes was expressed in a neurasthenic syndrome. These changes had certain regularities in their development, which were conditioned by the premorbid features of the subjects. The author stressed the significance of such psychological factors as apprehension of the duration of the experiment. The role of physical exercises on the mental states remained unclear because of the insufficient amount of observations. However, the author expressed the belief that the reason for these changes may be explained primarily by such factors as the change of a habitual life pattern, monotony of the environmental situation, and a certain degree of isolation.

A69-80169

A69-80169

**THE EFFECT OF DIVERSE IRON PREPARATIONS ON THE HEMOGLOBIN AND MYOGLOBIN CONTENT IN THE ORGANISM OF ALBINO RATS FOLLOWING SYSTEMATIC MUSCULAR EFFORTS [VLIHANIE RAZLICHNYKH PREPARATOV ZHELEZA NA SODERZHANIE GEMOGLOBINA I MIOGLOBINA V ORGANIZME BELYKH KRYSS PRI SISTEMATICHESKOI MYSHECHNOI DEIATEL'NOSTI].**

E. I. Smorodintseva and N. N. Iakovlev (P. F. Lesgaft Inst. of Phys. Cult., Dept. of Biochem., Leningrad, USSR).

*Voprosy Pitaniia*, no. 5, Sep.-Oct. 1968, p. 29-33. 26 refs. In Russian.

Tests in adult male rats showed that with normal nutrition and ordinary locomotive regimen regular administration of the iron glycerophosphate resulted in an increased hemoglobin and myoglobin content. Iron citrate and reduced iron proved ineffective. The action of the iron glycerophosphate may be potentiated by its use in conjunction with anabolic compounds, such as 4-methyluracil and casein hydrolysate. With an increased motional activity (training) glycerophosphate failed to potentiate the myoglobin rise incident to it. Given together with anabolic compounds, however, it tended substantially to raise the number of erythrocytes, as well as the hemoglobin and myoglobin levels, contributing to an increase of the oxygen capacity of the organism.

A69-80170

**THE EFFECT OF TEMPERATURE ON THE METABOLISM OF THE LABELLED CARBON ABSORBED IN THE COURSE OF PHOTOSYNTHESIS IN DIFFERENT CHLORELLA STRAINS [VLIHANIE TEMPERATURY NA METABOLIZM MECHENOGO UGLERODA, POGLOSHCHENNOGO PRI FOTOSINTEZE, U RAZNYKH SHTAMMOV KHLORRELLY].**

N. S. Mamushina and O. V. Zalenskii (USSR, Acad. of Sci., V. L. Komarov Botan. Inst., Leningrad).

*Botanicheskii Zhurnal*, vol. 53, Sep. 1968, p. 1274-1285. 22 refs. In Russian.

The effect of temperature from +10° to +45° C. was studied on the metabolism of organic compounds with labelled carbon in the course of photosynthesis in three strains of *Chlorella*: strain 4 (*Chlorella pyrenoidosa* Chick), strain 627 from Kazakhstan and strain 374 from the Khibiny Mts. (*Chlorella vulgaris* L.). The exposure of photosynthesis to the flow of C<sup>14</sup>O<sub>2</sub> was five min. The exposure to temperature lasted 30 min. The results showed that with the raising of temperature from +10° to +40° the intensity of photosynthesis increases, as well as the incorporation of C<sup>14</sup> into sugars (sucrose + polysaccharides). There was a difference between species in the incorporation of labelled carbon into polysaccharides and sucrose. Thus, in *Chlorella pyrenoidosa* the temperature optimum of photosynthesis coincided with the optimum of biosynthesis of polysaccharides, while in *Chlorella vulgaris* the optimal temperature of biosynthesis of polysaccharides did not exceed +30°, while a significant incorporation of C<sup>14</sup> into sucrose took place at +40°. Under the effect of superoptimal temperature (+45°) the rate of photosynthesis decreases, the radioactivity of phosphate esters of sugars did not change, but the incorporation of C<sup>14</sup> into sucrose, polysaccharides, organic acids and amino acids was suppressed considerably.

A69-80171

**A PILOT LOOKS AT VISIBILITY.**

Richard H. Beck.

*Air Line Pilot*, vol. 37, Oct. 1968, p. 12-16.

The problems of navigational guidance close to the ground in conditions of restricted and low visibility were discussed. Five means of representing visibility were outlined and included: (1) meteorological visibility; (2) tower visibility; (3) pilot visibility; (4) runway visibility; and (5) runway visual range. Runway visual range was discussed in greater detail, and it was concluded that it can

only be an indication to the pilot of what he may see when he reaches his decision height. Characteristics of various reduced visibility structures were presented and included: (1) radiation and advection fogs; (2) warm front fogs; (3) upslope, stream and ice fogs; and (4) other obstructions to vision such as snow, rain, sand and dust. It was indicated that a concerted effort be made to supply the pilot with a representative slant visual range that he will see from the cockpit at his decision height.

A69-80172

**CAD AND THE AIR LINE PILOT.**

John S. Dodd, Jr.

*Air Line Pilot*, vol. 37, Oct. 1968, p. 21-22.

Tests used for the diagnosis of coronary artery disease (CAD) were discussed with applications toward determining the flight fitness of airline pilots. The Master's two-step exercise electrocardiogram test was evaluated and its disadvantages were noted. The selective coronary arteriography method for studying CAD was also presented. Correlations between the two methods indicated a doubtful reliability of the Master's test. It was concluded that the test is useful for large group studies which attempt to isolate a particular group that might be subject to higher subsequent risk, but that the test loses much of its value when applied to a single individual.

A69-80173

**THE CHANGES OF BLOOD GLUCOSE LEVEL DURING SHORT STARVATION IN CONDITION OF LABILITY OF THE CENTRAL NERVOUS SYSTEM [ZMENY GLYKEMIE BEHEM KRATKODOBEHO HLADOVENI PRI LABILITE NERVOVEHO SYSTEMU].**

M. Pipal.

*Ceskoslovenská Hygiena*, vol. 13, Sep. 1968, p. 453-457. 18 refs. In Czech.

The level of blood glucose was observed in nine young volunteers (19-23 yr.) in the course of 24 hr. starvation. The starvation load was found to provoke considerably marked changes of blood glucose level even during this relatively short time interval. The changes were more pronounced in psychically labile persons than in psychically stable ones.

A69-80174

**THE CHANGES IN MUSCULAR CONTRACTION AND RELAXATION AFTER THE STATIC LOAD IN 16-YEAR BOYS AND GIRLS [ZMENY SVALOVE KONTRAKCE A RELAXACE PO STATICKEM ZATIZENI U SESTNACTILETYCH CHLAPCU A DIVEK].**

J. Sukop and R. Reisenauer.

*Ceskoslovenská Hygiena*, vol. 13, Sep. 1968, p. 458-466. 7 refs. In Czech.

An analysis of muscular contraction and relaxation of the hand flexors in boys and girls before and after the static load was made by means of running values of muscular contraction and relaxation of the hand flexors in 20 msec. intervals. The boys proved to be able to develop higher level of muscular tension in shorter time interval; it was manifested by higher running values during the whole contraction particularly at the end of its first half, where the predominance was characterized by 87% higher level in a comparison with girls. The static load proved to exhibit deeper reflection in boys. However, it manifested in the same way in the both groups by a decrease of running values of muscular tension. The relaxation proved to extend by 150 to 160% in both groups. The described experiment is to be considered as a part of broader investigation of the effects of different factors on changes in muscular contraction; its goal is to give the practice some new opportunity of more exact examination of neuro-muscular apparatus functions.

**A69-80175****A CONTRIBUTION TO THE ASSESSMENT OF HEAT INSULATING PROPERTIES OF GARMENTS [PRISPEVEK KE STANOVENI TEPELNE IZOLACNICH VLASTNOSTI ODEVNICH SOUCASTEK].**

J. Pohanka.

*Ceskoslovenská Hygiēna*, vol. 13, Sep. 1968, p. 473-479. 22 refs. In Czech.

In a group of 10 men an evaluation was made of the heat insulating properties of two types of warm linings of winter kit of soldiers. They proved that the heat insulating effect of linings from plastic foamy material was greater. To assess the heat insulating properties an electric thermometer (ELLAB) modified by the authors was used. They attempted to characterize the heat insulating properties of different garments by calculating the appropriate ratio of the total thermal difference. Finally attention is drawn to the need of the hygienic evaluation of garments in laboratory experiments on man.

**A69-80176****SIMPLE, QUICK METHODS FOR DETECTION OF IMPORTANT ORGANIC SOLVENTS OF ACUTE INTOXICATIONS [EINFACHE SCHNELLMETHODEN ZUM NACHWEIS WICHTIGER ORGANISCHER LOSUNGSMITTEL BEI AKUTEN VERGIFTUNGEN].**

R. K. Müller, R. Ludewig, and V. Görisch (Karl-Marx-U., Inst. für Pharmakol. und Toxikol. and Inst. für gerichtl. Med. und Kriminalistik, Leipzig, East Germany).

*Das deutsche Gesundheitswesen*, vol. 23, Sep. 5, 1968, p. 1697-1703. 6 refs. In German.

The authors describe simple quick methods for the orientative, informative detection of toxicologically important solvents. The survey submitted as a practical working instruction should help to facilitate the quick diagnostic judgment and treatment of acute intoxications caused by unknown solvents. A respective table indicating the reagents required will be available to prepare medical experts for such emergencies.

**A69-80177****THE FIGURAL AFTER-EFFECTS IN THE REVERSE DIRECTION.**

M. K. Malhotra (Bochum Ruhr U., Essen Med. Coll., Children's Hosp., West Germany).

*Acta Psychologica*, vol. 28, Jul. 1968, p. 266-282. 30 refs.

This review attempts to survey the experimental evidence of the conditions under which the figural after-effects occur in the reverse direction or otherwise counter to the usual pattern. The review shows that the figural after-effects in the reverse direction occur when certain conditions, such as the spatial arrangement of the inspection figure and the test figure the spatial arrangement of the figures and the subjects the temporal arrangement, the visibility of the figures, etc. are extreme. The presence of an extreme condition is a common factor between most of the cases of the figural after-effects in the reverse direction.

**A69-80178****THE EFFECT OF SET ON PERCEIVED EGOCENTRIC DISTANCE.**

Walter C. Gogel (Calif., U., Santa Barbara).

*Acta Psychologica*, vol. 28, Jul. 1968, p. 283-292. 8 refs.

NASA Grant NGR 05-010-010 and Grant NIH MH 12615-01.

In this study, the set of the observer to perceive the distances of playing cards was modified by providing experiences which would suggest that relatively far distances were being observed. One group of observers threw darts down a visual alley while viewing the alley, prior to observing the cards. When observing the cards, this group threw darts to the apparent distance of the cards and

gave verbal reports of apparent distance of the cards without throwing darts or viewing the throwing alley. The dart group gave verbal reports of the distances of the cards which were approximately twice those from the no dart group. In this experiment, the ratio of the perceived distances of the cards on the first presentation was considerably less than the simulated ratios. A second experiment was designed to investigate the effects of a prior presentation of a full cue field upon the subsequent perceived distance of the cards. This objective was not achieved in that a control group who was first presented with the cards, closely approximated veridicality in perceived distance using the absolute size cue. The study supports the following conclusions: (1) Perceived egocentric distance from the familiar size cue can be affected by the experiences of the observer occurring prior to the presentations of the cards. (2) The distinction between relative and absolute size cues to distance from familiar objects is valid. (3) Although the perception of egocentric distance from familiar size shows considerable observer variability, it can occur (Experiment I) and under some conditions can approach veridicality in terms of average (or median) responses (Experiment II).

**A69-80179****FATIGUE: IT PHYSIOLOGICAL AND PSYCHOLOGICAL SIGNIFICANCE.**

E. Grandjean (Eidgenössischen Tech. Hochschule, Inst. für Hyg. Und Arbeitsphysiol., Zurich, Switzerland).

*Ergonomics*, vol. 11, Sep. 1968, p. 427-436. 21 refs.

The physiological and psychological significance of fatigue was discussed. In the light of present neurophysiological knowledge fatigue may be considered as a state of the central nervous system controlled by the antagonistic activity of the inhibitory and activating system of the brain stem. The regulating systems in turn are susceptible to reaction to stimuli from the surrounding world, to stimuli from the conscious part of the brain, and to humoral factors originating within the organism and having obviously the task of regulating recovery and wakefulness. The state of fatigue is accompanied by a decrease in motivation to work, a decrease in physical and mental performances, and by the occurrence of subjective feelings of fatigue. The latter induced animals and human beings to a behavior-ensuring recovery.

**A69-80180****EXPERIMENTAL STUDIES OF SHIFT-WORK 1: A COMPARISON OF 'ROTATING' AND 'STABILIZED' FOUR-HOUR SHIFT SYSTEMS.**

W. P. Colquhoun, M. J. F. Blake, and R. S. Edwards (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).

*Ergonomics*, vol. 11, Sep. 1968, p. 437-453. 25 refs.

Roy. Naval Personnel Res. Committee supported research.

Efficiency at mental tasks was observed when performed according to a time schedule imposed by following one of two different four hr. shift systems for a period of 12 consecutive days. Twenty-eight subjects were assigned either to a rotating system, in which each four hr. period of the 24 hr. was worked once every 72 hr. in a repeating cycle, or to a stabilized system, in which the work periods were from 1230 to 1630 and 2400 to 0400 each day. In the rotating system, alterations in the level of several aspects of performance at different times of day were found to be related quite closely to concurrent fluctuations in body temperature arising from its natural circadian rhythm. A shift in the phase of this rhythm in response to the new sleep/waking cycle imposed by the stabilized system was accompanied by a corresponding change in the relative levels of performance observed in the two work periods. Thus in both systems body temperature was, in effect, a predictor of performance efficiency. Some implications for the organization of shift working are discussed.

A69-80181

A69-80181

**TIME RELATIONS OF THE EFFECTS OF ALCOHOL COMPARED TO PLACEBO: DOSE-RESPONSE CURVES FOR PSYCHOMOTOR AND PERCEPTUAL TEST PERFORMANCES AND BLOOD AND URINE LEVELS OF ALCOHOL.**

Carl-Magnus Idestrom and Björn Cadenius (Karolinska Hosp., Dept. of Exptl. Psychiat., Stockholm, Sweden).

*Psychopharmacologia*, vol. 13, Sep. 20, 1968, p. 189-200. 8 refs.

Thirty-one healthy male students were given a placebo and two different doses of alcohol (on different occasions and in random order). Choice-reaction-time, tapping-speed, bimanual hand-coordination, critical fusion frequency, standing steadiness, Bourdon's test, blood and urine alcohol content were measured before and 30, 60 and 90 min. after drinking. Self-ratings of mood were made. Seven of the subjects were also examined after 2, 3 and 13 hr. and altogether four doses of alcohol were used for this group. Twenty-four subjects were given an additional dose of alcohol two hr. after the first one and the tests were repeated 30, 60 and 90 min. after the additional dose. The agreement between blood and urine alcohol levels was good and the alcohol curves showed an approximately linear fall-off. For the highest alcohol dose used there was a good agreement between blood alcohol level and test performance. The impairment of performance was most marked after 30 to 60 min. After two hr. the impairment was very slight. The performance on Choice reaction time and Coordination was related to blood alcohol level also after a smaller dose. Statistically significant changes were obtained in most tests after the highest dose (0.8 g./kg. body weight) and in Choice reaction time and Coordination after the smaller dose (0.4 g./kg. body weight). No significant effects were obtained after administration of placebo.

A69-80182

**DIURNAL VARIATION IN THE CONCENTRATIONS OF SOLVOLYZABLE STEROIDS IN HUMAN PLASMA.**

T. Laatikainen and R. Vihko (Helsinki, U., Dept. of Med. Chem., Finland).

*Journal of Clinical Endocrinology and Metabolism*, vol. 28, Sep. 1968, p. 1356-1360. 17 refs.

*Finn. Med. Soc., 2nd Ann. Meeting, Helsinki, Mar. 29-30, 1968.*

Natl. Res. Council for Med. Sci. supported research.

Mono- and disulfated steroid conjugates were quantitated in human peripheral plasma to reveal the possible occurrence of a diurnal variation in the concentrations of these compounds. Plasma samples of six normal adults were obtained at 8 AM, noon, 4 and 8 PM, midnight, and at 8 the next morning. During the experimental period the subjects carried on with their usual activities. The concentration of monosulfated dehydroepiandrosterone, androsterone, epiandrosterone and pregnenolone, mono- and disulfated androst-5-ene-3, 17 -diol and pregn-5-ene-3, 20a-diol were determined. A diurnal variation is suggested to occur in the concentrations of monosulfated dehydroepiandrosterone and androsterone, mono- and disulfated androst-5-ene-3, 17 -diol and pregn-5-ene-3, 20 -diol. The values were highest at noon or at 4 PM and were 15 to 30% higher than the lowest values at midnight or at 8 AM. The diurnal fluctuation observed differs from that of 17-hydroxycorticosteroids, the concentration of which is highest in the early hours of the morning, then decreasing during the day. The difference in the diurnal variations of free 17-hydroxycorticosteroids and sulfate-conjugated neutral steroids possibly reflects differences in the release of these two types of compounds from the adrenals.

A69-80183

**THE ACTION OF PHENOBARBITAL ON THE RIBOSOMAL FRACTION FROM RAT LIVER [DIE WIRKUNG VON PHENOBARBITAL AUF DIE RIBOSOMENFRAKTIONEN DER RATTENLEBER].**

Jaroslav Seifert, Helmut Greim, and Prakash Chandra (Tübingen, U., Inst. für Toxikol. and Frankfurt am Main, U., Inst. für Therap. Biochem., West Germany).

*Hoppe-Seyler's Zeitschrift für Physiologische Chemie*, vol. 349, Sep. 1968, p. 1179-1184. 35 refs. In German.

The *in vitro* incorporation of [<sup>14</sup>C]phenylalanine into ribosomes isolated from rat liver is stimulated by phenobarbital within five hr. after i. p. injection of the drug. After 17 hr. the activity of the microsomes and membrane-bound ribosomes is diminished. Depending on the concentration of endogenous mRNA there is a little stimulation of ribosomal activity after phenobarbital. But the sensitivity to added synthetic ribosomal mRNA from pretreated animals is 40% higher than that of controls. At the same time the ribosomal fraction from phenobarbital-treated rats consists of a greater proportion of more rapidly sedimenting polysomal components. These results indicate that phenobarbital enhances the proteosynthesis not by the stimulation of mRNA-synthesis but by causing an increase in the number of ribosomal binding sites for mRNA-attachment.

A69-80184

**STUDIES ON THE DEPENDENCE OF LIPID PEROXIDATION ON THE PARTIAL PRESSURE OF OXYGEN IN RAT LIVER MICROSOMES [UNTERSUCHUNGEN ZUR ABHANGIGKEIT DER LIPIDPEROXYDATION IN RATTENLEBERMIKROSOMEN VOM SAUERSTOFFPARTIALDRUCK].**

Ludwig Lumper, Hans Joachim Plock, and Hansjürgen Stauinger (Giessen, U., Physiol.-Chem. Inst., West Germany).

*Hoppe-Seyler's Zeitschrift für Physiologische Chemie*, vol. 349, Sep. 1968, p. 1185-1190. 18 refs. In German.

Lipid peroxidation in microsomes shows a  $K_m$  for oxygen of  $3 \cdot 10^{-5}M$ . The process is not inhibited by carbon monoxide. Lipid peroxidation is inhibited by the preincubation of microsomes with ADP. In the peroxidation of unsaturated fatty acids in microsomes carbon monoxide could not be detected on the basis of binding to cytochrome P 450.

A69-80185

**INTRAORGAN VASCULAR BED OF SOME GLANDS OF INTERNAL SECRETION IN ANIMALS UNDER CONDITIONS OF MOUNTAINOUS HIGHLANDS [VNUTRIORANNYE SOSUDY SHCHITOVIDNOI ZHELEZY, NADPOCHECHNIKOV I IAICHNIKOV ZHIVOTNYKH, NAKODIVSHIKHSIA V USLOVIAKH VYSOKOGORNOI MESTNOSTI].**

L. E. Etingen (Tadjik Med. Inst., Dept. of Normal Anat., Dushanbe, USSR).

*Arkhiv Anatomii, Gistologii i Embriologii*, vol. 55, no. 8, 1968, p. 64-70. 27 refs. In Russian.

Analyzing the relevant literature the author found no works concerning the anatomy of the intraorgan vascular bed of the visceral organs in animals of mountainous highlands. The corresponding experiments were conducted on 50 adult dogs and 50 adult rabbits brought from Dushanbe (800 m. above sea level) to Anzob pass (Guissar mountain ridge, Tadjik SSR, 3,600 m. above sea level). The animals were sacrificed after one, three, seven and 15 days. Thirty dogs and 30 rabbits in Dushanbe served as controls. Considerable changes in the capillaries and vessels intimately connected with structural transformations in the thyroid gland, adrenals and ovaries were noted within the first 24 hr. The blood and lymph capillaries were enlarged 1.5-2 times. Sometimes they were distinctly deformed and arranged into numerous irregular loops. In a number of cases, in the glands under study there were found lacunae, glomerules, spirals, and sphincter-shaped enlargements, apparently as a compensatory reaction aimed at the balancing of disturbed blood circulation and lymph drainage and increasing length and capacity of the vascular bed of the organ.



## A69-80186

**THE INFLUENCE OF REGULAR MUSCLE ACTIVITY ON THE ACTIVITY OF THE ENZYMES OPERATING THE CONVERSION OF GLYCOGEN AND GLUCOSE-6-PHOSPHATE IN MUSCLES AND IN THE LIVER [VLIANIE SISTEMATICHESKOI MYSHECHNOI DEIATEL'NOSTI NA AKTIVNOST' FERMENTOV OBMENA GLIKOGENA I GLUKOZO-6-OSFATA V MYSHTSAKH I PECHENI].**

N. N. Iakovlev (Sci.-Res. Inst. of Phys. Cult., Biochem. Sect., Leningrad, USSR).

*Biokhimiia*, vol. 33, Jul.-Aug. 1968, p. 737-744. 26 refs. In Russian.

It was shown that regular muscle activity results in the increase in the activity of hexokinase, UDPG-glycogensynthetase (both forms in muscles and but form J in liver) and phosphorylase (both AMP-activated and AMP-independent) in muscles and in the liver of adult albino rats. In the liver the activity of G-6-phosphatase (G-6-P) is also increased. The activity of UDPG-pyrophosphorylase and phosphoglucomutase in muscles and liver and that of G-6-P-dehydrogenase in liver is not changed. The content of G-6-P is reduced but that in liver is not affected. Short-term muscle activity in trained animals is followed by earlier and a more significant increase in the activity of AMP-independent phosphorylase and by great decrease in the activity of glucosynthetase independent on G-6-P (form J) and the level of G-6-P. During rest time the activity of J-glycosynthetase and the amount of G-6-P increased more significantly. These changes in the amount enzyme activity indicate the increase in glycogenolytic and glycogenosynthetic possibilities of muscles and liver with training. They can be regarded as a kind of adaptation of the organism to more prolonged and more intensive muscle activity.

## A69-80187

**APPLICATION OF THE STEP TEST FOR ASSESSING THE EFFICACY OF THE CIRCULATION [MOZNOSTI URCENI ZDATNOSTI KREVNIOHO OBEHU STEP-TESTEM].**

J. Chrastek.

*Casopis Lékařů Ceských*, vol. 107, Jul. 1968, p. 908-913. 25 refs. In Czech.

Using a modification of the step test differences were shown in the efficacy of the circulation in trained and non-trained subjects. The author presents his classification of fitness and describe changes in the pulse rate and blood pressure during the test. Trained individuals respond by a lower rise of the pulse rate and systolic pressure. The possibility of using the test in long-term observation is considered. Circumstances which may influence the reactivity of the circulation during the test are mentioned. It is recommended to perform the test in the morning on fasting.

## A69-80188

**CALCULATION OF THE THEORETICAL WORK CAPACITY (PWC) AND THEORETICAL PULSE RATE (TPF) DURING FUNCTIONAL TESTS OF THE CIRCULATION [VYPOCET TEORETICKE PRACOVNI KAPACITY (PWC) A TEORETICKE TEPOVE FREKVENCE (TPF) PRI FUNKCNICH OBEHOVYCH ZKOUSKACH].**

V. Kriz.

*Casopis Lékařů Ceských*, vol. 107, Jul. 1968, p. 927-932. In Czech.

The calculation of the theoretical working capacity (PWC) theoretical pulse rate (TPF) and angle renders it possible to evaluate accurately the entire method and to process the results by computers. The symbols which are common for all these indicators and formulae used for their calculation explain their mutual relationship: performance with small load = P<sub>1</sub>, pulse rate assessed during this performance = PF<sub>1</sub>, performance during major load = P<sub>2</sub>, pulse rate during this performance = PF<sub>2</sub>, constant number of pulses strokes per minute for which PWC = X was calculated, constant performance for which TPF = Y was calculated.

## A69-80189

**CARDIORESPIRATORY FITNESS OF TRAINED AND NON-TRAINED SUBJECTS [KARDIORESPIRACNI ZDATNOST NETRENOVANYCH A TRENOVANYCH].**

J. Chrastek, V. Cermak, and J. Berka.

*Casopis Lékařů Ceských*, vol. 107, Jul. 1968, p. 913-917. 11 refs. In Czech.

The authors describe the method of spiroergometric examination which they use for assessing cardiorespiratory efficiency. Trained athletes and non-trained students worked on a bicycle ergometer with a load rising to the stage of "vita maxima". In this way the aerobic capacity is assessed. Values of pulse rate are given as well as minute ventilation, oxygen consumption assessed interferometrically, the oxygen consumption per kg. of body-weight, stroke volume of oxygen and ventilation equivalent which were attained at different stages of loading. Trained subjects burden their circulation and respiration when exposed to small loads significantly less than nontrained subjects. On the other hand, during maximum loads they mobilize both systems at a higher level. The results obtained by the authors in non-trained individuals are lower than previous results of other workers.

## A69-80190

**MINUTE VENTILATION AS AN INDICATOR OF LOADING OF THE ORGANISM DURING EXERCISE [MINUTOVA VENTILACE JAKO UKAZATEL ZATIZENI ORGANISMU PRI CVICENI].**

V. Seliger.

*Casopis Lékařů Ceských*, vol. 107, Jul. 1968, p. 918-921. 22 refs. In Czech.

The author discusses the possibility to use assessment of the minute ventilation (V) as an indicator of metabolic loading of the organism. From the results of examinations of the energy expenditure by indirect calorimetry in selected types of exercise lasting more than five min., as well as from investigations of some parameters during graded loading on a bicycle ergometer and some data in the literature a curve was prepared correlating V and oxygen consumption. It was revealed that the V during exercise correlates also with the energy output. The suggested correlation of V and oxygen consumption renders it possible to analyze physical performance not only in the linear but also nonlinear part of the curve.

## A69-80191

**EVALUATION OF FUNCTIONAL TESTS OF THE CIRCULATION BY MEANS OF GRADED LOADS [HODNOCENI FUNKCNICH OBEHOVYCH ZKOUSEK S VICESTUPNOVOU ZATEZI].**

V. Kriz.

*Casopis Lékařů Ceských*, vol. 107, Jul. 1968, p. 922-926. 45 refs. In Czech.

A method is described to evaluate quantitatively all types of loads of different grades where the performance can be expressed in physical units. The method is based on the following concepts: (1) Theoretical working capacity (PWC)—the theoretical performance for a certain constant number of pulse strokes, expressed in k.p.m./min, in k.p.m./s. or watts. (2) The theoretical pulse rate (TPF)—corresponding to a certain constant theoretical performance, expressed by the number of pulse strokes per min. (3) Angle  $\alpha$  which illustrates the steepness of the line or the correlation between pulse rate and increasing performance, expressed in grades. By means of this method it is possible to compare mutually the results of ergometric examinations of different subjects after loads of different intensity assessed by different authors.

A69-80192

A69-80192

**THE EFFECT OF MAJOR TRANQUILIZERS ON THE EEG ACTIVATION IN A WAKEFUL RABBIT, INDUCED BY 3,4-DIOXYPHENYLALANINE (DOPA) [VLIHANIE "BOL'SHIKH TRANKVILIZATOROV" NA AKTIVATSIIU EEG BODRSTVUIUSHCHEGO KROLIKA, VYZVANNUIU D, L-3,4-DIOKSIFENILALANINOM (DOFA)].**

IU. V. Burov and K. S. Raevskii (USSR, Acad. of Med. Sci., Inst. of Pharmacol. and Chemotherapy, Lab. of Pharmacol. of Nervous System, Moscow).

*Farmakologiya i Toksikologiya*, vol. 31, Jul.-Aug. 1968, p. 387-391. 21 refs. In Russian.

Antagonism between chlorpromazine, nozinane, stelazine and haloperidol on the one hand, and 3,4-dioxyphenylalanine (DOPA), on the other, was studied in rabbits with implanted electrodes by consulting the electroencephalographic (EEG) picture. Nozinane, chlorpromazine, stelazine, morphine and nembatal were found capable of blocking DOPA-activation on the EEG. Chlorpromazine and morphine proved most active from among DOPA antagonists, with nozinane and stelazine being effective only in large doses, while haloperidol and reserpine did not prevent the EEG activation reaction elicited by DOPA. A comparison of dosages in which these substances block the DOPA-activation and inhibit conditioned reflexes shows the lack of any parallelism between them. The obtained data are not in accord with the hypothesis of the central adrenolytic mechanism of the action exercised by chlorpromazine, nozinane, stelazine and haloperidol, and suggest that at the root of the inhibition of conditioned reflexes and blocking of the DOPA-activation produced by these substances are quite different mechanisms.

A69-80193

**AMINOTHIOLS EFFECT ON THE RHYTHM OF CARDIAC CONTRACTIONS [VLIHANIE AMINOTIOLOV NA RITM SERDECHNYKH SOKRASHCHENII].**

V. A. Kozlov and V. S. Shashkov.

*Farmakologiya i Toksikologiya*, vol. 31, Jul.-Aug. 1968, p. 424-425. In Russian.

Tests were set up in guinea pigs to investigate the influence of cystamine,  $\beta$ -mercaptopylamine, the monosodium salt of the  $\beta$ -aminoethylphosphoric acid and S.  $\beta$ -aminoethylisothiuronium (AET) on the rhythm of cardiac contractions. The latter was found to exert no substantial influence on the frequency of the cardiac contractions. The effect of the discussed agents is contingent upon the initial functional state of the organism. A marked effect on the function of the heart produce aminothiols compounds with their structure comprising only two free functional SH- and  $\text{NH}_2$ -groups.

A69-80194

**SOME FEATURES SPECIFIC TO THE RESPONSE OF THE ALBINO RATS ORGANISM TO HYPOXIA FOLLOWING INHALATION OF METHANE-OXYGEN MIXTURES [O NEKOTORYKH OSOBENOSTIYAKH REAKTSII ORGANIZMA BELYKH KRYS NA GIPOKSIIU PRI VDYKHANII METANO-KISLORODNYKH SMESEI].**

V. G. Deinega (Central Sci.-Res. Lab. of Mt. Rescue, Med. Sect., Lab. of Exptl. Therapy, Donets, USSR).

*Farmakologiya i Toksikologiya*, vol. 31, Jul.-Aug. 1968, p. 494-497. 10 refs. In Russian.

Tests were carried out in 100 rats. Evidence was made available showing that with inhalation of a methane-oxygen mixture containing 6% oxygen, as well as during a dynamic hypoxic test, there was a more pronounced decrease of the oxygen consumption and a considerably lengthened life-span in laboratory animals. Experiments with preliminary introduction of caffeine, sodium amyral and armine demonstrated that the beneficial effect of the methane-oxygen mixture was due to the development of a protective inhibition in the central nervous system.

A69-80195

**INVESTIGATION OF A NEW VENTILATING SYSTEM FOR CLEAN ROOMS.**

Claës Allander and Enno Abel (Roy. Inst. of Technol., Stockholm, Sweden).

*Medical Research Engineering*, Third Quarter, 1968, p. 28-38.

Swed. Natl. Council of Building Res. and Swed. Roy. Board of Building supported research.

The article sets out the physical bases and results of studies of a new ventilation system for clean rooms. The essence of the system is the use of thin air-seal streams in a room to limit the area sensitive to particles to an inner zone where a stable rate of air exchange higher than that in the rest of the room can be maintained by the introduction of air through a perforated ceiling. An experimental system of this type has been installed in an operating theatre at the Karolinska Hospital in Stockholm. It has been found here through the use of tracer gas that the inner zone remains stable even when a considerable amount of heat is generated there, and that the air-seal streams effectively limit the movement of particles. Particle-count measurements have been made while operations were in progress both in the theatre equipped with the experimental system and in a control theatre with a conventional ventilation system. The new system has proved capable of reducing the particle count in the particle-sensitive area to one-quarter as compared to a conventional ventilation system having the same capacity.

A69-80196

**ACUTE HEPATORENAL FAILURE FOLLOWING TRICHLOROETHYLENE POISONING [INSUFFICIENZA EPATO-RENALE ACUTE DA TRIELINA].**

C. Ponticelli, E. Imbasciati, B. Redaelli, and A. Salvadeo (Milan, U., Inst. di Urol. and Pavia, U., Ist. di Med. del Lavoro, Italy).

*Lavoro Umano*, vol. 20, May 1968, p. 205-212. 32 refs. In Italian.

A case is reported of acute hepato-renal failure due to trichloroethylene ingestion, treated by means of peritoneal dialysis and followed by recovery of the patient. The clinical picture was characterized by 20 days' anuria and by hepato-cellular jaundice. The renal alterations were represented by necrotic-degenerative lesions of renal tubules without interstitial involvement. The possible toxic action of trichloroethylene on the kidney and the liver is discussed and a possible influence of chronic alcoholism in favoring the occurrence of such lesions is prospected.

A69-80197

**EFFECT OF TOBACCO SMOKE ON THE ATTENTION OF MAN TO WORK [EFFETTI DEL FUMO DI TABACCO SULL'ATTENZIONE DELL'UOMO AL LAVORO].**

A. Lo Cascio (Palermo, U., Ist. di Med. del Lavoro, Italy).

*Lavoro Umano*, vol. 20, May 1968, p. 224-230. 11 refs. In Italian.

Research on the influence of tobacco smoke on the attention of the workers was studied in relation to the reflexes of the possible influence on their efficiency and on the occurrence of accidents. The data did not show any particular influence of smoke on attention in younger workers, but the older subjects were affected, some to a rather high degree. It was thought that the action of smoke takes place indirectly through the damages done to the various organs and apparatuses, particularly in the cardio-circulatory system. Considerations concerning prevention were included.

A69-80198

**CONTENT OF FREE AND BOUND AMINO ACIDS IN BRAIN AREAS OF RABBITS UNDER ACTION OF HIGH OXYGEN PRESSURE [SODERZHANIE SVOBODNYKH I SVIAZANNYKH AMINOKISLOT V OTDELAKH MOZGA KROLIKOV PRI DEISTVII POVYSHENNOGO DAVLENIYA KISLORODA].**

Z. S. Gershenovich, A. A. Krichevskaya, and T. N. Pogorelova (Rostov-on-Don State U., Dept. of Biochem., UkrSSR). *Ukrains'kyi Biokhimichnyi Zhurnal*, vol. 40, no. 4, 1968, p. 339-342. 13 refs. In Russian.

The content of free and bound forms of glutamic, aspartic, -aminobutyric acids and alanine was studied in the cerebral hemispheres, medulla oblongata and cerebellum. It is established that amino acids are contained in rabbit brain in free and bound forms. Different brain areas contain various amounts of free and bound amino acids. Correlation of free and bound acids in brain areas is disturbed in hyperoxia.

#### A69-80199

**INFLUENCE OF FOLIC ACID ON NUCLEIC ACID COMPOSITION OF NORMAL AND IRRADIATED BRAIN [VPLYV FOLIOVOI KYSLOTY NA NUKLEINOVY KYSLOTY HOLOVNOHO MOZKU V NORMI TA PRY PROMENEVOMU URAZHENNI].**

E. F. Sopin and M. E. Kucherenko (T. H. Shevchenko State U., Dept. of Human and Animal Biochem., Kiev, UkrSSR). *Ukrains'kyi Biokhimichnyi Zhurnal*, vol. 40, no. 4, 1968, p. 388-393. 6 refs. In Ukrainian.

The ratio was studied of nitrogen components of RNA and DNA in the guinea-pig brain during acute radiation disease and with injection of folic acid into irradiated and normal animals by means of paper electrophoresis in combination with the method of ultraviolet spectrophotometry. It is established that folic acid possesses distinctly pronounced antiradiation properties. When injecting it to the irradiated animals the disturbances in the ratio of RNA nucleotides and DNA nitrogen bases are normalized. Durable injection of folic acid to the normal animals does not affect the qualitative composition of brain nucleic acids. The possible mechanisms of antiradiation effect of folic acid are discussed.

#### A69-80200

**INFLUENCE OF ADRENOXYL ON ACTIVITY OF HEART ADENOSINETRIPHOSPHATASE AND PHOSPHORYLASE [VPLYV ADRENOKSYLU NA AKTYVNIST' ADENOZYNTRYFOSFATAZY TA FOSFORYLASY SERTSIA].**

V. M. Denisov and S. M. Rukavishnikova (Kharkov Med. Inst., Dept. of Biochem., UkrSSR). *Ukrains'kyi Biokhimichnyi Zhurnal*, vol. 40, no. 4, 1968, p. 384-387. 20 refs. In Ukrainian.

Influence of adrenoxy (catecholamine) was studied on the activity of adenosinetriphosphatase (ATPase) and phosphorylase of rabbit heart, as well as on the change in the noradrenaline content of this organ. It is detected that phosphorylase activity of activity of myocardial homogenates in subcutaneous adrenoxy injection in a dose of 1 and 2 mg./1 kg. of animal weight does not change, while the activity of ATPase of the homogenates decreases: ATPase activity of actomyosin in adrenoxy injection in a dose of 1 mg./kg. does not change, but in a dose of 2 mg./kg. it increases. Injection of adrenoxy in a dose of 2 mg./kg. causes the decrease in the heart content of both total noradrenaline and noradrenaline connected with proteins. ATPase activity depends on the noradrenaline content, probably, on its proteinized form.

#### A69-80201

**CARBOXYLATION OF RIBULOSEDIPHOSPHATE IN CELL-FREE EXTRACTS OF THE HYDROGEN BACTERIA [KARBOKSILIROVANIE RIBULEZODIFOSFATA V BESKLETOCHNYKH PREPARATAKH VODORODNYKH BAKTERII].**

A. K. Romanova, I. A. Vedenina, and N. G. Doman (USSR, Acad. of Sci., A. N. Bakh Inst. of Biochem., Moscow). *Izvestiia Akademii Nauk SSSR. Seriya Biologicheskaya*, no. 3, May-Jun. 1968, p. 363-371. 29 refs. In Russian.

Cell-free extracts of hydrogen bacteria (*Hydrogenomonas Z-1* strain) containing ribulosediphosphate carboxylase non-connected with particles were prepared. The activity of the enzyme depended on the concentration of the protein and of both substrates: carbon dioxide and ribulosediphosphate. The Michaelis's constant for CO<sub>2</sub> equaled  $1 \times 10^{-2}$  M, and C<sub>M</sub> for ribulosediphosphate was  $1.3 \times 10^{-3}$  M. The enzyme's specific activity attained in experiments equaled 0.11 mcM of substrate per min. per 1 mg. of protein. The inhibition of the enzyme by an excessive amount of substrates, phosphoglyceric acid, ATP, S<sub>2</sub>O<sub>3</sub><sup>2-</sup>, HSO<sub>3</sub>-SO<sub>3</sub><sup>2-</sup>, HPO<sub>4</sub><sup>2-</sup>, SO<sub>4</sub><sup>2-</sup> and Cl<sup>-</sup> ions and also hydrazine and hydroxylamine was shown. There was a tendency towards activation by S<sup>2-</sup> ions.

#### A69-80202

**ASSIMILATION OF NITROGEN NITRITE AND UREA BY CHLORELLA PYRENOIDOSA [ASSIMILIATSIYA AZOTA NITRITA I MOCHEVINY CHLORELLA PYRENOIDOSA].**

N. G. Tomova, Z. G. Evstigneeva, and V. L. Kretovich (Bulg. Acad. of Sci., Central Lab. of Biophysics, Sofia and USSR, Acad. of Sci., A. N. Bakh Inst. of Biochem., Moscow). *Izvestiia Akademii Nauk SSSR. Seriya Biologicheskaya*, no. 3, May-Jun. 1968, p. 431-435. 9 refs. In Russian.

Synchronous cultures of *Chlorella pyrenoidosa* grown in a nitrogen-free media absorbed quickly and regularly urea added in concentrations of either 140 or 14 mg. N/l. The absorption of nitrites depended on their concentrations. Nitrites were added in concentration of 140 mg. N/l. and were slowly assimilated, apparently along with the assimilation processes of adsorption and binding with insoluble nitrogen compounds took place. Nitrites in concentration of 14 mg. N/l. were assimilated faster than the same concentration of urea. The dynamics of alanine and glutamic acid accumulation was similar to that of soluble nitrogen compounds. During nitrite and urea assimilation the glutamic acid content was always higher than the alanine content.

#### A69-80203

**DIGITAL COMPUTER MODEL OF A TOTAL BODY ELECTROCARDIOGRAPHIC SURFACE MAP: AN ADULT MALE-TORSO SIMULATION WITH LUNGS.**

R. H. Selvester, J. C. Solomon, and T. L. Gillespie (Med. Inform. Systems Corp. and ECG and Biomath. Res. Group, Downey, Calif.). *Circulation*, vol. 38, Oct. 1968, p. 684-690. 10 refs. Grants PHS HE-09123, PHS HE-10722, and PHS HE-07888.

A 20 dipole digital computer model of the electromotive surface generated by the heart with a simulated human male torso, including lungs, is presented. The simulated torso-surface electrocardiogram (ECG) equipotential maps were compared to those seen in normal human subjects by a previous investigator and were found to resemble them to within the resolution of these maps throughout most of ventricular depolarization (QRS). On comparison of the simulated maps to those produced when the heart was considered to be a single equivalent dipole, it was found that normal surface maps contain considerable information not accounted for an equivalent dipole source during the mid and terminal portions of the QRS. This information occurs in areas not sampled by a standard precordial ECG. The addition of the lungs did not appear to change the surface ECG map in any important respect.

#### A69-80204

**COMPUTER QUANTITATION OF THE ST-SEGMENT RESPONSE DURING MAXIMAL TREADMILL EXERCISE: CLINICAL CORRELATION.**

Paul L. McHenry, Darwell E. Stowe, and Malcolm C. Lancaster (USAF School of Aerospace Med., Clin. Sci. and Biometrics Div., Internal Med. Branch, Brooks AFB, Tex.). *Circulation*, vol. 38, Oct. 1968, p. 691-701. 16 refs.

## A69-80205

This ST-segment response during maximal treadmill exercise was quantitated by digital computer after excessive noise in the electrocardiographic data was reduced by computer averaging. Both the slope and the depression were quantitated. Two groups of subjects were studied. Group A consisted of 35 subjects between 33 and 57 yr. of age with confirmed or suspected coronary artery disease. Group N consisted of 73 clinically normal subjects between 24 and 52 yr. of age. The responses of the group A subjects and the 26 subjects over age 35 in group N were compared by graphically plotting their ST slope and depression values from the last minute of exercise. A linear discriminant analysis computed from these values resulted in a line of separation between the majority of subjects in each of these groups. This separation was accomplished even though the majority of subjects in group A did not demonstrate segmental ST depression.

## A69-80205

### AEROSOL POLLUTION FROM INTERNAL COMBUSTION ENGINES.

R. Burt and A. Thomas (Shell Res. Ltd., Thornton Res. Centre, Chester, Great Britain).

*Proceedings of the Royal Society*, vol. 307, Oct. 29, 1968, p. 183-194. 16 refs.

Each type of internal combustion engine in general use was reviewed briefly, and the extent to which it pollutes the air with aerosols was indicated. The types of engines reviewed included the petrol engine, the diesel engine and the aircraft turbojet engine. Pollutants produced directly or indirectly by the three main types of internal combustion engine in general use included lead salts, barium salts, photochemical smog, mists of unburnt, partly burnt and partly oxidized hydrocarbons from the diesel engine and black smoke. The survey showed that technological solutions to the problems of aerosol pollution by the internal combustion engine exist, at least in principle. They may involve equipment development, fuel development or a combination of both.

## A69-80206

### THE EFFECT OF THE CALCIUM AND FLUORINE LEVEL IN THE DIET ON THE RESISTANCE OF ANIMALS TO A COMBINED LESION INFLICTED UPON THEM BY GAMMA-IRRADIATION AND INCORPORATED STRONTIUM 90 [VLIANIE UROVNIA KAL'TSIIA I FTORA V RATSIONE NA USTOICHIVOST' ZHIVOTNYKH K KOMBINIROVAN-NOMU PORAZHENIIU VNESHNIM GAMMA-OBLUCHENIEM I INKORPORIROVANNYM Sr90].

V. A. Knizhnikov and V. A. Grozovskaia.

*Voprosy Pitaniia*, vol. 27, Jul.-Aug. 1968, p. 33-36. 7 refs. In Russian.

Male rats were for a long time given a food ration containing different amounts of calcium and fluorine. Two mo. after a whole-body gamma-irradiation in doses of 350 to 700 r. the animals of all groups were subjected to peroral poisoning with strontium-90. The rats kept on a diet with elevated calcium and fluorine content, especially when both of these elements had been added jointly to the food, lived for a much longer time than did control animals which had been receiving a ration with ordinary content of calcium and fluorine.

## A69-80207

### EFFECT OF VARIOUS PHYSIOLOGICAL FACTORS ON GLUCOSE-6-PHOSPHATE DEHYDROGENASE AND 6-PHOSPHOGLUCONATE DEHYDROGENASE ACTIVITIES IN LIVER AND BRAIN OF THE RATS [IZMENENIE AKTIVNOSTI GLIUKOZO-6-FOSFAT-DEGIDROGENAZY I 6-FOSFOGLIUKONAT-DEGIDROGENAZY V PECHENI I MOZGU KRYSA POD VLIANIEM RAZLICHNYKH FIZIOLOGICHESKIKH FAKTOROV].

IU. L. Zakhar'in (USSR, Acad. of Med. Sci., Inst. of Nutr., Moscow).

*Voprosy Meditsinskoi Khimii*, vol. 14, Jul.-Aug. 1968, p. 348-355. 25 refs. In Russian.

Activities of glucose-6-phosphate dehydrogenase (G6PD) and 6-phosphogluconate dehydrogenase (6PGD) in the rat liver and brain increased with age, reached the maximum in the mature rats and decreased with aging. No sex differences were noted in the activities of G6PD and 6PGD in the liver. This difference was more pronounced in the spring-summer season than in the autumn-winter season. The activity of these enzymes was higher in brain of males than in females. The G6PD and 6PGD activities in the liver tissue decreased after starvation. This decrease was more pronounced in rats previously fed a high-carbohydrate diet. The realimentation after starvation induced a significant increase in G6PD and 6PGD activities in the liver tissue irrespective of the diet. The activities of these enzymes in the liver of rats fed a high-carbohydrate diet were higher, and in rats fed with a low-protein diet were lower than in those kept on the balanced diet.

## A69-80208

### EFFECT OF PHENAZINE METASULPHATE ON METHEMOGLOBIN-HEMOGLOBIN CONVERSION IN THE BLOOD OF RAT WITH HEMIC HYPOXIA [VLIANIE FENAZINMETOSUL'FATA NA PREVRASHCHENIE METGEMOGLOBINA V GEMOGLOBIN V KROVI KRYSA PRI GEMICHESKOI GIPOKSII].

L. A. Romanchuk and Kh. M. Rubina (I. P. Pavlov First Leningrad Med. Inst., Dept. of Biochem., USSR).

*Voprosy Meditsinskoi Khimii*, vol. 14, Jul.-Aug. 1968, p. 358-360. 17 refs. In Russian.

Administration of phenazine metasulphate to rats with hemic hypoxia led to rapid methemoglobin reduction. Decreased glutathione reductase activity observed during the hypoxia returned to normal level within three hr. after drug administration. The effect of the drug on methemoglobin reduction was discussed.

## A69-80209

### THE ACTIVITY OF DNA-ASE 2 IN SPLEEN MICROSTRUCTURES OF IRRADIATED RATS PROTECTED BY CYSTAMINE [AKTIVNOST' DNK-AZY 2 SUBKLETOCHNYKH FRAKTSII SELEZENKI KRYSA, OBLUCHENNYKH V USLOVIIAKH ZASHCHITY TSISTAMINOM].

V. G. Vladimirov and D. A. Golubentsev (S. M. Kirov Mil.-Med. Acad., Leningrad, USSR).

*Voprosy Meditsinskoi Khimii*, vol. 14, Jul.-Aug. 1968, p. 361-365. 22 refs. In Russian.

Irradiation of rats at a dose of 600 r. led to the increase in DNA-ase II activity in spleen cells. The most pronounced changes in enzymatic activity were observed in the cytoplasm. Administration of cysteamine at a radioprotective dose reduces the effect of radiation. The radioprotective action of cysteamine on mitochondria was found at 24 hr. and its effect on cytoplasm was revealed on the first and the third day after irradiation.

## A69-80210

### EFFECT OF CAFFEINE ON THE RESPIRATION AND OXIDATIVE PHOSPHORYLATION IN BRAIN MITOCHONDRIA [VLIANIE KOFEINA NA DYKHANIE I OKISLITEL'NOE FOSFORILIROVANIE MITOKHONDRII MOZGA].

O. A. Dimitrov (A. A. Zhdanov U., Dept. of Biochem., Leningrad, USSR).

*Voprosy Meditsinskoi Khimii*, vol. 14, Jul.-Aug. 1968, p. 381-385. 13 refs. In Russian.

Effect of caffeine on the respiration and oxidative phosphorylation in rat brain mitochondria *in vitro* was studied. In the

course of glutamate and  $\alpha$ -ketoglutarate oxidation the mitochondrial respiration was increased after addition of caffeine at concentrations of  $2.1$  to  $6.4 \times 10^{-3}$  M. Simultaneously a slight uncoupling effect was noted. The oxidation of glutamate was followed by the stimulation in inorganic phosphate esterification. During  $\alpha$ -ketoglutarate oxidation no changes in the rate of inorganic phosphate esterification were noted. At the concentrations studied caffeine did not change the rate of spontaneous swelling of mitochondria. This testified to its direct action on submitochondrial enzymatic systems.

**A69-80211**

**EFFECT OF LIGHT AND TEMPERATURE ON THE PRIMARY PRODUCTION OF SOME UNICELLULAR GREEN AND DIATOMIC ALGAE [VLIANIE SVETA I TEMPERATURY NA PERVICHNUIU PRODUKTSIIU NEKOTORYKH ODNOKLETOCHNYKH ZELENYKH I DIATOMOVYKH VODOROSLEI].**

V. D. Fedorov, V. N. Maksimov, and V. M. Khromov (M. V. Lomonosov Moscow State U., USSR).

*Fiziologija Rastenii*, vol. 15, Jul.-Aug. 1968, p. 640-651. In Russian.

The effect of light and temperature on the photosynthetic activity of green unicellular algae (*Dunaliella salina*, *Platymonas* sp.) and diatomic algae (*Nitzschia kuetziagiana*, *Nitzschia ovalis*) was studied by factorial design. The cultures studied differ considerably with respect to their specific photosynthetic activity (rate of CO<sub>2</sub> fixation per unit biomass). Appreciable age variations in the specific photosynthetic activities were found. The algae responded differently to changes in temperature and illumination. The most pronounced was the positive interaction between light and temperature in the *D. salina* culture. Thus a notable increase of primary production of the algae was observed only when the illumination and temperature were raised simultaneously. A positive effect was observed in both types of diatomic algae on increase of the temperature from 10° to 20° whereas an increase of the illumination from 2,000 to 4,000 lux did not appreciably affect the primary production. It is found that *Platymonas* sp. is more sensitive to variation of illumination than to variation of temperature. An increase of temperature from 10° to 20° at an illumination of 2,000 lux evoked a negative effect whereas at 4,000 lux a pronounced positive effect was observed.

**A69-80212**

**THE EFFECTS OF PRENATAL MATERNAL DECOMPRESSION ON THE ELECTROENCEPHALOGRAPHIC DEVELOPMENT OF THREE-YEAR-OLD CHILDREN.**

B. D. Murdoch (CSIR, Natl. Inst. for Personnel Res., Neuropsychol. Div., Johannesburg, South Africa).

*South African Medical Journal*, vol. 42, Oct. 19, 1968, p. 1067-1071. 25 refs.

Electroencephalograms (EEG) were recorded from 151 three-yr.-old children. Seventy-four were born to mothers who had had antenatal decompression treatment and 77 to mothers who had had either antenatal physiotherapy or no treatment. Five statistically significant differences (comprising 12% of the total number of differences) were found between the two groups. The decompression group had a lower amplitude for the nine Hz. component; a higher amplitude for the 10-Hz. component; a higher incidence of six Hz. activity; a higher mean delta frequency; and a lower incidence of abnormality in the resting record. The differences between the two groups are evaluated in terms of age and other factors influencing the EEG of children. It is concluded that these differences provide no definite evidence for support or rejection of the theory that improved fetal cerebral oxygenation, claimed to result from antenatal maternal decompression, accelerates cerebral maturation.

**A69-80213**

**TARGET STRUCTURE AND VISUAL DISTANCE.**

S. Howard Bartley and Ray W. Winters (Mich. State U., Dept. of Psychol., Lab. for the Study of Vision and Related Sensory Processes, East Lansing).

*Journal of Psychology*, vol. 70, Nov. 1968, p. 267-278. 36 refs.

Considerations regarding the sensory behavior (perceptual consequences) of making right-left target manipulations were discussed. The study focused on the fact that the phenomenal distance of objects seen on the left is different than when seen on the right. Several previous studies were reviewed and results indicated that an object appeared to be closer when shown in the left of a photograph than when on the right under specific conditions. Additional phenomenal effects, minimally structured and briefly exposed targets, as well as other left-right differences were discussed. Suggestions were made for clarifying the vocabulary needed for studies of sensory behavior. The ultimate goal of such studies is a set of experimentally grounded statements describing the functional interrelations between components of a target and visual end results.

**A69-80214**

**EFFECT OF CARBON MONOXIDE ON THE WHOLE FIBRINOLYTIC ACTIVITY.**

Osamah A. El-Attar (Assiout U., Fac. of Med., United Arab Republic).

*Journal of the Egyptian Medical Association*, vol. 51, no. 6/7, 1968, p. 591-597. 17 refs.

A study of whole fibrinolytic activity among 21 cases of acute carbon monoxide poisoning, 28 cases of repeated carbon monoxide exposure and 15 subjects of a control group was conducted. Increases in whole fibrinolytic activity in acute carbon monoxide poisoning were significant. Moderate increases were noticed among repeated carbon monoxide exposure group more than among control group. The results suggested that attention ought to be paid to the whole fibrinolytic activity periodically among workers exposed to carbon monoxide. When the fibrinolytic activity is highly elevated, the concentration of carbon monoxide in the working environment should be lowered and medical treatment given to the applicant.

**A69-80215**

**EXPERIENCE AND PERCEPTION [ERFAHRUNG UND WAHRNEHMUNG].**

Gaetano Kanizsa.

*Studia Psychologica*, vol. 10, no. 3, 1968, p. 174-182. 9 refs. In German.

*Psychol. of the Danube Reg., First Meeting, Bratislava, Sep. 14-19, 1967.*

In this essay some situations are presented and discussed in which autochthonous factors of perceptual organization and past experience are put into conflict. In the first section, a new case of masking is illustrated which is constructed according to the principles of the Gottschaldt's, Galli and Zama's figures. A factor studies by Petter appeared to be particularly strong: this factor (in spite of all experience, logic and expectation) imposes the stratification in depth of the different planes. As a result of one experiment, only seven among 49 subjects recognized the well known shape of Europe. The others described configurations (the seas in relief) which they affirmed they had never seen. In the last section, an experiment is described from which it comes out that, when the conditions allow it, a movement without crossing imposes itself even when, on the ground of previous experience, a crossing movement is waited for.

A69-80216

A69-80216

**DECREASED ERYTHROPOIETIC RESPONSE OF HYPOPHYSECTOMIZED RATS TO LOWERED BAROMETRIC PRESSURES.**

C. E. Bozzini, Maria Ester Barrio Rendo, and Josefina M. Tomio (Buenos Aires, U., Fac. de Cienc. Exactas y Nat., Cátedra de Química Biol., Fac. de Odontol., Cátedra de Fisiol. and Comisión Nacl. de Energía Atómica, Dept. de Aplicaciones, República Argentina). *Acta Physiologica Latino Americana*, vol. 18, no. 2, 1968, p. 114-118. 12 refs.

Consejo Nacl. de Invest. Cient. y Técnicas de la Rep. Argentina supported research.

In order to study the erythropoietin production in hypophysectomized rats, the Fe<sup>59</sup> distribution in plasma, bone marrow, erythrocytes and spleen, as well as the total erythroid tissue iron uptake were measured in normal and hypophysectomized rats at sea level and maintained during 32 hr. at a barometric pressure of 380 mm. Hg. The erythropoietic response to hypoxia in the hypophysectomized rats did not parallel that observed in normal rats, which would mean: (1) that the process in both normal and hypophysectomized rats is not proportionally the same; (2) that the stimulus used was not enough to reach this proportionality; or (3) that the production of erythropoietin in the hypophysectomized rats does not proceed at a normal rate.

A69-80217

**BASIS AND PRESENT STATE OF OBJECTIVE AUDIOMETRY [GRUNDLAGEN UND GEGENWÄRTIGER STAND DER OBJEKTIVEN AUDIOMETRIE].**

H. G. Demus (Martin-Luther U., Klin. and Poliklin. für Hals-Nasen-Ohrenkrankh., Halle-Wittenberg, East Germany). *Verkehrsmedizin und ihre Grenzgebiete*, vol. 15, Jul. 1968, p. 283-298. 15 refs. In German.

The limits of classical and reflex-audiometrical procedures are pointed out on the basis of their prerequisites and possibilities. The strong development of electronics and electro-acoustics is prerequisite and basic for a thorough electrophysiological research-work, especially concerning the ear. Electrical potentials representing and accompanying metabolic processes appear on the way where the environmental stimulus works. Measurements of these potentials are the starting point of methods known as objective audiometry, e. g. oto-, neuro-, and cerebroaudiograms. The analysis of these measurements is partly done by electronic computers (computers taking the mean and correlators). The fundamental basis of the cerebroaudiogram is discussed in detail, and its applications in pathological cases are discussed. Because of a greater temporal and instrumental expenditure of objective audiometry subjective audiometry will be relevant even in future times.

A69-80218

**VISUAL ILLUSIONS AND PROBLEMS OF EVALUATING ALTITUDE AND DISTANCE IN FLYING [VISUELLE TAUSCHUNGEN UND PROBLEME DER EINSCHÄSSUNG VON HOHE UND ENTFERNUNG BEIM FLIEGEN].**

I. Lehwess-Litzmann

*Verkehrsmedizin und ihre Grenzgebiete*, vol. 15, Jul. 1968, p. 275-282. 17 refs. In German.

According to the author's examinations, false evaluations of altitude and distance were experienced by 75% of all pilots of commercial aircraft. The intention of this paper is to point out physiological situations and difficulties in distance perception on the basis of potential size and movement illusions, in order to put light into this problem. Distance evaluation comprehends a complex of physiological processes. In addition to contrast, background formation, perspective, movement parallax, oculomotor adjustment, convergence, and accommodation play an important role. Size and movement illusions are discussed with relation to over- and under-estimation of distance to the ground or to other aircrafts.

A69-80219

**CELLULAR EFFECTS OF LASER RADIATION: LIGHT MICROSCOPIC STUDIES ON INJURY OF THE MOUSE LIVER.**

Glenn C. Faith, Marvin N. Stein, Jude R. Hayes, and Robert E. Stowell (Armed Forces Inst. of Pathol., Washington, D. C.). *Archives of Pathology*, vol. 86, Sep. 1968, p. 262-278. 73 refs. *Federation of Am. Soc. for Exptl. Biol., 49th Ann. Meeting, Atlantic City, Apr. 10, 1965.*

U.S. Army supported research.

Bursts of ruby laser energy from 23 to 135 joules/cm.<sup>2</sup> were directed at the exposed livers of anesthetized mice. Immediately, light gray lesions appeared that extended hemispherically into the parenchyma. At high energies, there was cavitation and extrusions of tissue. Portions of the lesions were fixed, embedded in paraffin or epoxy resin, and examined microscopically. Cells were distorted, intercellular spaces widened, and staining properties altered. Nucleoplasmic constituents became aggregated, and cytoplasmic components were often markedly disarranged. Within the perspective of the literature on photic, thermal, and laser injury, it is concluded that a reasonable concept of the pathogenesis of laser-induced necrosis is one of heat-mediated denaturation and coagulation of cell proteins, and vaporization of tissue water, creating multiple intercellular and intracellular spaces.

A69-80220

**THE EFFECTS OF CONTINUOUS HIGH LEVEL NITROGEN DIOXIDE ON HAMSTERS.**

Jerome Kleinerman and C. Richard Cowdrey (St. Luke's Hosp., Dept. of Pathol. Res. and Clin. Pathol., Cleveland, Ohio).

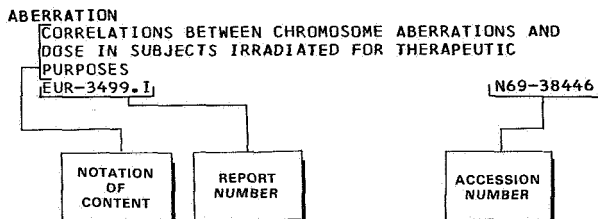
*Yale Journal of Biology and Medicine*, vol. 40, Apr. and Jun. 1968, p. 579-585. 11 refs.

The effects of continuous high level nitrogen dioxide (NO<sub>2</sub>) on hamsters was investigated. Animals were sacrificed, and lung volumes and right ventricular weights were measured after one wk. and after ten wk. of continuous exposure to concentrations of NO<sub>2</sub> ranging from 45 to 55 p.p.m. for 21 to 23 hr. daily. Several animals were allowed to survive in room air for an additional 14 wk. and sacrificed and studied in the same manner as previous groups. The combined evidence of the study pointed strongly to the conclusion that a tissue destructive form of emphysema was not produced. These findings concurred with those of previous studies that NO<sub>2</sub> exposure in sublethal concentrations for shorter daily periods over a longer time did not cause emphysema. The hamster responded to NO<sub>2</sub> inhalation by an exudative and proliferative reaction, without evidence of tissue destruction. It was hoped that the study may refocus interest on the reparative apparatus of the lung and on the need for careful preparation of pulmonary materials in studies of experimental obstructive disease.

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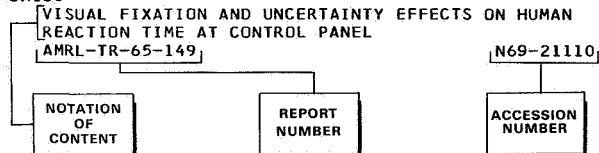
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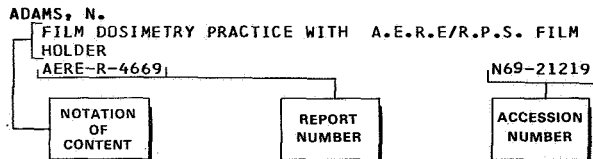
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