# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY

### WITH INDEXES

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NASA SP-7011(38)

# 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 May 1967

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

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*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:

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c. LC entries identified by a number in the A67-80000 series.

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*(continued)*

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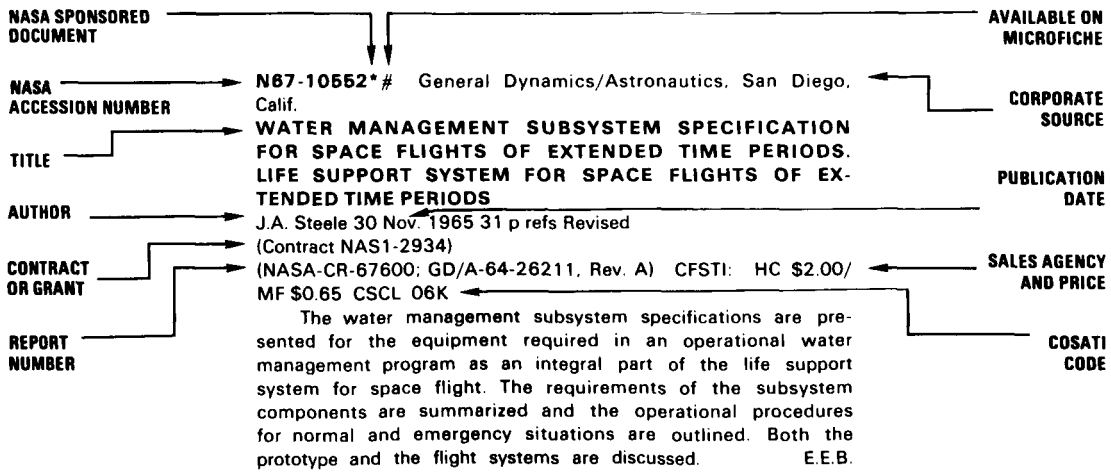

# AEROSPACE MEDICINE AND BIOLOGY

*a continuing bibliography* JUNE 1967


## STAR ENTRIES

**N67-19417*#** Republic Aviation Corp., Farmingdale, N. Y.
**RESEARCH ON MICROMINIATURE PASSIVE TELEMETRY FOR BIOLOGICAL MEASUREMENTS Final Report**
1 Dec. 1966 136 p refs
(Contract NASw-789)
(NASA-CR-82795; FHR-2901-5) CFSTI: HC $3.00/MF $0.65 CSCL 06B

The capabilities of physiological passive telemetry devices, used in living organisms to monitor vital biological functions, are briefly outlined. For application to waveforms such as heart muscle potentials, work in this program phase emphasized the development of a frequency modulation system to improve the signal-to-noise ratio, and range. The system works to the point where phase modulation can be demonstrated to show that an antenna excited with 8 and 12 megacycles receives the sum frequency of 20 megacycles which has been phase modulated by an audio frequency signal. The system processes the phase modulated signal, and the phase modulation itself can be displayed on an oscilloscope, or the modulating signal recovered in a phase detector and displayed as the desired intelligence waveform. Although a frequency modulation system was not considered efficient, significant progress was achieved. It was recommended, however, that completion of this FM system debugging would require funding for another research period. R.LI.

**N67-19419#** Oak Ridge National Lab., Tenn.
**BIOLOGY DIVISION SEMIANNUAL PROGRESS REPORT, PERIOD ENDING JANUARY 31, 1966**
Alexander Hollaender, S. F. Carson, and J. L. Liverman May 1966 207 p refs
(Contract W-7405-ENG-26)
(ORNL-3922) CFSTI: HC $3.00/MF $0.65

Comprehensive data are presented for various biological concepts reported in the fields of genetics, radiation immunology, cytology, biophysics, viral physiology, pathology, and enzymology. Published information lists 435 papers, abstracts, and book reviews for this reporting period. Meetings and conferences mentioned include: Symposium on the Nucleolus, Its Structure and Function; Bone Marrow Conferences; and the Nineteenth Annual Biology Research Conference. Technological reporting also includes work in: fungal genetics, *Drosophila melangaster* cytology, cytochemistry and cell reproduction, mammalian genetics, human cytogenetics, radiation microbiology, subcellular and viral physiology, nucleic acid chemistry, nucleic acid enzymology, plant physiology and photosynthesis, microbiology, and biochemical regulation. Bibliographic information completes each section. AEC–NIH cooperative programs highlight chemical carcinogenesis, and ultracentrifuge development. R.LI.

**N67-19479*#** Naval School of Aviation Medicine, Pensacola, Fla. Naval Aerospace Medical Center.
**A TORQUE MOTOR SERVOROTATOR FOR VESTIBULAR APPLICATION**
W. Carroll Hixson and Jorma I. Niven 26 Sep. 1966 20 p refs Joint Report with NASA
(NASA Order R-93)
(NASA-CR-82833; NAMI-979) CFSTI: HC $3.00/MF $0.65 CSCL 06L

The periodic angular rotator is a novel servorotator designed for studies of the dynamic response of the oculovestibular system. It will rotate a single subject about an earth-vertical axis in a wide variety of stimulus waveforms. Step function, ramp, and sinusoidal angular motions are generated precisely by a closed-loop power servomechanism drive system. The use of a low speed dc torque motor coupled directly to the payload resulted in a system with low acoustic noise and mechanical vibration properties, fast dynamic response characteristics, and a high degree of coupling stiffness. When operated in a velocity mode of control, the device is rated to produce a maximum angular velocity of 100 rpm either clockwise or counterclockwise at angular accelerations up to 100 deg/sq sec and sinusoidal oscillation frequencies beyond 2.0 cps. When operated in the alternative displacement mode, similar ratings apply over a plus or minus 150 degree excursion. Author (TAB)

**N67-19521#** California Univ., Berkeley. Lawrence Radiation Lab.
**CHEMICAL BIODYNAMICS ANNUAL REPORT, 1965**
Mar. 1966 81 p refs Sponsored by AEC
(UCRL-16806) CFSTI: HC $3.00/MF $0.65

CONTENTS:

1. ORGANIZATION AND FUNCTION OF CHLOROPHYLL PIGMENTS IN PLANT CHLOROPLASTS Kenneth Sauer p 1–2 refs

2. THE ROLE OF BACTERIOCHLOROPHYLL IN PHOTOSYNTHETIC HYDROGEN TRANSFER Marianne Byrn and Melvin Calvin p 3–4 refs

3. STRUCTURES OF RIBONUCLEIC ACIDS I. Tinoco, Jr., C. A. Bush, C. R. Cantor, S. R. Jaskunas, and M. M. Warshaw p 5 refs

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5. THE EFFECTS OF DAY LENGTH ON QUANTASOME STRUCTURE AND CHLOROPLAST PHOTOCHEMISTRY IN

*SPINACIA OLERACEA* L. VAR. EARLY HYBRID #7 R. B. Park and S. Drury p 9–14 refs (See N67-19523 04-04)

6. LOCALIZATION OF CHLOROPHYLL IN SPINACH CHLOROPLAST LAMELLAE BY FLUORESCENCE AND ELECTRON MICROSCOPY P. Lintilhac and Roderic B. Park p 15–16 refs

7. THE EFFECT OF HYDROLYTIC ENZYMES ON THE PHOTOSYNTHETIC EFFICIENCY AND MORPHOLOGY OF CHLOROPLASTS Elchanan S. Bamberger and Roderic B. Park p 17–24 refs

8. PHOTOSYNTHESIS OF CARBON COMPOUNDS J. A. Bassham, M. Kirk, T. A. Pedersen, R. Jensen, C. N. Hetzer et al p 25–30 refs (See N67-19524 09-04)

9. BIOSYNTHESIS OF OPIUM AND TOBACCO ALKALOIDS H. Rapoport p 31 refs

10. CATABOLITE REPRESSION OF ENZYME SYNTHESIS V. Moses and C. Prevost p 32–33

11. HEREDITY, ENVIRONMENT, LEARNING, AND THE BRAIN Edward L. Bennett, Marie Hebert, Hiromi Morimoto, and Ann Orme p 34–38 refs

12. INVESTIGATIONS OF THE MECHANISM OF RADIOPROTECTION BY AMINOTHIOLS Phillip E. Brown p 39–41 refs

13. PRODUCTION OF CYSTEIC ACID, TAURINE, AND CYSTAMINE UNDER PRIMITIVE EARTH CONDITIONS A. S. U. Choughuley and R. M. Lemmon p 42–43 refs (See N67-19525 09-04)

14. THE MECHANISM AND PROTOBIOCHEMICAL RELEVANCE OF DICYANAMIDE-MEDIATED PEPTIDE SYNTHESIS Gary Steinman, Dean H. Kenyon, and Melvin Calvin p 44-52 refs

15. SOME ANALYTICAL RESULTS IN ORGANIC GEOCHEMISTRY T. Belsky, E. D. McCarthy, and W. Van Hoeven p 53 refs (See N67-19526 09-06)

16. STUDY OF THE RING DEGRADATION OF TOLUENE-1-$^{14}$C Tz-Hong Lin and Richard M. Lemmon p 54–57 refs

17. FURTHER IMPROVEMENTS ON THE 10-kV ION ACCELERATOR H. M. Pohlit and W. R. Erwin p 58–59 ref (See N67-19527 09-11)

**N67-19522#** California Univ., Berkeley. Lawrence Radiation Lab.
**APPLICATIONS FOR ESR, MOESSBAUER, ELECTRONIC, AND OPTICAL ROTATORY SPECTRA TO PROBLEMS IN BIOLOGY**
Melvin P. Klein *In its* Biodyn. Ann. Report, 1965 Mar. 1966 p 6-8 (See N67-19521 09-04) CFSTI: HC $3.00/MF $0.65

The variety of spectroscopic techniques being applied to the study of intact biological systems, to component parts of such systems, to individual molecules, and to model systems is discussed. The objective of these investigations is to relate structural parameters and details to biological functions. Consideration is given to studies on electron spin resonance signals that occur when photosynthetic materials are illuminated by light, ESR signals of *Rhodospirillum rubrum* at liquid helium temperatures, complexes between porphyrins and metal ions in biological materials, and the Mossbauer spectra of iron-containing materials. Also discussed are the electron spectroscopic method for determining atomic energy levels, electron spectrum studies of sulfur in a number of proteins, and optical rotatory dispersion research. A.G.O.

**N67-19523#** California Univ., Berkeley. Lawrence Radiation Lab.
**THE EFFECTS OF DAY LENGTH OF QUANTASOME STRUCTURE AND CHLOROPLAST PHOTOCHEMISTRY IN *SPINACIA OLERACEA* L. VAR. EARLY HYBRID #7**
Roderic B. Park and Susan Drury *In its* Chem. Biodyn. Ann. Report, 1965 Mar. 1966 p 9–14 refs (See N67-19521 09-04) CFSTI: HC $3.00/MF $0.65

The effects of photoperiod on the efficiency and internal structure of chloroplast membranes are investigated. Preliminary results show that chloroplasts isolated from 4- to 5-week-old short-day spinach plants are 20 to 100% more efficient than long-day chloroplasts as assayed by Hill reaction activity. This difference in efficiency is correlated with differences in the internal membrane system of the chloroplast as seen both in thin section and in shadowed material. The chlorophyll/N ratio of both long- and short-day membranes is the same, which to a first approximation indicates that the difference in efficiency between the two membranes may be largely a difference in structure rather than a difference in chemical composition. A.G.O.

**N67-19524#** California Univ., Berkeley. Lawrence Radiation Lab.
**PHOTOSYNTHESIS OF CARBON COMPOUNDS**
J. A. Bassham, Martha Kirk, T. A. Pedersen, Richard Jensen, C. N. Hetzer et al *In its* Chem. Biodyn. Ann. Report, 1965 Mar. 1966 p 25–30 refs (See N67-19521 09-04) CFSTI: HC $3.00/MF $0.65

The photosynthetic pathways by which carbon dioxide, phosphate, and other inorganic compounds are converted to organic compounds are being investigated. Emphasis is being placed on studies of the mechanisms of the transfer of electrons and phosphate groups to the carbon compounds, and the effects of light quality on the products of photosynthesis and glycolysis in the photosynthetic apparatus in vivo and in isolated chloroplasts. Light-dark transient changes in labeling of compounds in the photosynthetic carbon reduction cycle and related compounds were determined, and the possible significance of these changes is discussed. Considerable effort has been spent developing chloroplast isolation and incubation methods to give good $CO_2$ fixation rates, and it is reported that studies with isolated spinach chloroplasts have produced rates of $CO_2$ fixation as high as 20% of normal in vivo rates. A.G.O.

**N67-19525#** California Univ., Berkeley. Lawrence Radiation Lab.
**PRODUCTION OF CYSTEIC ACID, TAURINE, AND CYSTAMINE UNDER PRIMITIVE EARTH CONDITIONS**
Ahmed S. U. Choughuley and Richard M. Lemmon *In its* Chem. Biodyn. Ann. Report, 1965 Mar. 1966 p 42–43 refs (See N67-19251 09-04) CFSTI: HC $3.00/MF $0.65

Experiments were performed in an attempt to demonstrate the "primitive-earth" synthesis of sulfur-containing amino acids. To increase the detection sensitivity for an amino acid product, $H_2{}^{35}S$ was used as one of the reactants. By this method the appearance of cysteic acid, and the closely related compounds, taurine and cystamine, was established. It is also noted that cysteine and cystine probably were formed, but they appeared to be oxidized to cysteic acid during chromatographic analyses. A.G.O.

**N67-19534#** Library of Congress, Washington, D. C. Aerospace Technology Div.
**AUTONOMIC AND CARDIOVASCULAR DISORDERS DURING CHRONIC EXPOSURE TO SUPER-HIGH FREQUENCY ELECTROMAGNETIC FIELDS Surveys of Foreign Scientific and Technical Literature**
Sheila Penners 6 Oct. 1966 8 p refs Transl. into ENGLISH from Gigiena Truda i Prof. Zabolevaniya (Moscow), v. 10, no. 7, 1966 p 13–17
(ATD-66-124; AD-644360) CFSTI: HC $3.00/MF $0.65

The clinical observation of persons chronically exposed to intense SHF radiation indicates that in individual cases the angiodystonic manifestations caused by chronic exposure to SHF radiation may develop further into more serious autonomic and cardiovascular pathologies. These are characterized by a tendency to antiospastic reactions and cerebral autonomic vascular attacks accompanied by pronounced arterial pressure lability and coronary spasms with corresponding changes in EKG. Author (TAB)

**N67-19556#** Texas Nuclear Corp., Austin.
**EXPERIMENTAL FAST NEUTRON DOSIMETRY AND LD 50/30 STUDIES IN MICE Final Report, 1 Sep. 1965–31 Aug. 1966**
I. L. Morgan, J. B. Ashe, L. D. England, S. C. Mathur, and P. S. Buchanan 31 Aug. 1966 53 p refs
(Contract AF 41(609)-2947)
(AD-6397 .3) CFSTI: HC $3.00/MF $0.65

The report concerns experimental 14 MeV neutron dosimetry using mice as neutron scattering samples and an LD 50/30 study of mice using 14 MeV neutrons and 2 MeV X-rays. The irradiations for the LD 50/30 study were carried out using computed neutron-flux-to-dose values. The experimental neutron dosimetry study is described, not only for mice but for three tissue-equivalent type materials: polyethylene, nylon, and Shonka plastic. TAB

**N67-19559#** Martin Co., Orlando, Fla.
**EFFECT OF PERSPECTIVE GEOMETRY TRAINING ON TARGET AREA LOCATION Final Report, 1 Apr.–15 Oct. 1966**
W. C. Hagen, M. A. Larue, and H. Ozkaptan Oct. 1966 64 p refs
(Contract N00014-66-C0150)
(OR-8528; AD-640712) CFSTI: HC $3.00/MF $0.65

A study was conducted to assess the value of training in perspective geometry on a subject's ability to locate target areas. Perspective geometry is defined as the study of spatial relationships on the ground and how they change when viewed from an oblique angle by means of a television system under simulated dynamic flight conditions. Simulation was accomplished by filming actual terrain from 2000 feet with a 28 degree field-of-view camera and projecting through a closed circuit TV system. Author (TAB)

**N67-19561** Kansas State Univ., Manhattan. Dept. of Psychology.
**THE EVOLUTION OF PERCEPTUAL FRAMES OF REFERENCE**
William Bevan and Harry Helson Jul. 1966 72 p refs
(Contract Nonr-3634(01))
(AD-635784) CFSTI: HC $3.00/MF $0.65

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1. STIMULUS GENERALIZATION AS A FUNCTION OF CONTEXTUAL STIMULI H. Helson and L. L. Avant 9 p refs (See N67-19562 09-04)
2. AN ADAPTATION-LEVEL INTERPRETATION OF REINFORCEMENT W. Bevan 39 p refs (See N67-19563 09-04)
3. STIMULUS VARIATION AND RECALL: THE ROLE OF BELONGINGNESS W. F. Dukes and W. Bevan 8 p refs (See N67-19564 09-04)
4. OPERANT LEVEL FOLLOWING A QUALITATIVE CHANGE IN LIQUID REINFORCEMENT W. Bevan, R. A. Bell, and H. G. Lankford 7 p refs (See N67-19656 09-04)

**N67-19562** Kansas State Univ., Manhattan. Dept. of Psychology.
**STIMULUS GENERATION AS A FUNCTION OF A CONTEXTUAL STIMULI**
Harry Helson and Lloyd L. Avant *In its* Evolution of Perceptual Frames of Ref. Jul. 1966 9 p refs Submitted for publication (See N67-19561 09-04) CFSTI: HC $3.00/MF $0.65
(TR-41)

In the experiments described, size rather than color was used as the relevant variable in order to provide a more rigorous test of the frame of reference or central tendency hypothesis. Twenty-five male subjects randomly assigned to five groups participated; stimuli were squares cut from black construction paper and mounted in the center of 14 in. square white posterboard sections. The squares ranged by 1/8 in. increments from 2-1/2 to 3-1/2 in. Subjects were shown a square, and then asked to determine if the following series of squares were the same size or different. Results indicate that in each of the asymmetric distributions the largest percent of same responses shifted toward the central stimulus. The point is made that operationally the stimuli used in testing for stimulus generalization affects the generalization gradient as well as the originally learned stimulus. M.G.J.

**N67-19563** Kansas State Univ., Manhattan. Dept. of Psychology.
**AN ADAPTATION-LEVEL INTERPRETATION OF REINFORCEMENT**
William Bevan *In its* Evolution of Perceptual Frames of Ref. Jul. 1966 39 p refs Submitted for publication (See N67-19561 09-04) CFSTI: HC $3.00/MF $0.65
(TR-42)

Basic theoretical ideas on the phenomena associated with reinforcement are reviewed as background to the adaptation level (AL) interpretation concept. The theory stemmed from consideration of the elation and depression effects following shifts in the magnitude of reinforcers. The approach taken is to view reinforcement as a continuous process, changing as inputs change, but always providing the reference value for defining the effectiveness of a particular reinforcing agent on any given trial and the net effectiveness of a set of reinforcers over a block of trials. In constructing the idiomatic language of the theory, care was taken to include reference to the curvilinear relationship which is held to characterize arousal and performance. Details are given on the basic experiments which were conducted to illustrate the concept of effective stimulus magnitude; reinforcers as psychophysical stimuli; reinforcers as effective stimulus magnitudes; reinforcers and the principle of pooling; and average intensity, performance, and tension levels. Several applications of the theory are given; a bibliography of references is included. M.G.J.

**N67-19564** Kansas State Univ., Manhattan. Dept. of Psychology.
**STIMULUS VARIATION AND RECALL: THE ROLE OF BELONGINGNESS**
W. F. Dukes (Calif. Univ., Davis) and William Bevan *In its* Evolution of Perceptual Frames of Ref. Jul. 1966 8 p refs Submitted for publication (See N67-19561 09-04) CFSTI: HC $3.00/MF $0.65
(TR-43)

A total of 261 female subjects, tested in groups, were presented brief exposures of noun–adjective pairs. They were then asked to first list the nouns they could remember and later the adjectives. There were two experimental variables: repetition versus variation of particular noun–adjective combinations, and the belongingness versus the non-belongingness of the adjective to the noun. Variation proved superior to repetition as a condition of recall of the nouns regardless of the probability character of the noun–adjective association. Variation was most effective when the pairs were high in belongingness. In contrast, belongingness exerted no influence upon recall of the nouns under the repeated condition. Recall of the adjectives was proportionately better when the noun–adjective combinations were repeated. Author

**N67-19565** Kansas State Univ., Manhattan. Dept. of Psychology.
**OPERANT LEVEL FOLLOWING A QUALITATIVE CHANGE IN LIQUID REINFORCEMENT**

William Bevan, Russell A. Bell, and H. G. Lankford *In its* Evolution of Perceptual Frames of Ref. Jul. 1966 7 p refs Submitted for publication (See N67-19561 09-04) CFSTI: HC $3.00/MF $0.65
(TR-44)

Experiments were conducted to examine the possibility of producing a qualitative contrast effect using the white rat in a simple performance task, with a change in sensory quality rather than cognitive cue as the reinforcement condition. Interest was also focused on studying the meaning of a change in sensory quality for a change in reinforcer effectiveness. Animals were shaped to press the bar for water, and divided into three groups. The control group was kept on water for the entire experiment; the other two groups were placed on nonnutrient flavored reinforcement. It was concluded that the data supported the two hypotheses being tested: (1) Animals exposed to flavored liquid would display a relatively lower response rate when returned to water than those kept on water throughout. (2) Animals adapted to flavored solutions, different in quality but approximately equivalent in reinforcer effectiveness, would show no difference in their subsequent response to water. M.G.J.

**N67-19574#** Library of Congress, Washington, D. C. Aerospace Technology Div.
**RESEARCH DATA ON THE STANDARDIZATION OF ELECTROMAGNETIC FIELDS IN THE SHORT AND ULTRA-SHORT WAVE RANGES [MATERIALLY ISSLEDOVANIY K NORMIROVANIYU ELEKTROMAGNITNYKH POLEY DIAPOZONA KOROTKIKH i ULTRAKOROTKIKH VOLN]**
P. P. Fukalova, M. S. Tolgskaya, S. V. Nikogosyan, I. A. Kitsovskaya, and I. N. Zenina 27 Sep. 1966 13 p refs Transl. into ENGLISH from Gigiena Truda i Prof. Zabolevaniya (Moscow), no. 7, 1966 p 5–9
(ATD-66-126; TT-67-60347; AD-644537) CFSTI: HC $3.00/MF $0.65

The conclusion is drawn that an intensity of 20 v/m in the short-wave range may therefore be recommended as the permissible threshold. An evaluation study of the effectiveness of the protective measures introduced on the authors recommendation for the benefit of workers operating within electromagnetic fields in the communications industries and industries engaged in the heat treatment of dielectrics showed that the adopted measures reduced the effects of radiation to permissible levels and therefore may be recommended as standards for other industries. Author (TAB)

**N67-19674#** School of Aerospace Medicine, Brooks AFB, Tex.
**AUTO- AND CROSS-CORRELATION OF THE EEG FOLLOWING UNILATERAL CALORIC STIMULATION OF THE LABYRINTH Final Report, Jun. 1964–Feb. 1966**
E. Liske, Harry M. Hughes, and Darwell E. Stowe Aug. 1966 14 p refs Submitted for publication
(SAM-TR-66-76; AD-641016) CFSTI: HC $3.00/MF $0.65

Twenty-eight neurologically and medically normal Air Force males between the ages of 18 and 23 years underwent unilateral caloric stimulation of the labyrinth while the brain waves were monitored by the electroencephalograph. In addition, eye movements were recorded by electro-oculograph, and all bioelectric signals were recorded in FM mode on magnetic tape. The brain waves were then digitized and analyzed on digital computer with an auto- and cross-correlation program. The results of the study show that unilateral caloric stimulation of the labyrinth has no significant effect on the alpha activity generators on either side of the brain. Further, those neuronal circuits responsible for maintaining calorically induced nystagmus do not significantly alter those neuronal circuits which generate alpha activity. Lastly, no phase shift between bilateral alpha activity could be induced by the unilateral caloric stimulation of the labyrinth. Author (TAB)

**N67-19682#** University Coll. of North Staffordshire, Keele (England). Dept. of Communication.
**NEW METHODS OF ANALYSIS OF ELECTROPHYSIOLOGICAL RESPONSES Final Scientific Report**
Donald M. Mackay, D. Aled Jeffreys, and Richard R. Glover 30 Jun. 1966 87 p refs
(Grant AF-EOAR-65-18)
(AFOSR-66-2337; AD-640860) CFSTI: HC $3.00/MF $0.65

The report is a continuation of the work described in Reports AD-278 590 and AD-416 363. A simple 4 channel averaging system using a form of PFM for signal recording and a closed loop of magnetic tape as the accumulator is described and the experimental results of its application to the study of human evoked responses to patterned visual fields reported. The use of simple pulse coincidence circuitry for cross-correlation of E.E.G. signals is summarized. Author (TAB)

**N67-19693#** Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
**VISUAL STIMULUS REDINTEGRATION IN THE CHIMPANZEE**
Donald N. Farrer and Jim Milner Nov. 1966 22 p refs
(ARL-TR-66-19; AD-642836) CFSTI: HC $3.00/MF $0.65

Three chimpanzees, two males and one female, 92 to 104 months of age, were taught a visual match-the-sample task consisting of 24 problems. Following the demonstration that these subjects could memorize the rewarded stimulus in each of 24 configurations, each consisting of four stimuli, the subjects ability to continue to respond to the rewarded stimuli with one stimulus to two stimuli missing from each configuration was tested. The results demonstrated that the chimpanzee can successfully respond to visual stimulus and configurations that no longer contain all components on which the subject was originally trained. These results are discussed in terms of the amount and kind (i.e., rewarded vs. non-rewarded stimuli) of information required by the chimpanzee for the solution of a visual discrimination task, redintegration in the chimpanzee, and the cognitive capacity of the chimpanzee. Author (TAB)

**N67-19701#** Indiana Univ., Bloomington.
**TESTS FOR THE EXTENT OF GENERALIZATION IN CLASSICAL CONDITIONING UNDER IDENTICAL TRAINING SCHEDULES**
John J. Furedy Nov. 1966 15 p refs
(Contract Nonr-908-15)
(TR-16; AD-642781) CFSTI: HC $3.00/MF $0.65

The possibility that equal rates of reinforcement may produce generalization between two dissimilar conditioned stimuli is important both for understanding generalization itself and for interpreting null outcomes resulting from within-S comparisons of two conditioning methods. Conventional procedures for testing the extent of generalization are not applicable, but suitable trial arrangements do allow tests of this question, the number and nature of these tests depending on: (a) whether the reinforcement schedule is continuous or partial, and (b) whether conditioning can be measured on training trials. An application of one of the tests suggested that generalization of the conditioned GSR was total between a tone and a light. The statistical power of the tests under optimal trial arrangements is considered, and the implications of the result of the GSR study are discussed. Author (TAB)

**N67-19703#** Aerospace Medical Lab. (Clinical), Lackland AFB, Tex.
**CONSTRUCTION AND USE OF AN INEXPENSIVE SMALL-ANIMAL TREADMILL Technical Report, Nov. 1965–Apr. 1966**

Dominic Criscuolo and Kenneth H. Cooper Oct. 1966 13 p refs
(AMLC-TR-66-4; AD-642772) CFSTI: HC$3.00/MF$0.65

The design and construction of a 10-rat exercising treadmill is presented. Minimal shop facilities are required, and the cost does not exceed $200. An electric fence charger is used as a stimulus to induce the animals to keep running. The treadmill has been used to study the effect of exercise on the tissue level of rats exercised twice a day for 30 minute periods. The small-animal exerciser was used for 30 days without mechanical failure. Author (TAB)

**N67-19716#** Monsanto Research Corp., Dayton, Ohio.
**IDENTIFICATION OF VOLATILE CONTAMINANTS OF SPACE CABIN MATERIALS Final Report, Jun. 1964–Sep. 1965**
John V. Pustinger, Jr., F. Neil Hodgson, and William D. Ross Wright-Patterson AFB, Ohio, AMRL, Jun. 1966 209 p refs
(Contract AF 33(615)-1779)
(AMRL-TR-66-53; AD-642054) CFSTI: HC$3.00/MF$0.65

Fifty-five candidate materials for space cabin construction were stored for 30, 60, and 90 day periods at 23-25C, and 20-40% R.H. in environments of air at a pressure of one atmosphere and oxygen at 5 psia. The composition of the gas-off products were determined by mass spectrometry and gas chromatography. Additional analyses were performed on desorbates from four carbon canisters from space cabin simulators and the hydrolysis products of MCS 198. Author (TAB)

**N67-19717#** Texas Christian Univ., Fort Worth. Inst. of Behavioral Research.
**GENERAL THEORETICAL PROBLEMS RELATED TO ORGANIZATIONAL TAXONOMY: A MODEL SOLUTION AND ITS ASSUMPTIONS**
S. B. Sells 30 Sep. 1966 36 p refs Presented at the Symp. on People, Groups, and Organ., An Effective Integration of Knowledge; Sponsored by ONR and Rutgers Univ.
(Contract Nonr-3436(00))
(AD-642496) CFSTI: HC$3.00/MF$0.65

The report discusses the development of a social system model. Recognition that organizational functioning reflects the interdependence of organizations and their members with the total, physical, social, and cultural environment has been amply demonstrated. The emphasis on this principle is a sign of progress in organizational theory. TAB

**N67-19754#** Army Edgewood Arsenal, Md. Medical Research Lab.
**REPETITIVE PSYCHOMETRIC MEASURES: EQUATING ALTERNATE FORMS. A REPLICATION Technical Report, Jun.–Dec. 1965**
James J. Hart and Kragg P. Kysor Nov. 1966 14 p refs
(EATR-4049; AD-642164) CFSTI: HC$3.00/MF$0.65

An attempt was made to replicate the findings of others on form difficulty for two of the six Repetitive Psychometric Measures: the Number Facility subtest (NF) and the Speed of Closure subtest (SC). Tests were given to 207 volunteers to serially evaluate drug effects or other changes in performance for extended periods of time. The questions to be answered are: (1) How consistent are estimates of level of form difficulty for three samples of subjects. (2) How much correspondence is there between ranked level of difficulty as determined by others and as determined from the sample. (3) Does the application of a correction factor to another sample reduce the variability of the means of alternate forms. A significant degree of correspondence was found in the level of form difficulty of the NF and SC for three samples. There was a significant degree of correspondence between correction factors for the NF and SC obtained from these data and from those of other investigators. The use of correction factors obtained from one sample on the SC reduced both the range of the form means and their standard deviations when applied to another sample. Author (TAB)

**N67-19761#** Henry Ford Hospital, Detroit, Mich. Dept. of Neurological and Behavioral Sciences.
**DYNAMICS OF RETICULAR AND LIMBIC POST STIMULUS DISCHARGE Progress Report**
Lorne D. Proctor 1 Nov. 1966 19 p
(Grant AF-AFOSR-1037-66)
(AFOSR-66-2807; AD-643511) CFSTI: HC$3.00/MF$0.65

The reticular and limbic systems post stimulus discharges were observed further, using rats, cats and Nemestrina monkeys. The few microelectrode observations in rats and cats suggested this discharge is not a neural membrane phenomena. In three Nemestrina monkeys repeated stimulation and recording from macroelectrodes revealed the following: (1) The most reliable stimuli were 80% duty cycle square wave impulses with a frequency of 400 cps and voltages ranging from 6 - 15 volts with current flow of approximately 3.0 milliamperes for 10 seconds. The 80% duty cycle and 400 cps were critical parameters. (2) Stimulation in the amygdala produced 3 cps rhythmic discharges interrupted by high amplitude monophasic sharp waves or bursts of high amplitude biphasic waves in the stimulation electrode area and was usually reflected to the cortex. There was a residuum of this discharge even three days post stimulus. (3) Following some such stimulations there were large fluctuating DC shifts in the cortex and/or amygdala areas. Author (TAB)

**N67-19771#** Duke Univ., Durham, N. C.
**BUFFER CONDITIONS IN EXPERIMENTAL STRESS**
Kurt W. Back and Morton D. Bogdonoff Sep. 1966 16 p refs
(Contract Nonr-1181(11); Grants NIH G-M-5356; NIH G-MH-10896)
(TR-21; AD-640569) CFSTI: HC$3.00/MF$0.65

Reactions of subjects to the experimental situation was investigated by means of plasma free fatty acid level. Arousal (elevated FFA level) was shown at entry into the experiment, at the giving of instructions, and at upsetting experiences during the experiment. Stress at entry can be called experimental stress, variations within the experiment, manipulated stress. A series of conditions which insulate the subject socially, psychologically or physically from the situation diminish experimental stress and obliterate the differences in manipulated stress. They are: previous acquaintance, previous work together as a group, commitment to the experiment, and low height-weight ratio. Author (TAB)

**N67-19776#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
**BIOENERGETICS**
King-Hwa Hsu 16 Sep. 1966 20 p refs Transl. into ENGLISH from Ti i Tz'u Ch'uan Kuo Sheng Wu Hua Hsueh Hsueh Shu Hui i Hui K'an (Communist China), no. 1, 1962 p 76–84
(FTD-TT-65-1495; TT-67-60277; AD-643953) CFSTI: HC $3.00/MF$0.65

Contents: Possible forms of energy changes in biological bodies; Thermodynamics and the phenomenon of life; Entropy and information in biological bodies; Energy barriers and entropy barriers. TAB

**N67-19787#** Human Engineering Labs., Aberdeen Proving Ground, Md.
**PACED REHEARSAL IN SEQUENTIAL SHORT-TERM MEMORY**
Richard A. Monty, Robert Karsh, and Harvey A. Taub Nov. 1966 15 p refs
(TM-12-66; AD-643120) CFSTI: HC$3.00/MF$0.65

Subjects were required to mentally keep track of the number of occurrences of each of four different symbols presented sequentially. It was found that a green light introduced into the sequence just prior to the presentation of each successive symbol tended to enhance performance. It was suggested that the light served to cue the subjects to complete rehearsal of the current state of the information in preparation for the next stimulus in the sequence. Author (TAB)

**N67-19788#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
**PHYSICAL NATURE OF EXPLOITATION LIMITATIONS**
A. M. Tarasenkov 30 Mar. 1966 16 p Transl. into ENGLISH from Vestn. Protivovozdushnoy Oborony (USSR), no. 5, 1964 p 45-48
(FTD-TT-65-1634; TT-67-60173; AD-643374) CFSTI: HC $3.00/MF $0.65

A report is presented of velocity and flight altitude limitations of supersonic aircraft, the angle of attack, as well as problems connected with distance limitation and flight continuation. TAB

**N67-19790#** American Inst. for Research, Washington, D. C.
**THE EFFECTS OF DAILY GOAL-SETTING ON CODE RECEIVING PERFORMANCE AND ATTITUDES: A PILOT STUDY**
Edwin A. Locke and Judith F. Bryan Oct. 1966 21 p
(AD-642784) CFSTI: HC $3.00/MF $0.65

One class at the Radioman A School at Bainbridge, Maryland (the Experimental group) set daily goals in terms of the score they would try for in code receiving. A second class (the Control group), run concurrently, did not set daily goals. It was found that the Experimental group improved their code receiving speed at a significantly faster rate than the Control group and made significantly fewer errors at speeds of 10 and 12 wpm than the group without daily goals. In addition, the Experimental group had significantly more favorable attitudes in code class than did the Control group on three of four attitude measures. The results, while promising, are not completely unequivocal, since there were a number of uncontrolled variables that might have affected the groups differently. Author (TAB)

**N67-19792#** Philco Corp., Palo Alto, Calif.
**ODOR CODING FOR MALFUNCTION DETECTION AND DIAGNOSIS Final Report, May 1965–Mar. 1966**
Robert A. Goldbeck, Judith H. Kaeding, and W. E. Feroglia Wright-Patterson AFB, Ohio, AMRL, Aug. 1966 58 p refs
(Contract AF 33(615)-2948)
(AMRL-TR-66-122; AD-643239) CFSTI: HC $3.00/MF $0.65

The use of the olfactory sense for detecting and diagnosing malfunctions in equipment systems has been investigated. The literature on olfaction is reviewed and the data and data gaps relevant to equipment maintenance applications are summarized. With the literature findings as a point of reference, performance requirements for an odor-coding system are established and a taxonomic structure is synthesized for the purpose of developing specific odor-coding systems. A survey of equipment system applications leads to the conclusion that odor-augmented maintenance displays are both feasible and practical. Recommendations are made for a program of research and development leading to broad scope implementation of odor coding for malfunction detection and diagnosis. Author (TAB)

**N67-19793#** RAND Corp., Santa Monica, Calif.
**PULSE TRAINS IN LATERAL GENICULATE AND RETINAL GANGLION NERVE CELLS**
R. J. MacGregor Nov. 1966 65 p refs
(Contract ARPA SD-79; ARPA Order 189-1)
(RM-4870-ARPA; AD-644629) CFSTI: HC $3.00/MF $0.65

An examination was made of the relationship between the physical stimulus and the neuroelectric events involved in visual perception and discrimination. The data indicate that certain elemental relations of psychophysics reflect properties of retinal behavior. Electrical correlates of flicker fusion, intensity encoding, and spatial and temporal contrast are seen in the spike trains of ganglion cells. The concept that some psychophysical relations are mediated primarily in the retina, along with the neuroelectrical and neuroanatomical indications that centrifugal control at this level is small, suggests that the retina would be a promising point of entry for understanding some of the neural mechanisms subserving vision. Author (TAB)

**N67-19812#** Aerospace Medical Div. Aeromedical Research Lab. (6570th), Wright-Patterson AFB, Ohio.
**THE NATURE AND CAPABILITIES OF THE CUTANEOUS SENSES**
Billy M. Crawford and N. Katherine Copeland Barnes Jul. 1966 49 p refs
(AMRL-TR-66-108; AD-643266) CFSTI: HC $3.00/MF $0.65

Maintenance and operational personnel frequently obtain information concerning the status of their equipment and environment from other than visual or auditory cues. In many instances these cues were not intentionally provided for by the equipment designer. This report is based on the assumption that system performance can be significantly improved through planning and design for systematic use of man's 'secondary' sensory capabilities. The text of the report summarizes what is known about the cutaneous senses as they relate to troubleshooting, maintenance, and the more general problem of machine-to-man communication. Separate discussions are included for touch and pressure, vibration, temperature, moisture, oiliness, stickiness and texture. Characteristics of each sense are described in terms of theory, method of stimulation, stimulus dimensions and their perceptual correlates, the range through which stimuli are effective and useful, thresholds for detection and differentiation of stimuli, adaptation, and interactions with environmental conditions. The bibliography includes a relatively exhaustive set of references pertaining to the secondary senses, in general, i.e., smell and taste as well as the cutaneous senses. Author (TAB)

**N67-19813#** Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
**EVALUATION OF THE BIOCHEMICAL AND PHYSIOLOGICAL EFFECTS OF CONFINEMENT ON HUMAN SUBJECTS Final Report, Aug. 1963–Jun. 1966**
K. J. Smith, Marilyn E. George, E. W. Speckmann (Miami Valley Hosp.), G. M. Homer, W. W. Blanchard et al Apr. 1966 47 p refs Prepared in cooperation with Miami Valley Hospital
(Contract AF 33(657)-11716)
(AMRL-TR-66-2; AD-644634) CFSTI: HC $3.00/MF $0.65

A series of experiments has been designed to determine the water, energy, and protein requirements of man under various simulated aerospace conditions. The reported 42-day experiment was designed to evaluate the effects of confinement on the nutritional, biochemical, and physiological status of human subjects in the Life Support Systems Evaluator. A freshly prepared diet that closely matched a proposed aerospace diet was fed to human volunteers, and coefficients of apparent digestibility and balance of the component nutrients were determined. The 4-day cycle menu composed of fresh, canned and heat processed foods was high in organoleptic acceptability. None of the foods became less acceptable with repeated servings. Confining the subjects for 28 days in the Life Support Systems Evaluator did not affect subject body weight, nutrient balance, digestion, or water balance. The values obtained for the nutrient balances indicated that the diet was efficiently digested and metabolized. Confinement to 2.4 square meters per man, in the Evaluator, had no effect on the hematological or physiological measurements. Author (TAB)

**N67-19855#** Bucknell Univ., Lewisburg, Pa.
**FEAR OF FAILURE AND COGNITIVE CONTROLS**
Lawrence K. Lundwall and Richard C. Teevan 1966 31 p refs
(Contract Nonr-3591(01))
(TR-17; AD-641891) CFSTI: HC $3.00/MF $0.65

A review is given on studies and experiments on fear of failure and cognitive controls. TAB

**N67-19858*#** Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile and Space Systems Div.
**REPORT ON THE DEVELOPMENT OF THE MANNED ORBITAL RESEARCH LABORATORY (MORL) SYSTEM UTILIZATION POTENTIAL. TASK AREA IV:**
T. D. Kennedy (Hamilton Std. Div., United Aircraft Corp.) and R. M. Byke Dec. 1965 160 p refs
(Contract NAS1-3612)
(NASA-CR-66289; SM-48816) CFSTI: HC $3.00/MF $0.65 CSCL 06K

This document contains a description of the environmental control life support (EC/LS) system studies performed in connection with the MORL system improvement study. The objectives of this task were as follows: (1) Modify the EC/LS system to correct any imitations or marginal capabilities identified as a result of the study of the expanded experimental plan and the mission development plan. (2) Identify new system elements stemming from advances in technology which will improve the EC/LS system and emphasize maximum system flexibility and growth capability. (3) Detail the research and technological development required. (4) Identify potential MORL support by the Apollo applications program through system development testing. Author

**N67-19873*** Dartmouth Coll., Hanover, N. H. Dept. of Biological Sciences.
**THE EFFECT OF WEIGHTLESSNESS ON THE GROWTH AND ORIENTATION OF ROOTS AND SHOOTS OF MONOCOTYLEDONOUS SEEDLINGS Final Report, 1 Jul. 1964–30 Jun. 1965**
Charles J. Lyon 30 Jul. 1965 45 p refs
(Contract NAS2-1558)
(NASA-CR-75092) CFSTI: $3.00 CSCL 06C

Grain seeds were sterilized, rinsed, immersed in distilled water for 4 hours, and finally inserted in plastic tubes containing a mixture of water and vermiculite. Assembled seed packages were then inserted in a temperature controlled clinostat; the absence of geotropical stimulation was simulated by turning the experimental package on a 2 rph horizontal axis. Measurements of coleoptiles and roots produced by growth, together with measurements of orientation angles for the seedling organs, showed a reasonably good consistency in orientation. The variations in length of the organs were not great enough to introduce unacceptable parameters in the angles; larger means of curvatures increased with the lengths of the coleoptiles. In the absence of gravitational stimulation, roots had a tendency to curve strongly in one direction; the side view angle of the primary root was recommended as criterion of the formative weightlessness effect for orbital experiments. G.G.

**N67-19879*#** Martin Co., Denver, Colo.
**ENGINEERING STUDY AND EXPERIMENT DEFINITION FOR AN APOLLO APPLICATIONS PROGRAM EXPERIMENT ON VEHICLE DISTURBANCES DUE TO CREW ACTIVITY**
J. R. Tewell and C. H. Murrish Mar. 1967 162 p Film Supplement No. L-954 to this Report is Available on Loan from Langley Res. Center
(Contract NAS1-6713)
(NASA-CR-66277) CFSTI: HC $3.00/MF $0.65 CSCL 05H

An Apollo Applications Program (AAP) flight experiment has been proposed to investigate crew motion disturbances. Typical crew motions were selected on the basis of frequency of occurrence during normal orbital operations and those activities associated with the AAP experiments. This report is presented in two parts, a technical report and a data supplement. The report outlines the selection of the crew motions studied, the analytic and direct simulation approaches, and defines the required instrumentation for an in-orbit experiment duplicating those activities studied. A detailed orbital experiment plan is also developed. As an illustration of the significant results of this study, it was found that the simple process of raising and lowering one arm can produce a change in attitude angle of 0.00075° (approximately 3 arc-sec) in a matter of 1 sec for uncontrolled space vehicles typical of the AAP. Author

**N67-19880*** Martin Co., Denver, Colo.
**ENGINEERING STUDY AND EXPERIMENT DEFINITION FOR AN APOLLO APPLICATIONS PROGRAM EXPERIMENT ON VEHICLE DISTURBANCES DUE TO CREW ACTIVITY—DATA SUPPLEMENT**
J. R. Tewell and C. H. Murrish Mar. 1967 253 p
(Contract NAS1-6713)
(NASA-CR-66277) CFSTI: $3.00 CSCL 05H

This appendix to the Apollo experiment on vehicle disturbances due to crew activities contains the data obtained in simulating translational activities as carried out on the six degree of freedom simulator (SOS). Forces, moments, and resulting spacecraft reactions from limb motions of test subjects were sampled by analog signals and converted to digital computation, of varying the distance between the spacecraft center of mass and the torso center of mass were also calculated. G.G.

**N67-19900*#** National Aeronautics and Space Administration, Washington, D. C.
**AEROSPACE MEDICINE AND BIOLOGY—A CONTINUING BIBLIOGRAPHY WITH INDEXES, JANUARY 1967**
Feb. 1967 223 p refs
(NASA-SP-7011(34)) CFSTI: HC $3.00/MF $0.65 CSCL 06S

As part of a continuing bibliography on aerospace medicine and biology, a selection of annotated references is presented on the biological, physiological, psychological, and environmental effects to which man is subjected during the following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on lower organisms are also included along with such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors. Emphasis is on applied research, but references to fundamental studies and theoretical principles related to experimental development are included. Subject, corporate source, and personal author indexes are appended. R.N.A.

**N67-19902*#** New York Univ., N. Y.
**A DIFFUSION MODEL OF PERCEPTUAL MEMORY**
R. A. Kinchla and F. Smyzer 30 Jan. 1967 34 p refs
(Grant NGR-33-016-067)
(NASA-CR-82958; I-67-1) CFSTI: HC $3.00/MF $0.65 CSCL 05J

A model is presented of the perceptual process through which an observer decides whether two stimuli are the same or different, with emphasis on the role of perceptual memory in such tasks. The results of two experiments, one visual and one auditory, are presented which illustrate the model's application and suggest its validity. Author

**N67-19910#** Advisory Group for Aerospace Research and Development, Paris (France).
**AGARD INFORMATION BULLETIN, NO. 67-1**
Jan. 1967 42 p refs
CFSTI: HC $3.00/MF $0.65

*Reports of the Advisory Group for Aerospace Research* and Development (AGARD) Panel activities and future plans are presented. These cover the fields of aerospace medicine, avionics, flight mechanics, fluid dynamics, guidance and control, propulsion and energetics, structures and materials, and technical information. Also included are descriptions of the AGARD lecture series and publications, and a calendar of AGARD meetings. R.N.A.

**N67-19935*** Naval School of Aviation Medicine, Pensacola, Fla.
**ENERGY DISSIPATION CHARACTERISTICS IN TISSUE FOR IONIZING RADIATION IN SPACE Progress Report, 1 Dec. 1966–28 Feb. 1967**
Hermann J. Schaefer 28 Feb. 1967 3 p
(NASA Order R-75)
(NASA CR-82932; PR-17) CFSTI: HC $3.00 CSCL 06R

The question of how to treat the Bragg peaks of heavy nuclei terminating in tissue (so-called thindown hits) has been raised from an analysis of the rem dose equivalents. It is reported that work has been directed toward a clarification of the quantitative relationships governing the transition of thindown hits as they would follow from the latest information on the primary galactic spectrum during solar maximum and minimum. A.G.O.

**N67-19947*** Chicago Univ., Ill.
***INTEGRATED RESEARCH AND TRAINING IN* SPACE-MOLECULAR BIOLOGY Annual Progress Report, 1 Apr.–31 Dec. 1966**
Humberto Fernandez-Moran 31 Dec. 1966 34 p refs
(Grant NsG-441-63)
(NASA-CR-82952) CFSTI: $3.00 CSCL 06C

Reports and summaries are presented of the following work: (1) contamination studies with samples recovered from a Luster micrometeorite sounding rocket experiment; (2) correlated electron microscopic and electron diffraction studies of certain meteorites and of pre-Cambrian organized systems; (3) high resolution electron microscopy with superconducting lenses at liquid helium temperatures; (4) development of improved instrumentation and preparation techniques for high resolution microscopy; and (5) studies on the subunit structure of membranes, including mitochondria, nerve membranes, and photoreceptors, and involving retinal rod outer segments, multienzyme complexes, fraction-I protein, and RNA-polymerase. An outline is also presented of organization and operation of special electron microscope laboratories in the biophysics department of the university. K.W.

**N67-19955*** California Univ., Berkeley. Space Sciences Lab.
**ENZYME ACTIVITY IN TERRESTRIAL SOIL IN RELATION TO EXPLORATION OF THE MARTIAN SURFACE Semiannual Progress Report, 1 Jul.–31 Dec. 1966**
J. J. Skujins and A. D. McLaren 12 Jan. 1967 74 p refs
*Its* Ser. no. 8, issue no. 2
(Grant NsG-704)
(NASA-CR-82944; SAPR-5) CFSTI: $3.00 CSCL 06M

The study objective is to develop tests for enzyme activities in soil and to adapt the most suitable of these to procedures compatible with telemetry from Mars probes. The investigation includes enzyme reactions in environments of limited water availability and at interfaces. An attempt was made to locate the microsites of soil phosphatase by electron microscopy. A study of surface effects in the hydrolysis of insoluble chitin by adsorbed chitinase and lysozyme is being conducted to investigate factors influencing reactions at interfaces. Studies of urea hydrolysis by urease in low-water media are described. The reaction is detectable at 65% relative humidity and the method is being developed for the detection of catalytic, i.e., enzymatic, breakdown of urea in Martian envirionment. A study of the initial metabolic steps of hydrocarbon degradation by terrestrial microorganisms was started. K.W.

**N67-19983*#** *Massachusetts Inst. of Tech., Cambridge.* Man-Vehicle Control Lab.
**BIOPHYSICAL EVALUATION OF THE HUMAN VESTIBULAR SYSTEM Semiannual Status Report, 1 Jul.–31 Dec. 1966**
J. L. Meiry and L. R. Young Jan. 1967 24 p refs
(Grant NGR-22-009-156)
(NASA-CR-82977; MV-67-2; SASR-2) CFSTI: HC $3.00/MF $0.65 CSCL 06P

The physical properties of the labyrinthine fluids and their variation with temperature were measured. A precision microviscometer was built and calibrated to measure viscosity of endolymph and perilymph. Progress in experiments and modeling of the vestibular caloric stimulation process is reported. Analytical efforts to establish a fluid dynamic model of the semicircular canals are discussed. Author

**N67-19994*** Pennsylvania State Univ., University Park. Biophysics Dept.
**PHYSICS OF CELLULAR SYNTHESIS, GROWTH AND DIVISION Progress Status Report, 1 Jul.–31 Dec. 1966**
E. C. Pollard 1 Mar. 1967 13 p refs
(Grant NsG-324)
(NASA-CR-82923) CFSTI: $3.00 CSCL 06C

Previous research in hyperchromicity, density gradients, and related topics is summarized, and details are given on current investigations. In order to study centrifugation of *E. coli* cells, an experiment was devised, using a polysaccharide material of high molecular weight. The experiment is described and the results discussed. It was concluded that either centrifugation does not force a rearrangement of the internal structure of the bacterial cell or the cell has the ability to function in spite of gross distortion. Preliminary experiments on the effect of radiation on banding position of bacterial cells in a CaCl density gradient are briefly reported; results indicated that gamma irradiation does alter the banding position. Investigation of the mechanism of $T_4$ replication in uv light-induced filamentous *E. coli* cells, using radioautographic techniques and genetic recombinational analysis, is briefly described. Finally, research in the effects of radiation on cultured mammalian cells is reviewed. L.E.W.

**N67-20006#** City of Hope Medical Center, Duarte, Calif.
**FURTHER TOXICOLOGIC STUDIES OF ACUTE HYDRAZINE *TOXICITY IN MICE, 1 JULY 1965–31 MARCH 1966***
Eugene Roberts and Daisy G. Simonsen Brooks AFB, Tex., USAF School of Aerospace Medicine, Oct. 1966 18 p refs
(Contract AF 41(609)-2949)
(SAM-TR-66-89; AD-644027) CFSTI: HC $3.00/MF $0.65

Toxicologic studies of acute hydrazine toxicity in mice were continued. The results indicate that acute toxicity of hydrazine probably is not mediated through a histamine-release mechanism. Various experiments showed that the type of lethal seizure produced by hydrazine probably has no relationship to the sound-induced seizures in susceptible strains of mice. It was found that sodium phenobarbital had a marked protective effect against hydrazine toxicity when given in subhypnotic amounts. Sodium phenobarbital had an additive protective effect when it was administered together with the previously studied protective mixture (AGKO) containing arginine, glutamate, alpha-ketoglutarate, and oxalacetate. NaBr also was found to be protective and was found to act additively with either sodium phenobarbital or with the AGKO mixture. It was found in the course of the above experiments that imidazoleacetic acid, a substance not protecting mice against acute hydrazine toxicity, had interesting analgesic and hypnotic effects in mice. The quantitative aspects of these effects were worked out, and it is suggested that this agent should be explored further as a possibility for human use. Author (TAB)

**N67-20145#** Staatliche Zenrale fuer Strahlenschutz, Berlin (East Germany).
**BIOLOGICAL–CHEMICAL RADIATION PROTECTION, II [BIOLOGISCH–CHEMISCHER STRAHLENSCHUTZ, II]**
**Summary Report**
R. Huber May 1966 28 p refs In GERMAN
(SZS-5/66)

A bibliographic review is presented of data on the effectiveness of various radioprotective substances. The radioprotective agents considered are SH compounds and derivatives, amines, amino acids, vitamins, hormones, and some unclassified compounds. NSA

**N67-20251*#** Louisville Univ., Ky. Performance Research Lab.
**THE USE OF LOCATION AND LOCATION-INTENSITY PATTERNS IN ELECTROCUTANEOUS COMMUNICATION**
**Annual Report, 1 May 1965–30 Apr. 1966**
Emerson Foulke and Thomas G. Sticht 26 Aug. 1966 61 p refs
(Grant NGR-18-002-007)
(NASA-CR-82857) CFSTI: HC $3.00/MF $0.65 CSCL 06B

Development and testing of electrocutaneous codes for general language communication and for improved information handling abilities is presented. The major objective was an electrocutaneous code for the communication of general language information at useful rates. In the encoding scheme employed, the representation of the elements in the Japanese Katakana Syllabary by electrocutaneous code signals required the use of patterns formed from 1,2 or 3 stimulated fingertip and palm locations. A group of signals was tested that included patterns composed of only one location; patterns of two locations on a single hand; and patterns with three locations, two on one hand and one on the other. The test consisted of requiring the subject to identify the stimulated location or locations that constituted the stimulus patterns. Studies were also performed to determine the relative discriminability of the onsets and offsets of electrical stimuli as indexed by reaction time at various intensities, frequencies, and rise-decay times. Where appropriate, underlying neurophysiological functions are suggested as explanations for psychophysical data. S.P.

**N67-20395** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
**CERTAIN DYNAMIC CHARACTERISTICS OF THE OPERATOR IN TRACKING UNDER THE CONDITIONS OF SPACEFLIGHT ON THE VOSKHOD 2 CRAFT**
P. I. Belyayev, A. A. Leonov, V. A. Popov, L. S. Khachatur'yan, and V. K. Filosofov *In its* Cosmic Res. 23 Jun. 1966 p 220–231 refs (See N67-20381 10-30) CFSTI: $3.00

The influence of various factors, including spaceflight, on certain dynamic characteristics of an operator forming part of a control system is considered, regarding the pilot as a dynamic element as he performs tracking problems. It is found that the quality of the operator's tracking in flight is lower than that observed on the ground. On the whole, however, the operator's tracking performance did not suffer serious changes under the conditions of the real day-long spaceflight including A.A. Leonov's emergence into open cosmic space. Author

**N67-20396** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
**ENDOGENIC FORMATION OF CARBON MONOXIDE AND ITS IMPORTANCE IN A CLOSED ECOLOGICAL SYSTEM**
L. A. Tiunov and V. V. Kustov *In its* Cosmic Res. 23 Jun. 1966 p 232–244 refs (See N67-20381 10-30) CFSTI: $3.00

Presented is a literature survey on the endogenic formation, oxidation, and function of carbon monoxide in animal and plant tissues. Focused on is the importance of these processes in ecological cycles, and their importance to the design of spacecraft life support systems. Author

**N67-20397** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
**RESULTS OF PREFLIGHT AND POSTFLIGHT MEDICAL EXAMINATION OF CREW MEMBERS OF THE VOSKHOD SPACECRAFT**
P. V. Buyanov, V. V. Kovalev, V. G. Terent'yev, Ye. A. Fedorov, and G. F. Khlebnikov *In its* Cosmic Res. 23 Jun. 1966 p 245–253 (See N67-20381 10-30) CFSTI: $3.00

Results of postflight clinical and physiological data obtained on crew members of the Voskhod spacecraft are compared with preflight data and data obtained during spacecraft simulator tests. Postflight examinations indicated a moderate decrease in ability to work, slight instability in Romberg's position, tremors of the fingers, higher-than-normal perspiration, a moderate decrease in muscle tone, quickening of the pulse, and a decrease in pulse pressure due to an increase in the diastolic pressure. Body weight had declined by 2.5–4%. There were also moderate shifts in metabolic processes, manifested in an increase in the basal metabolism, cholesterol level, blood urea and excretion of nitrogenous components with the urine. The phagocytic activity of the leucocytes had decreased to some degree. The changes observed after the flight were associated with fatigue effects and the stress reaction. The deviations noted were functional in nature and vanished a few days after the flight. The differences detected in the nature of the changes were associated with individual peculiarities and the quality of preflight preparation. Author

**N67-20398** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
**INFLUENCE OF FACTORS IN SPACEFLIGHT ABOARD THE "VOSKHOD" MANNED SPACECRAFT ON TRADESCANTIA PALUDOSA MICROSPORES**
N. L. Delone, B. B. Yegorov, and V. V. Antipov *In its* Cosmic Res. 23 Jun. 1966 p 254–262 refs (See N67-20381 10-30) CFSTI: $3.00

The sensitivity of developmental phases in *Tradescantia paludosa* microspores to Voskhod spaceflight conditions (ascent, weightlessness, and landing) was studied on the basis of the following sensitivity criteria: chromosome rearrangements, and disturbances in cellular mitosis. The objective of the study was to determine the validity of the projected hypothesis that chromosome rearrangements are caused by a single group of factors accompanying manned spaceflight, and disturbances in cellular mitosis are caused by another group of factors. The sensitivity of phases in *Tradescantia paludosa* was found to vary. The late and middle prophase were found to be most sensitive; thereafter, sensitivity diminished and the early interphase was found to be the least sensitive. When the number of cells with mitotic disturbances was taken as the sensitivity criterion, the late interface was the most sensitive and sensitivity was lower in the prophase and lowest in the early interphase. S.C.W.

**N67-20403** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
**BIOLOGICAL-EFFECT SIMULATION OF MONOENERGETIC PROTON-FLUX DEPTH DOSE**
V. S. Morozov, V. S. Shaskov, and B. I. Davydov *In its* Cosmic Res. 23 Jun. 1966 p 284–289 refs (See N67-20381 10-30) CFSTI: $3.00

Using mice as models of the biological cell of the living organism, experiments were performed in an attempt to evaluate the change in biological effectiveness of proton penetration near the end of its path, and the biological effect of irradiation in specific regions of the organism. Two groups of animals were used, one of which was given an intraperitoneal dose of 150 mg/kg of

a radioprotective substance (AET) 15 to 20 minutes before irradiation; the other of which was given a dose of 1600 rad at a dose rate of 50 rad/min in a synchrocyclotron. Data on survival rates and average survival time of animals irradiated in the synchrocyclotron and animals given the AET are compared. Results indicate that physical protection may be a factor that intensifies the effect of cosmic radiation of solar origin, radiation belts of the earth, and the effectiveness of using pharmacochemical protective agents. S.C.W.

**N67-20420*#** Aerojet-General Corp., Azusa, Calif. Life Support Systems Div.

**BIOLOGICAL EXPLOITATION OF A PLANET**

B. J. Mechalas, R. P. Geckler, and B. D. Culver *In* NASA 2d Ann. Meeting of the Working Group on Extraterrest. Resources [1964] p 84–88 refs (See N67-20412 10-30) CFSTI: HC $3.00/MF $0.65

Various aspects of converting planetary resources to make a suitable environment for human colonization are considered. The use of earth microorganisms would be the simplest way, and one requiring the least input of energy, to convert the reducing environment of a planet to an oxidizing one. The competitive effects of these organisms on an existing ecological system are discussed. The roles of heterotrophic anerobes, photosynthetic autotrophs, purple sulfur bacteria, and blue green algae in altering an alien environment are described. Also mentioned is the need for spacecraft sterilization as well as studies to determine characteristics of alien microorganisms and the survivability of earth organisms on other planets. R.N.A.

**N67-20444#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**PHYSIOLOGICAL METHODS IN ASTRONAUTICS**

R. M. Bayevskiy 16 Aug. 1966 303 p refs Transl. into ENGLISH of the book "Fiziologiya Cheloveka i Zhivotnykh" Moscow, Izd. "Nauka", 1965 p 1–299

CFSTI: HC $3.00/MF $0.65

Contents: Brief historical outline of physiological space research; transmission of physiological information from spacecraft to earth; contemporary physiological measurement systems on spacecraft; design principles of physiological measurement and information systems for use on long-term, long-range space flights; on-board automatic physiological information processing systems; some problems of physiological measurement in interplanetary flights; cardiovascular research methods; research on the external respiratory function; methods for studying the neuromuscular system and working capacity; methods for studying the vestibular apparatus; future trends in the development of physiological research in astronautics.

**N67-20480#** Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.

**PROBLEMS IN DEPTH PERCEPTION: PERCEIVED SIZE AND DISTANCE OF FAMILIAR OBJECTS**

Walter C. Gogel and Henry W. Mertens Jun. 1966 23 p refs

(AM-66-22; AD-641477) CFSTI: HC $3.00/MF $0.65

Judgments of the distance of familiar objects, especially other aircraft, are critical aspects of flight safety. In this study, the perception of distance as a function of the retinal size of a familiar object was investigated by simulating a stationary or a radially moving playing card in an otherwise dark visual field. When different observers were first presented with the different sizes of the stationary object, a relation between retinal size and perceived distance occurred only if perceived size was taken into consideration and only for the largest two of the three retinal sizes used. It seems that familiar size was a cue to perceived absolute distance when the simulated distances were approximately 3 feet or less, but not approximately 6 feet from the observer. Judgments of the distance of subsequent static presentations of cards, while usually more veridical than first presentations, were found to be dependent upon distance judgments made in the prior presentations. The importance of interactions between presentations or within changing presentations was reflected in the modifications of the dynamic adjustments that resulted from using different starting sizes. The results from this experiment support the view that relational distance cues occurring between successive or sequential presentations are dominant over absolute distance cues occurring with respect to a single object. Author (TAB)

**N67-20499#** Georgia Univ., Athens.

**PSYCHOPHYSIOLOGIC VARIABLES AS INDICATIONS OF EMOTIONAL STRESS Final Report, Apr. 1964–Jul. 1965**

Herbert Zimmer Griffiss AFB, N. Y., RADC, Sep. 1966 622 p refs

(Contract AF 30(602)-3380)

(RADC-TR-65-296; AD-641814) CFSTI: HC $3.00/MF $0.65

The report covers the physiological responses of the human and means of achieving maximum discrimination between critical and neutral stimuli. Consideration is given to the social context in which the response is solicitated, the selection of the most useful psychophysiologic variable, methods of recording and analyzing the data by computers and the limits imposed by the existing knowledge. The appendix contains a rationale of those physiologic measures which have been employed by other investigations to study emotional reactions to stimuli of short duration. Author (TAB)

**N67-20517*#** Colorado State Univ., Fort Collins. Coll. of Engineering.

**COLLOID PARTICLE FORMATION FROM BIOLOGICAL WASTES**

G. W. Tompkin, Jr. *In its* Advanced Elec. Propulsion Res. Jan. 1967 6 p refs (See N67-20509 10-28) CFSTI: HC $3.00/MF $0.65

The first results of investigation on the use of organic macromolecules in the colloid particle thrustor of an electric propulsion system are reported. The desired characteristics are delineated, and the factors favoring the use of the organic macromolecules are outlined. Particle production methods reviewed are: chemical rupture of peptide bonds in the polypeptide chain; rupture of the disulfide bonds between cystine residues in adjacent polypeptide chains; and the dissociation of the noncovalent bonds of the distinct chains of the hemoglobin molecule. N.E.N.

**N67-20519#** Naval Radiological Defense Lab., San Francisco, Calif.

**DNA SYNTHESIS IN RELATION TO CELL DIVISION IN *TETRAHYMENA PYRIFORMIS***

I. L. Cameron (New York State Univ.) and D. Stuart Nachtwey 12 Oct. 1966 33 p refs Prepared jointly with New York State Univ.

(USNRDL-TR-1084; AD-642777) CFSTI: HC $3.00/MF $0.65

The effect of different nutritional conditions on the durations of the G1, S, G2 and D periods of exponentially replicating Tetrahymena pyriformis strain HSM was determined with autoradiographic techniques and observation of individual cells. The data indicate that, with decreased availability of nutrients, DNA synthesis is initiated proportionately later in the cell division cycle and that the proportion of the cell cycle spent in DNA synthesis increases. The effect of temperature on the relationship of the phases of the cell cycle was examined. Between 29 and 20C, the generation time and the time spent in the G2 period about double while the time spent in the S phase remains about the same. This phenomenon results in a reduction in the proportion of the generation time spent in the S phase and a compensatory increase in the G1 phase proportion. These results are discussed as they

relate to nutritional factors involved in initiation and maintenance of DNA synthesis. Author (TAB)

**N67-20541#** Naval Medical Research Inst., Bethesda, Md.
**ALONE TOGETHER**
W. W. Haythorn and I. Altman [1966] 17 p
(AD-641288) CFSTI: HC $3.00/MF $0.65

A study was made to determine what happens when pairs of men are locked together around the clock that would not happen if they were merely fellow workers or roommates who went their own ways at night. Eighteen pairs of men--young sailors in boot training--were selected to meet certain conditions of compatibility, in order to determine how much of the stress of isolation could be relieved by properly matching personalities. They were tested and rated in four personality dimensions: need for achievement; need for dominance; need for affiliation; need for dogmatism. They were then matched in such a way that in one-third of the pairs both men were high in each of these dimensions, in one-third both were low, and in the final third one was high and one low. The control group, composed of similar pairs, followed the same work schedule in identical, confined rooms, but were not confined around the clock. The study demonstrates clearly that the stresses of isolation are considerably affected by the relations between personality types. Good adjustment may decrease or modify stress in constructive ways; bad adjustment may increase, exaggerate, or complicate it, sometimes in destructive ways. TAB

**N67-20542#** School of Aerospace Medicine, Brooks AFB, Tex.
**A PRIMER OF VESTIBULAR FUNCTION, SPATIAL DISORIENTATION, AND MOTION SICKNESS**
Kent K. Gillingham Jun. 1966 74 p refs *Its* Review 4-66
(AD-637943) CFSTI: HC $3.00/MF $0.65

CONTENTS: Review of Vestibular Function: Anatomy; Physiology; Review of Proprioceptive Function: Anatomy and physiology; Spatial Disorientation: Instrument flying; Formation flying; Causes of Spatial Disorientation; Statistics; Preventive measures; Motion Sickness: Importance; Etiology; Management. TAB

**N67-20559#** Honeywell, Inc., St. Paul, Minn. Research Dept.
**INTRASPECIES BIOLOGICAL AND BEHAVIORAL VARIABILITY, 1 NOVEMBER 1965–31 OCTOBER 1966**
S. P. Stackhouse and N. A. Sidley 31 Oct. 1966 149 p refs
(Contract AF 41(609)-2937)
(Rept.-12026-FR1; AD-642417) CFSTI: HC $3.00/MF $0.65

Experiments were conducted using men and Rhesus monkeys to examine the variability of responses within and between species as well as parameter variability in time. The monkeys were exposed to 400 Roentgens of ionizing radiation. Five classes of data were collected: behavioral, hematological, blood chemistry, electrophoretic, and electrophysiological. Several parameters were measured repeatedly within each data class. Data analyses showed that in general: (1) the between species variables correlate sufficiently to provide a basis for extrapolating monkey radiation effects data to humans; (2) these variables show no significant time trends; (3) some of the variables within each data class were significantly altered by radiation; (4) monkey pre- and post-radiation groups could be formed; and (5) predictors could be identified. Author (TAB)

**N67-20568#** Naval Radiological Defense Lab., San Francisco, Calif.
**EFFECTS OF CONTINUOUS LOW-LEVEL GAMMA IRRADIATION ON CIRCULATING AND PERITONEAL MONONUCLEAR LEUCOCYTES OF MICE**
Lottie Kornfeld and Vivian Greenman 20 Oct. 1966 26 p refs
(USNRDL-TR-1985; AD-642788) CFSTI: HC $3.00/MF $0.65

LAF1 mice were exposed continuously to Co60 gamma radiations at a dose rate of 1.4 rads per hour. The number of lymphocytes in the circulating blood fell sharply during the first week of exposure (190 rads) and decreased thereafter at a very gradual but statistically significant rate for the duration of the experiment (15 weeks, 3450 rads). The disappearance of small lymphocytes (6 microns in diameter) from the peritoneal cavity was also more rapid during the first week of irradiation than during subsequent weeks. Medium peritoneal lymphocytes (8-10 microns in diameter) and peritoneal macrophages disappeared at constant rates over the entire observation period. After the first week of exposure, the disappearance rates of small and medium peritoneal lymphocytes were identical. This rate was greater than that for peritoneal macrophages and that for circulating lymphocytes. Based on the fraction of cells surviving any given exposure, the mononuclear leucocytes may be arranged in the following order of decreasing sensitivity to continuous low dose rate gamma irradiation: circulating lymphocytes, small peritonela lymphocytes, medium peritoneal lymphocytes, peritonela macrophages. This order is the same as that after acute exposure to X rays. Author (TAB)

**N67-20570#** Massachusetts Inst. of Tech., Cambridge.
**DYNAMICS OF THE SACCADIC EYE-MOVEMENT MECHANISM. NEUROLOGICAL SERVOMECHANISMS. SECTION I:**
Gerald Cook and Lawrence Stark 9 Nov. 1966 125 p refs
(Contract AF 49(638)-1313)
(DSR-75002; AFOSR-66-2640; AD-642126) CFSTI: HC $3.00/MF $0.65

Dynamics of saccadic eye-movement mechanism: An on-line computer was used to experimentally measure the dynamic performance of horizontal eye movement saccades. A mathematical model based upon physiological measurements in the literature was assembled for the plant--eyeball and eye muscles., and the controller signals-EMG. Simulation of the model with parameter adjustment led to reasonably close agreement between model and experimental overall behavior. It was found that actual movements require about three times as long for completion as would be necessary if the system operated with a minimum time policy. Neurological servomechanisms: The transfer function of the crayfish photoreceptor is examined, and successive refinements of technique and recording in three series of experiments are described. In the first series of experiments gross recordings were made of averaged frequency responses to sinusoidal inputs at several different frequencies. The instrumentation of the first experimental series was supplemented in the second and third series of experiments by a pulse height window which permitted only pulses from fibers responding to light intensity to be recorded. In addition, more experimental points were recorded than in the first series. Author (TAB)

**N67-20625#** Union Carbide Corp., Tonawanda, N. Y. Research Lab.
**MOLECULAR INTERACTIONS OF WATER IN BIOLOGICAL SYSTEMS Final Report**
G. F. Doebbler 1 Nov. 1966 32 p refs
(Contract AF 49(638)-1611)
(AFOSR-66-2762; AD-643438) CFSTI: HC $3.00/MF $0.65

The study is concerned with the molecular interactions of water in systems of biological interest as examined by techniques of thermal neutron inelastic scattering spectroscopy (NIS). Spectra were determined for water and solutions of the inert anesthetic gases, xenon, nitrous oxide and ethylene. Spectra were also determined for solutions of xenon at 1C and increased pressures and xenon hydrate (Xe 5.75 H2O) and compared with spectra for water, ice and other known hydrates. Differences were observed between the spectra of xenon hydrate and ice but NIS was relatively insensitive to long range crystallographic order differences in these extensively hydrogen bonded structures. Small changes in

the NIS spectrum of water are induced by inert gases. With xenon these changes are enhanced at reduced temperature and increased pressure. Definitive interpretation of the spectral changes cannot be made since it appears that associated units in liquid water are highly variable with regard to size, structure or structural perfection and give rise to broad dispersions of lattice frequencies which obscure structural details. Author (TAB)

**N67-20650#** Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
**STANDARDIZATION OF SYMBOLS AND UNITS FOR ENVIRONMENTAL RESEARCH**
W. C. Kaufman Aug. 1966 11 p refs
(AMRL-TR-66-115; AD-644684) CFSTI: HC $3.00/MF $0.65

A logical system of symbols to designate the widely accepted biological variables routinely measured in environmental research is described. Upper case letters are used for three major symbols of temperature, heat quantity, and rate of heat transfer. These are modified by upper case subscripts for physical variables and lower case subcripts for biological variables. Author (TAB)

**N67-20654#** School of Aerospace Medicine, Brooks AFB, Tex.
**GEOGRAPHIC AND ASTRONOMIC DISTANCE RESPONSES BY RATED OFFICERS**
Bernard I. Grosser Oct. 1966 8 p refs *Its* Aeromed. Rev. no. 5-66
(AD-644155) CFSTI: HC $3.00/MF $0.65

The data demonstrate that knowledge of distance around the earth, distance to the moon, and distance to the sun cannot be used as a test for organic brain damage in rated pilots and navigators. The diagnosis of organicity based on fund-of-information deficit is predicated on the principle that a given population normally has knowledge of the facts which are employed in the examination. The most nearly perfect answer was in response to the question of distance around the earth; however, the fact that more than 1 in 10 rated officers gave an incorrect response precludes the use of this question as a test for organic deficit. Author (TAB)

**N67-20658#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
**ELECTRON-MICROSCOPE INVESTIGATION OF BACTERIA AND PHAGES**
A. P. Pekhov 13 Jun. 1966 302 p refs Transl. into ENGLISH of the book "Elektronnomikro-Skopicheskoye Issledovaniye Bakteriy i Fagov" Moscow, Gos. Izd. Med. Lit., 1962 224 p
(FTD-TT-65-1922; TT-67-60330; AD-644142) CFSTI: HC $3.00/MF $0.65

The monograph gives a practical course in electron microscopy and presents the modern achievements of the submicroscopic techniques of studying bacteria and phages. Methods of electron microscopic analysis of bacteria and phages, techniques of preparing ultrathin bacterial and phage sections, as well as data on the ultrastructure of bacteria and phages and on the development of phages within the bacteria, are presented in detail. TAB

**N67-20674#** City Coll. of the City of New York. Hunter Coll.
**MODES OF RESOLUTION, CONCEPT FORMATION, AND RESEARCH STRATEGY**
Walter Weiss Nov. 1966 15 p refs
(Contract Nonr-4309(00))
(RR-9; TR-9; AD-643168) CFSTI: HC $3.00/MF $0.65

Some characteristics and problems of a conceptual orientation, using the concepts of cognitive consistency-inconsistency and modes of resolution, are discussed. Contrasted is a more empirical approach which is open to a wide diversity of responses to stimulus situations. Some research is used to illustrate the heuristic value of the latter perspective in respect to communication effects. Author (TAB)

**N67-20695#** Instituto de Neurologia, Montevideo (Uruguay).
**EFFECTS OF PSYCHOPHARMACOLOGIC DRUGS UPON SENSORY INFLOW IN NORMAL SUBJECTS, IN PSYCHIATRIC PATIENTS AND IN ANIMALS Annual Report, Oct. 1, 1965–Sep. 30, 1966**
Elio Garcia Austt Sep. 1966 12 p refs
(Grant DA-ARO-49-092-66-G100)
(Rept.-2; AD-643985) CFSTI: HC $3.00/MF $0.65

Averaged visual evoked potentials are being studied in man and animals by means of a computer of average transients (CAT). Modifications incorporated to this computer are described. Effects of psychotropic drugs upon the averaged visual evoked response (VER) in normal subjects are studied. LSD 25 determined multiplication of the waves. The response amplitude increased during continuous flicker stimulation instead of decreasing as observed in controls. Chlorpromazine reduced VER amplitude both in wakefulness and sleep. Stupour and coma VER was simple, lower amplitude than normals. Stuporous subjects important changes were observed generally in conjunction with modifications in background activity indicative of changes in the level of awareness. Effects of same drugs upon visual inflow along primary and secondary visual pathways were studied in cats. LSD 25 VER changed in pattern as well as in amplitude. An increase in latency of secondary waves was evident. Chlorpromazine provoked an increase of primary response with small doses. Larger doses tended to decrease it and to reach normal amplitude. Author (TAB)

**N67-20725#** Bunker-Ramo Corp., Canoga Park, Calif.
**HUMAN ENGINEERING SUPPORT TO AIR FORCE FLIGHT CONTROL AND FLIGHT DISPLAY INTEGRATION PROGRAM Final Report, 14 Mar.–24 Jun. 1966**
Gerald F. Rabideau and Clarence A. Semple, Jr. Wright-Patterson AFB, Ohio, AF Flight Dyn. Lab., Oct. 1966 50 p refs
(Contract AF 33(615)-3757)
(AFFDL-TR-66-157; AD-644636) CFSTI: HC $3.00/MF $0.65

Among the research outputs were (1) a head-up display literature search and analysis, and (2) experimental design for dynamic (open-loop) study of moving tape scale variables. Among the continuing research tasks were: (1) visual requirements in cockpit displays under low ambient illumination, (2) switch type and location evaluation for control yoke, (3) V/STOL landing display literature search, and (4) Control-Display Information Center subjective index development. Additionally, the more extensive consulting tasks included: (1) V/STOL program development, (2) advanced multipurpose spacecraft display study, (3) V/STOL panel and cockpit mockup support, and (4) electroluminescent altimeter design concept evaluation. Author (TAB)

**N67-20744*#** Sandia Corp., Albuquerque, N. Mex.
**MICROBIOLOGICAL STUDIES RELATING TO CLEAN ENVIRONMENTS. PART II: DEPOSITION OF NUTRIENTS TO SURFACES BY RODAC PLATES**
John William Beakley, W. J. Whitfield, and J. C. Mashburn Sep. 1966 8 p refs
(NASA Order R-09-019-040; Contract AT(29-1)-789)
(NASA-CR-83053; SC-RR-66-386) CFSTI: HC $3.00/MF $0.65 CSCL 06M

The deposition of nutrient residues onto surfaces following impressions made with Rodac plates was observed, photographed, and quantitated. In the experiments performed, a medium residue between 20 and 50 micrograms in weight was deposited from Rodac plates onto stainless steel surfaces. Such residues were shown to be adequate to support microbial growth when such surfaces were contaminated and incubated under ideal conditions of humidity and temperature. Author (NSA)

**N67-20747#** Staatliche Zentrale fuer Strahlenschutz, Berlin (East Germany).

**MODERN METHODS OF PERSONNEL DOSIMETRY [MODERNE METHODEN DER PERSONENDOSIMETRIE]**

W. Kraus, D. Herrmann, and W. Kiesewetter Jul. 1966 48 p refs In GERMAN; ENGLISH summary

(SZS-6(1966))

Physical properties of radiation detectors used in personnel dosimetry are considered. The applicability of the various dosimeters is discussed for the purposes of personnel monitoring in single institutes and in control centers, for accidential and other high level dosimetry, and for the dosimetry in natural radiation fields and in space. Difficulties in the interpretation of dosimeter responses with regard to the organ dose are briefly reviewed. Author (NSA)

**N67-20779#** Colorado Univ., Boulder.

**RADIATION EFFECTS IN BIOCHEMISTRY AND ORGANIC CHEMISTRY Technical Progress Report, 15 Oct. 1965–14 Oct. 1966**

Bert M. Tolbert et al 14 Oct. 1966 133 p refs

(Contract AT(11-1)-690)

(TID-23265) CFSTI: HC $3.00/MF $0.65

Results are presented from studies on the effects of ionizing radiation in purified compounds found in biological systems, with emphasis on solid amino acids, peptides, and proteins. Data are included on the effects of $^{137}Cs$ $\gamma$ radiation on the denaturation of $\alpha$-chymotrypsin; mechanisms of radioinduced denaturation of enzymes; the relationship of stable free radicals to radiation damage in lysozyme; hydrogen exchange in lysozyme; $\gamma$ radiation effects on reversible configurational damage in lysozyme determined by tritium exchange methods; energy transfer during $\gamma$ inactivation of the allosteric, oligomeric enzyme aspartate transcarbamylase (ATCase); the effects of $\gamma$ radiation on the alosteric properties of hemoglobin; the effects of $\gamma$ radiation on the activity of dehydrogenase enzymes and radiation energy transfer in several dehydrogenase enzymes; and the $\gamma$ induced decarboxylation of DL-phenylalanine at low energy inputs. A list is included of 28 publications since 1964. NSA

**N67-20960#** Massachusetts Univ., Amherst.

**INHIBITION OF THE SYNTHESIS OF MACROMOLECULES BY ULTRAVIOLET RADIATIONS Final Report, 1 Feb. 1965–31 Jul. 1966**

Paul A. Swenson 15 Sep. 1966 9 p refs

(Contract AT(30-1)-3511)

(NYO-3511-2) CFSTI: HC $3.00/MF $0.65

Progress is reported on studies on the effects of uv radiation on the synthesis of macromolecules by radiosensitive and radioresistant strains of *Escherichia coli*. Data are included from studies on the effects of uv radiation on the $\beta$-galactosidase-forming ability of the bacteria at various temperatures from 5 to 37°C. The radiosensitivity of tryptophanase and d-serine deaminase systems in the two strains was also studied. Strain differences in enzyme-forming ability, dark repair, response to photoactivating light, respiration, and RNA and protein synthesis were found in the uv-irradiated bacteria. NSA

**N67-20976#** Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.

**RADIOSENSITIVITY OF CHLORELLA AFTER MEDIUM ENERGY ACCELERATED ELECTRON IRRADIATION [RADIOSENSIBILITE DES CHLORELLES AUX ELECTRONS ACCELERES DE MOYENNE ENERGIE]**

Jean-Claude Roux Jun. 1966 72 p refs In FRENCH

(CEA-R-2984)

Survival curves were constructed for *Chlorella pyrenoidosa* exposed to 0.65 and 1 Mev electron beams. Multiplication capacity was determined for cells on porous membrannes, and dose was calculated by Fricke dosimetry. Anoxia was shown to be more effective in survival than dose fractionation. RBE of 0.65 and 1 Mev electrons was less than that of 180 kev X-rays. NSA

**N67-21030#** Institute For Defense Analyses, Arlington, Va.

**ON THE THEORY OF COILING AND UNCOILING OF DNA MOLECULES**

Elliott W. Montroll *In* Brookhaven Natl. Lab. Inelastic Scattering of Neutrons by Condensed Systems Mar. 1966 p 57–68 refs (See N67-21022 10-24) ) CFSTI: HC $3.00/MF $0.65

The structure of the DNA molecule is considered, and various models for the thermal splitting and uncoiling of this molecule are discussed. These include the random model, the model with nearest-neighbor correlations, the first form of the partition function for a mixed system, and regularly spaced type 2 bonds. NSA

**N67-21142#** Kernforschungsanlage, Juelich (West Germany). Zentralabteilung Strahlenschutz.

**ON THE EFFECTS OF INCORPORATED PLUTONIUM [UEBER DEN NACHWEIS VON INKORPORIERTEM PLUTONIUM]**

H. Jacobs Oct. 1965 31 p refs In GERMAN

(JUL-312-ST) CFSTI: HC $3.00/MF $0.65

The present stand of plutonium determination in the human body is reviewed. Pertinent works are presented in a bibliography covering the past 10 years. General characteristics of plutonium and its metabolism in the human body are briefly discussed in order to clarify methods and to assist in the evaluation of the results. Transl. by K.W.

**N67-21143** Argentina. Comision Nacional de Energie Atomica, Buenos Aires.

**TISSUE FILTERING OF $I^{131}$ AND PERIPHERAL CIRCULATION [DEPURACION TISULAR DE $I^{131}$ Y CIRCULACION PERIFERICA]**

H. Garcia del Rio, V. Pecorini, and O. Degrossi 1966 12 p refs In SPANISH

(CNEA-174) CFSTI: $3.00

In order to determine the time lapse for tissue depuration, radiation counters were used to detect iodine 131 isotopes injected intraveneously into human subjects. It was found that there was no difference in depuration time observed for $I^{131}$ or $Na^{24}$ isotopes in normal subjects or patients suffereing from arteriopathy. In areas where sodium 24 is impossible to obtain or uneconomical to use, the most appropriate clinical method recommended for the study of peripheral arteriopathy is iodine 131 tissue depuration. Transl. by R.Ll.

**N67-21152#** Argentina. Comision Nacional de Energie Atomica, Buenos Aires.

**ON THE SYNTHESIS OF INDIGOTIN FROM N-(CARBOXYMETHYL)-ANTHRANILIC ACID [SOBRE LA SINTESIS DE LA INDIGOTINA A PARTIR DE ACIDO N-(CARBOXIMETIL)-ANTRANILICO]**

Mauricio F. Buehler, Aldo E. A. Mitta, and Rodolfo Lopez 1966 8 p refs In SPANISH Presented at the 11th Session of the Argentine Chem. Assoc., Bahia Blanca, Argentina, 1964 Submitted for publication

(CNEA-178) CFSTI: HC $3.00/MF $0.65

Using $^{14}C$ as a tracer, an experiment was performed to show which of carboxyls of n-(carboxymethyl)-anthranilic acid participates in the formation of the heterocycle of indoxyl and which is eliminated during the reaction. Experimental results outlined confirm the mechanism previously agreed upon for the reaction, which is the intermediate formation of indoxylic acid although the small activity of the indigotin obtained leads to the assumption that although in a small proportion (0.6%), the extranuclear carboxyl participates in the formation of the heterocycle. Transl. by R.Ll.

**N67-21168*** Arinc Research Corp., Annapolis, Md. Science Center.
**HUMAN RELIABILITY PROGRAM FOR THE SATURN V LAUNCH VEHICLE GROUND SUPPORT EQUIPMENT**
Harald R. Leuba Oct. 1965 33 p refs *Its* Publ.-294-25-34-539
(Contract NAS8-11087)
(NASA-CR-83119) CFSTI: HC$3.00 CSCL 05H

The prediction and evaluation of human reliability for the Saturn V launch vehicle ground support equipment are discussed. The investigation is divided into five major sections: (1) the purpose of the human reliability program, (2) a system description, (3) possible techniques for prediction and evaluation, (4) limitations of the study, and (5) recommended actions. The material presented does not solve human reliability prediction and evaluation problems, but it does describe those problems and provide quantitative recommendations on how they could be solved. Information requirements and alternative analytic procedures are listed. Author

**N67-21171** Joint Publications Research Service, Washington, D. C.
**ANALYSIS OF INTONATIONAL CHARACTERISTICS OF SPEECH AS A CRITERION OF THE EMOTIONAL STATE OF MAN UNDER CONDITIONS OF SPACE FLIGHT**
V. A. Popov, P. V. Simonov, A. G. Tishchenko, M. V. Frolov, and L. S. Khachatur'yants 15 Feb. 1967 15 p refs Transl. into ENGLISH from Zh. Vysshei Nervnoi Deyatel'nosti (Moscow), v. 16, no. 6, 1966 p 974-983
(JPRS-39906; TT-67-30554) CFSTI: HC$3.00

The possibility of using speech color for determining the degree of emotional stress of cosmonauts was investigated. Tapes of actual conversations with cosmonauts, and also actor-imitated conversations were analyzed with the formant frequency method. The situations were associated either with progress in assignment completion (positive emotion), or with complications related to increasing danger (negative emotion). The voice frequencies were correlated with electrocardiograms and respiratory data. Among the conclusions are: (1) The spectrum characteristics of speech may be used for emotional stress evaluation. (2) An increase in stress can be coordinated with a rise in formant frequency and intensity. (3) Concurrent use of physiological data improves accuracy in determining operator's condition and also aids in differentiating between physical and emotional stress. N.E.N.

**N67-21177*#** Army Biological Labs., Fort Detrick, Md.
**QUANTITATIVE SPORE RECOVERIES FROM DIATOMACEOUS EARTH PELLETS USED AS PROTECTIVE MATERIAL IN DRY HEAT STERILIZATION STUDIES**
Dorothy M. Portner 23 Feb. 1967 6 p refs *Its* Rept.-13-67
(NASA Order R-35)
(NASA-CR-83122) CFSTI: HC$3.00/MF$0.65 CSCL 06M

The selection of materials to simulate electronic components to determine their ability to withstand sterilization procedures is discussed. Diatomaceous earth was investigated by comparing the bacterial recoveries from diatomaceous earth pellets and from glass surfaces after exposure to dry heat at 105° or 125°C. After the heat treatment, samples were shaken and assayed by the pour plate method using trypticase soy agar as the culture medium. The results of the study indicated that death rate for *B. subtilis* var *niger* spores exposed to dry heat is considerably slower when the spores are in diatomaceous earth than when they are on the exterior glass surface. The D values calculated from the results were 240 and 400 min for spores on glass and diatomaceous earth respectively at 105°C, and 17 and 28 min at 125°C. Tabulated data show that comparable recoveries can be obtained with diatomaceous earth pellets. L.E.W.

**N67-21340#** Hiroshima Univ. (Japan). Dept. of Physiology.
**MECHANISMS OF SMOOTH MUSCLE RELAXATION THROUGH THE ANODAL CURRENT STIMULATION Final Report, Oct. 1965–Oct. 1966**
Hiroshi Irisawa Nov. 1966 43 p refs
(Contract DA-92-557-FEC-38715)
(J-220-10; FR-10; AD-644249) CFSTI: HC$3.00/MF$0.65

The comparative physiological method was combined with the electrophysiological method in an attempt to resolve the problems related to the mechanisms of relaxation of the involuntary muscle system. The effect of sodium ion on the mammalian smooth muscles, vertebrate myocardium, and invertebrate myocardium has been compared since 1962. Effect of higher sodium concentration on the myocardium was obtained by using the skate myocardium without changing the osmotic pressure of the bath. The results of this study will be published in the Journal General Physiology. A continuation of this research is in progress by studying the effect of Ca(++) on the myocardium. In the skate myocardium, the elevation in action potential by increasing Ca(++) was found to be caused by the increased availability of Na carrier and probably not by the direct inflow of Ca(++) into the cell. On the other hand, in the invertebrate myocardium such as molluscus, Ca(++) appears to play a very important role for the initiation of action potential. The heart muscle of the oyster can continue to contract spontaneously in Na free solution. Amplitude of action potential of the oyster myocardium increased 29 mV by a 10 fold increase in extracellular Ca concentration. Spontaneous activity was not diminished in a relatively high concentration of puffertoxine but was inhibited by the administration of manganese ion. All these facts indicate that the inward current may be carried by Ca(++) ion in the extreme condition in this heart muscle. In connection with this study, the ionic concentrations of intracellular Na and K were studied in the skate myocardium and similar measurements are being made on other muscles. Author (TAB)

**N67-21348#** Lockheed Missiles and Space Co., Sunnyvale, Calif.
**DEVELOPMENT OF AN INTEGRATED ERGOMETER/LOWER BODY NEGATIVE PRESSURE SYSTEM Final Report, Aug. 1965–Jun. 1966**
F. E. Riley, C. C. Cain, and A. L. Weitzmann Brooks AFB, Tex., Aerospace Med. Div., 9 Dec. 1966 41 p refs
(Contract AF 41(609)-2800)
(LMSC-4-06-66-8; AMD-TR-66-4; AD-644224) CFSTI: HC $3.00/MF$0.65

The object of the program was to provide prototype equipment for use by the USAF in laborary studies of physiological deconditioning similar to that which results from space flight. Three successive versions of an integrated Ergometer/Lower Body Negative Pressure (LBMP) System were delivered to AMD. The ergometer consists of a self-powered bicycle type unit with a solid-state electronic control system to maintain constant generator output regardless of pedal rotation speed. Recording capabilities are provided for a tachometer, and a wattmeter. Provisions are made to attach power consuming or power storage devices to the ergometer. Work loads up to one horsepower can be accommodated. The ergometer was calibrated using a dynamometer and speed reducer. The LBNP chamber is fully collapsible and employs circumferential rings to support the side loads. For ground applications longitudinal support members are used to carry the axial loads. The waist seal is a single molded unit and is removable from the chamber. The chamber has provisions for 19 leads of bioinstrumentation. A fail-safe overpressure control system is provided. A design limit of −80 mm Hg for 15 minutes was demonstrated. Normal operating pressure is −30 mm Hg. Provisions were made to integrate the ergometer with the LBNP. The two systems were designed to be operated individually, separately, or simultaneously, and in either the vertical or horizontal mode. Development needs were identified for future investigations. The

major areas requiring further study are: generator design, weight reduction material analysis and flight version design. Author (TAB)

**N67-21424*#** Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
**EFFECT OF CHRONIC RESTRAINT GASTROINTESTINAL FUNCTION**
Maurice Sullivan Mar. 1967 26 p refs
(NASA Order A-73704)
(NASA-CR-73071) CFSTI: HC $3.00/MF $0.65 CSCL 06P

Purpose of the study was to determine if the prolonged restraint of laboratory animals (the rat) adversely affects absorption of fluid and electrolytes. Experiments were performed to determine: (1) the influence of chronic restraint on the transport properties of the rat small intestine for electrolyte and fluid, both *in vitro in vivo*; (2) if chronic restraint causes latent effects that are manifested by more severe acute restraint; and (3) if the effects of chronic restraint and the known changes in function that occur after exposure to ionizing radiation are additive. Data were also obtained of the the effect on calcium absorption and retention, body, kidney, femur and femur ash weight, and the histopathology of the rat small intestine. The results do not indicate a deleterious effect either on intestinal function or on the susceptibility of the small intestine to more severe stress. Growth depression due to chronic restraint was noted, and it was found that weights of body, femur, and kidney were depressed in the same proportion. Bone mineralization is thought to be transiently affected. K.W.

**N67-21435#** Illinois Univ., Urbana. Dept. of Psychology.
**SPECULATION ON THE STRUCTURE OF INTERPERSONAL INTENTIONS**
Charles E. Osgood Sep. 1966 54 p
(Contract Nonr-1834(36); ARPA Order 454)
(TR-39; AD-643277) CFSTI: HC $3.00/MF $0.65

A model is presented in which dimensions are hypothesized to operate as a simultaneous bundle of distinctive features which mediate the meaning of behavioral events, either perceived or intended. It is suggested that, if the dimensional structure of interpersonal intentions is culturally invariant, manifest differences in behavioral prescription and expression can be economically compared. Assuming the dimensions themselves are culturally common, cultural differences reside in (1) the allocation of interpersonal intentions within the dimensional system, (2) the appropriateness or frequency with which intentions are said to characterize different role-pairs, and (3) the translation of intention into overt behavior or, conversely, the inference of intention from perceived behavior. Here, the concern was to develop a set of a priori features through a rational analysis of the language of interpersonal behavior and to show that a relatively small set of distinctive features can discriminate among a large number of interpersonal verbs. Six features were initially proposed. Index categories of Rogets Thesaurus were then sampled for representative, interpersonal verbs. Two hundred and ten verbs obtained in this manner were judged and coded on each of the six features. Face validity of the features was presented in terms of the resulting word clusters formed and differentiated on the basis of the feature scoring. Characteristics of the six features, their coding distribution and intercorrelation with other features was also provided. Author (TAB)

**N67-21452*#** National Aeronautics and Space Administration, Washington, D. C.
**VARIATIONS IN RESPIRATION PROCESS DURING GAMMA RADIATION OF PLANT TISSUE [IZMENENIYA V PROTSESSE DYKHANIYA PRI GAMMA-OBLUCHENII RASTITEL'NOY TKANI]**
I. P. Petrash and L. V. Metlitskiy Mar. 1967 9 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 170, no. 3, 1966 p 711–713
(NASA-TT-F-462) CFSTI: HC $3.00/MF $0.65 CSCL 06R

Changes in the activity of tomato oxidizing enzymes under the influence of gamma irradiation established a drop in oxygen absorption ability from 80% for normal fruit to 0–10% in irradiated fruit. Ionizing oxidation disrupted the normal pattern of respiratory enzyme actions most pronounced in less ripe tomatoes. G.G.

**N67-21478#** Norsk Radiumhospital, Oslo.
**INDUCED RADIOACTIVITY IN THE COLLIMATOR SYSTEM OF A 31 MeV BROWN BOVERI BETATRON**
Aksel Stroemme [1959] 8 p refs
(Contract AT(30-1)-3364)
(NYO-3364-21) CFSTI: HC $3.00/MF $0.65

It is found that during use some radioactivity is induced in the collimator system of the BBC 31-MeV betatron. Direct handling of the equalizer system is to be avoided because otherwise the doses to the hands can exceed 150–200 mR a day. But if the hands are placed not closer than about 15 cm from the equalizer system, the dose to the hands will not exceed 3–4 mR even on a busy day. If care is taken the radiation hazards due to induced radio activity after collimator iradiation are of no practical importance. In modern betatrons the collimator system with the field equalizer is safely mounted inside the apparatus and remotely controlled, and there is thus no radiation hazard from the collimator system. Author (NSA)

**N67-21606#** Sandia Corp., Albuquerque, N. Mex.
**PHYSICAL CHEMISTRY OF CLEANING**
G. L. Krieger et al Sep. 1966 118 p refs
(Contract AT(29-1)-789)
(SC-TM-66-428) CFSTI: HC $3.00/MF $0.65

The effects of contaminants on the properties of materials important to electronic devices and to related vacuum processes are discussed. Modern methods of achieving, testing for, and maintaining cleanliness are described. NSA

**N67-21623#** European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
**VALUE OF GAMMA SPECTROSCOPY APPLIED TO BIOLOGICAL SAMPLES [VALEUR DE LA SPECTROMETRIE GAMMA APPLIQUEE AUX ECHANTILLONS BIOLOGIQUES]**
H. Tanguy and V. Camera Jul. 1966 20 p refs In ITALIAN
(EUR-2998.f)

The analysis of biological samples has fewer applications than whole-body counting, nevertheless it has value when applied to biological specimens such as urine and feces. The authors establish the normal spectra for urine and feces and find a net increase in $^{137}Cs$ in urine after the middle of 1963. Body burdens calculated from the concentrations in the urine were higher than in other places where the same measurements were done. The authors report results on spectra of some cases of slight contamination that were found at Ispra. Contamination was due to $^{203}Hg$, $^{134}Cs$, $^{152,154}Eu$ and other uranium fission products. Author (NSA)

**N67-21676*#** Sandia Corp., Albuquerque, N. Mex.
**MICROBIOLOGICAL STUDIES RELATING TO CLEAN ENVIRONMENTS. PART I: EVALUATION OF THE EFFICIENCY OF A CLASS 100 LAMINAR-FLOW CLEAN ROOM FOR VIABLE CONTAMINATION CLEANUP**
John William Beakley, W. J. Whitfield, and J. C. Mashburn Sep. 1966 8 p refs
(NASA Order R-09-019-040; Contract AT(29-1)-789)
(NASA-CR-83246; SC-RR-66-385) CFSTI: HC $3.00/MF $0.65 CSCL 06T

A laminar-flow wall-to-floor clean room was challenged with *Bacillus subtilis* spores and then tested for efficiency of cleanup using both electronic and viable particle detection systems. The results confirmed the extreme efficiency of laminar-flow systems in reducing airborne viable particles to an absolute minimum. Author (NSA)

**N67-21698#** School of Aerospace Medicine, Brooks AFB, Tex.
**INSTRUMENTED IDENTIFICATION FOR BACTERIAL DIFFERENTIATION. A. THE BAIT AND TAMIS CONCEPT. B. IMMUNOELECTRONIC PRINCIPLES AND INSTRUMENTATION**
Irving Davis, William G. Glenn, Warren J. Russell, Wesley E. Prather, and Heinz A. Jaeger Nov. 1966 18 p refs
(SAM-TR-66-61; AD-643948) CFSTI: HC $3.00/MF $0.65

The BAIT (Bacterial Automated Identification Technic) concept for identification of bacteria, appropriate for small area-point source coverage, is outlined. Coupling of the BAIT instrument with other medical defense requirements is described. Finally, a concept for large area coverage for biologic agent identification is presented. This is the TAMIS (Telemetric Automated Microbial Identification System) concept. The differentiation of bacterial extracts by precipitin analyses has been well established by the researches of numerous investigators. Advances in instrumentation have made the quantitation of this type of antigen-antibody reaction both exacting and efficient. This report emphasizes principles of quantitation, methods, and instruments currently in use for electronic data reduction and evaluation of the comparability of precipitin reactions. Author (TAB)

**N67-21708*#** Massachusetts Inst. of Tech., Cambridge. *Research* Lab. of Electronics.
**ACOUSTICALLY EVOKED POTENTIALS IN THE RAT DURING CONDITIONING**
Robert D. Hall and Roger Greenwood Mark 30 Nov. 1966 89 p refs
(Grants NsG-496; NSF GK-835; NIH G-MH-04737-06; Contract DA-36-039-AMC-03200(E))
(NASA-CR-83248; TR-455; AD-644853) CFSTI: HC $3.00/MF $0.65 CSCL 06B

*Acoustically evoked potentials* were recorded from unanesthetized rats in a series of experiments designed to study changes in evoked potentials during conditioning. It is shown that when clicks are established as conditional stimuli (CS) in conditioned emotional response (CER) situations, click-evoked potentials recorded *from central auditory structures* and from mesencephalic reticular formation exhibit amplitude increases. Similar increases were found with Sidman avoidance conditioning. These changes during aversive conditioning were not related to acquired discriminative properties of the acoustic stimulus, since similar changes in click-evoked potentials were found when a CER was elicited by a photic CS. The changes were shown to be independent of movement-related variables. Potentials evoked in central auditory structures by electrical stimulation of *the cochlear nucleus or cochlea* increased in amplitude during acquisition of a CER. In one CER situation nearly all movement was eliminated through methods of behavioral control, and data-sampling techniques provided a control for residual differences in amount of movement during CS and *control periods. These procedures did not eliminate* increases in click-evoked potentials during conditioning. In general, whenever behavioral measures indicated that rats were frightened, acoustically evoked potentials exhibited increased amplitudes, whether or not a CS was present, but only changes in late components of *click-evoked potentials* were consistently related to observed behavioral changes. Author (TAB)

**N67-21712#** Army Limited War Lab., Aberdeen Proving Ground, Md.
**VENTILATED FLIGHT SUIT Final Report**
Frederic G. Hardenbrook Dec. 1966 17 p
(TR-66-07; AD-644611) CFSTI: HC $3.00/MF $0.65

The purpose of this development is to increase the efficiency of the pilot and co-pilot of the Mohawk aircraft when operating *in hot climates by using the principle of evaporative cooling. To* do so, a Ventilated Flight Suit was developed through which ambient air could be forced by using a small blower and flexible tubing conducting the ambient air to the suit using the perspiration of the individual to achieve the cooling. Service Tests made in *South Vietnam proved the Ventilated Flight Suit inadequate when* the aircraft cooling system was not in operation unless a supplementary lightweight, portable cooling system is provided. TAB

**N67-21715#** Illinois Univ., Urbana. Group Effectiveness Research Lab.
**A METHODOLOGICAL STUDY OF BEHAVIORAL AND SEMANTIC DIFFERENTIAL SCALES RELEVANT TO INTERCULTURAL NEGOTIATIONS**
Earl E. Davis Jun. 1966 74 p refs
(Contract Nonr-1834(36); ARPA Order 454)
(TR-32; AD-643274) CFSTI: HC $3.00/MF $0.65

One hundred and fifty students, including 84 white male and 66 negro male Ss, rated 32 complex person stimuli on 18 behavioral differential (BD) and 19 semantic differential (SD) scales, as well as 24 socio-political issues on a set of 10 SD scales. The BD scales were selected for their relevance to intercultural negotiations between the two subject groups; the SD scales were selected for their appropriateness in rating person stimuli and issues, as opposed to more general SD scales. The scales, stimuli and subjects generated a cube of data such that variation in any of the three faces of the cube could be a source of variation in factor structure. The techniques for dealing with this three-way correlational and factorial problem were described. Factor analyses of scales were performed; analyses of *variance of the factorial* design of the stimuli were performed for each scale factor, and comparisons were made between the two subject populations. Factor analysis of the BD scales yielded, among others, a cooperation factor which, it was felt, might be particularly important predictor variable in *intercultural negotiations. Factor analysis* of the SD scales used to judge person stimuli yielded five interpretable factors closely paralleling those found by Osgood and Ware in their work with the personality differential. Factor analysis of the scales used to judge issues yielded three factors specific to this domain of *stimuli. A comparison of the results* obtained from the white and negro subjects was made, and the factorial similarity of the scale factors for the two S types was measured. TAB

**N67-21716#** *TRW Systems, Redondo Beach, Calif.* Quantum Physics Lab.
**PHOTOCHROMIC EYE-PROTECTIVE DEVICE BASED ON TRIPLET ABSORPTION Annual Research Report, 1 Sep. 1965–31 Aug. 1966**
Maurice W. Windsor, William R. Dawson, and Richard S. Moore 31 Aug. 1966 106 p refs
(Contract AF 41(609)-2908)
(TRW-05465-6002-R000; Rept.-7; AD-645362) CFSTI: HC $3.00/MF $0.65

A prototype 6 x 8-inch photochromic windshield segment was developed and delivered to the Air Force. The device is designed to protect pilots against flash blindness caused by exposure to nuclear explosions. The reversible *photochromic darkening* is based upon absorption of visible light by metastable triplet states of aromatic molecules. The active compounds are incorporated into solid sheets of transparent plastic. Three sheets of plastic are

arranged in an N-type configuration and the triplet states are produced by UV excitation from two flash lamps. Black glass filters prevent visible light from the flash lamps from dazzling the observer. With a 1900 joule input to the flash lamps, the triplet-state windshield segment attains within one millisecond an optical density, weighted for eye-response, that varies from 1.4 along a line midway between the flash lamps to 2.7 close to each flash lamp. The open-state transmittance is 65% and the device re-opens to one-half this transmittance in approximately 2 seconds. Author (TAB)

**N67-21735#** Naval Radiological Defense Lab., San Francisco, Calif.

**THE RADIATION RESISTANCE OF LONG-LIVED LYMPHOCYTES AND PLASMA CELLS IN MOUSE AND RAT LYMPH NODES**

John J. Miller, III and Leonard J. Cole 23 Sep. 1966 28 p refs

(USNRDL-TR-1074; AD-644116) CFSTI: HC $3.00/MF $0.65

Rats and mice were given a secondary immunological stimulus with TAB vaccine and then were given twice daily injections of tritiated thymidine for 4 days into the hind foot pad. Thirty days later the mice were exposed to 850 rad, 500 rad, or were left nonirradiated and the rats were exposed to 850 rad or left nonirradiated. Despite a marked, generalized destruction of lymphocytes, the aortic nodes of the mice and the popliteal nodes of the rats had larger values for percent of small lymphocytes labeled in the period immediately following irradiation than did the nodes from the nonirradiated control animals. The mean grain counts of the labeled small lymphocytes from irradiated animals were equal to or larger than those from nonirradiated animals. These results are interpreted as demonstrating a relative radio-resistance of long-lived, lymph node lymphocytes. Large numbers of persistently labeled plasma cells were also found in lymph nodes after irradiation. No difference could be found in the numbers or distribution of labeled plasma cells in lymph nodes from irradiated mice compared to lymph nodes from nonirradiated mice. There may have been a loss of a small proportion of the long-lived plasma cells present in the rat lymph nodes. It is believed that the ability of plasma cells to survive irradiation explains the radio-resistance of established antibody production. Author (TAB)

**N67-21739#** Ohio State Univ., Columbus.

**THE EFFECT OF SIMULATED TEAM FEEDBACK ON THE PERFORMANCE OF GOOD AND POOR TRACKERS**

William A. Johnston and Leon H. Nawrocki Nov. 1966 12 p refs

(Grant AF-AFOSR-985-66)

(AFOSR-66-2541; AD-644480) CFSTI: HC $3.00/MF $0.65

The effect of partner ability on individual tracking performance was assessed under conditions of simulated team feedback. Each subject was told that he had a partner and that feedback represented his team performance relative to average performance. The average performance criterion was set so that subjects would exceed it on 10%, 30%, 50%, 70%, and 90% of the trials. These levels of criterion difficulty simulated partners of varying ability and each was administered to 14 subjects. As contrived partner ability increased, performance of the better trackers increased steadily, and performance of the poorer trackers first decreased, then increased. Author (TAB)

**N67-21753** Rome Univ. (Italy).

**STUDY OF THE ACTION MECHANISM OF IONIZING AND ULTRAVIOLET RADIATIONS *IN VITRO* CULTURES OF MAMMALIAN CELLS [STUDIO DEL MECCANISMO D'AZIONE DELLE RADIAZIONI IONIZZANTI ED ULTRAVIOLETTE NELLE CELLULE DI MAMMIFERO IN COLTURE IN VITRO] Annual Report, 1 Nov. 1964–31 Oct. 1965**

Brussels, EURATOM, 1967 21 p In ITALIAN; ENGLISH summary

(Contract EUARTOM-036-64-6 BIOI)

(EUR-3266.i) CFSTI: $3.00

The main work was devoted to the solution of the following problems: (1) preparation of the apparatus for uv irradiation of cells and relative dosimetry; (2) determination of the chromosome and growth characteristics (relative length of the various phases of the cellular cycle) of the strains to be used in the experiments; (3) analysis of the survival of cells irradiated with various doses and various wavelengths of uv light; and (4) frequency and type of chromosome aberrations induced in cells irradiated with various doses and various wavelengths of uv light. In addition, certain experiments have been undertaken to determine the possibility of inducing chromosome ruptures in cells pretreated with a furocoumarin (8-methoxypsoralen) and subsequently irradiated with uv of 3650 Å. Author

**N67-21756#** National Defense Research Organization TNO, The Hague (Netherlands).

**EFFECT OF CHEMICAL DRY CLEANING ON FIRE RESISTANT COMPOSITION OF COTTON OVERALLS FOR PILOTS**

28 Jun. 1966 8 p refs

(Rept.-668; TDCK-46046) CFSTI: HC $3.00/MF $0.65

Tests are described in which the fire resistance and shrinkage of three Dutch air force pilot overalls were evaluated after repeated chemical dry cleanings under controlled conditions. The evaluation of the khaki-colored cotton garments was made after 1, 5, and 15 cleanings. One of the overalls was initially clean, one was soiled, and the third, which was not treated for fire resistance, was evaluated for shrinkage. Reagent tablets for timed burning were used in the flame test. After 15 cleanings the fire resistance of the overalls remained fully effective. Transl. by K.W.

**N67-21815#** Florida Univ., Gainesville. Dept. of Pathology

**BIBLIOGRAPHY OF THE TOXICOLOGY OF NICKEL CARBONYL**

F. William Sunderman, Jr. 1 Jul. 1966 6 p refs

(Contract AT(40-1)-3461)

(ORO-3461-8a) CFSTI: HC $3.00/MF $0.65

A list of 46 references to information on the toxicology of nickel carbonyl is given. NSA

**N67-21817#** Florida Univ., Gainesville. Dept. of Pathology.

**BIBLIOGRAPHY OF NICKEL CARCINOGENESIS**

F. William Sunderman, Jr. 1 Jul. 1966 7 p refs

(Contract AT (40-1)-3461)

(ORO-3461-8b) CFSTI: HC $3.00/MF $0.65

Sixty-three references pertaining to the carcinogenic effects of nickel are presented. Papers on clinical and experimental studies are included, as well as those treating occupational parameters of respiratory tract carcinogenesis. NSA

**N67-21841#** System Development Corp., Santa Monica, Calif.

**EXPERIMENTS IN COMPUTER-AIDED INDUCTIVE REASONING**

J. R. Newman and M. S. Rogers 6 Dec. 1966 80 p refs

(SDC-TM-3227; AD-645422) CFSTI: HC $3.00/MF $0.65

The document reports on a program of research on human problem-solving behavior when that behavior is being assisted by certain computer and display aids. The research is particularly concerned with problem solving that involves inductive reasoning or concept formation. Previous investigations have indicated that human subjects use a variety of systematic operations when they are solving such problems; one purpose of this project is to carry out an experimental analysis of some of these operations and

their explicit uses. To accomplish this purpose, the operations are made available to the problem solver in the form of computer and display aids so that he can call for their implementation quite easily. The problem solver is thus relieved of the burden of actually carrying out the details of the operations. Furthermore, through the complete recording of the use of these computer aids, some aspects of the problem-solving process are externalized for examination by the researcher. The first part of this report outlines the general method and rationale of this work and its relation to other research. The second part describes four specific experiments within that general framework. Groups of subjects were exposed to two major types of concept problems: classification and relational. Those subjects who were allowed to use the computer and display aids (called symbol manipulation functions) in solving the problems achieved significantly higher performance than non-aided subjects. The aids increased in usefulness with problem difficulty and had their greatest utility for the relational problems, which proved to be considerably more difficult than classification problems. Author (TAB)

**N67-21853#** Naval Ordnance Test Station, China Lake, Calif.
**THE TRANSMISSION OF ARBITRARY ENVIRONMENTAL INFORMATION BETWEEN BOTTLE-NOSE DOLPHINS**
Jarvis Bastian (Calif. Univ., Davis) Jan. 1967 53 p refs
(NOTS-TP-4117; AD-646241) CFSTI: HC $3.00/MF $0.65

An investigation was made of the capacity of a pair of bottle-nose dolphins to perform a cooperative task which required the acoustical transmission of information about an arbitrary visual event in the environment of one of the animals. Each animal was first trained to press one of two paddles, depending upon the state of a light signal. Next, while housed in adjacent enclosures, they were required to coordinate their actions in a fixed sequence and within fixed time limits. Then the light signal to the animal required to respond first was removed, and visual contact with the other animal and its light was eliminated. The pair continued to perform successfully as long as they were in acoustical contact and the light signal to the one animal was provided. Their performance success was found to depend directly upon the emission of pulse trains by the animal receiving the light signal, although it was also found to be indirectly connected with that animals emission of whistle signals. The specific nature of this dependency could not be determined. Author (TAB)

**N67-21856#** Army Medical Research Lab., Fort Knox, Ky. Experimental Psychology Div.
**VISUAL-AROUSAL INTERACTION AND SPECIFICITY OF NYSTAGMIC HABITUATION**
John E. Marshall and James H. Brown 9 Dec. 1966 13 p refs
(AMRL-688; AD-645926) CFSTI: HC $3.00/MF $0.65

Forty male Ss with no previous exposure to precise constant angular acceleration received 13 positive accelerations of 24 degrees/sq. sec. Vision was permitted for all Ss on pre- and post-test criterion trials. Twenty Ss received concomitant visual stimulation with an illuminated visual field during 10 habituating trials. The remainder were habituated in complete darkness. Habituation acquired in darkness did not transfer to criterion trials with vision. Darkness habituated Ss showed a significant slow-phase increment when tested with vision following task-controlled arousal level increase. Ss habituated with vision showed a continued output decline when tested under similar conditions. Author (TAB)

**N67-21879#** Army Medical Research Lab., Fort Knox, Ky.
**ABERRANT CORNEAL EPITHELIAL CELLS PRODUCED BY RUBY LASER IRRADIATION**
W. H. Parr and Robert S. Fisher 31 Oct. 1966 31 p refs
(AMRL-698; AD-645452) CFSTI: HC $3.00/MF $0.65

Rat corneas were exposed to either 4 joules per sq cm or 8 joules per sq cm and were harvested at varying times following laser exposure. Corneal whole mounts were evaluated for changes in either the differential mitotic cell count or the mitotic index. Ruby laser radiation (6,943 A) produces aberrations in the corneal epithelium of the rat. At 8 joules per sq cm both interphase cells and cells in active mitosis were obviously altered. At 4 joules per sq cm aberrant corneal epithelial cells became apparent immediately after laser irradiation, and some were still present 30 days later. The mechanism by which laser radiation alters the cornea remains obscure. Author (TAB)

# IAA ENTRIES

**A67-21686**
WAVEFORM ANALYSIS AND PREPROCESSING WITH AN ANALOG EAR-BRAIN SIMULATION.
John L. Stewart (Santa Rita Technology, Inc., Menlo Park, Calif.).
IN: WINCON '67; WINTER CONVENTION ON AEROSPACE AND ELECTRONIC SYSTEMS, 8TH, LOS ANGELES, CALIF., FEBRUARY 7-9, 1967, CONFERENCE RECORD. [A67-21674 09-08]
Convention sponsored by the Aerospace and Electronic Systems Group and the Los Angeles Council of the Institute of Electrical and Electronics Engineers.
Los Angeles, Institute of Electrical and Electronics Engineers, Inc., Los Angeles Council (Winter Convention Series. Volume 6), 1967, p. IIIE-35 to IIIE-40.
USAF-sponsored research.

Discussion of the transformations used by animals in processing acoustic waveforms for submission to the auditory centers of the brain. The highly complex, noisy, stimulus-dependent, and nonlinear system is represented in simulated, or analog, form. The simulation is described in an attempt to provide a generalized theory for monaural auditory perception. Particular attention is given to the electric analog of a grasshopper ear. M. F.

**A67-21714 •**
INTERRUPTION OF PROPRIOCEPTIVE SENSORY INPUT - MECHANISM FOR INDUCTION OF "CARDIOVASCULAR DECONDITIONING."
Floyd E. Leaders and Stata Norton (Kansas, University, University of Kansas Medical Center, Dept. of Pharmacology, Kansas City, Kan.).
Aerospace Medicine, vol. 38, Feb. 1967, p. 117-123. 25 refs.
NASA-supported research.

A simple, reproducible, objectively scored method has been described for direct quantitation of vascular changes in the microcirculation of unanesthetized rats. This method has been utilized to investigate the role of the microcirculation in cardiovascular deconditioning. The hypothesis that cardiovascular deconditioning may be the result of an alteration of peripheral vasomotion was tested. Reduction of sensory input was achieved in rats by partial confinement or by spinal section. Evidence has been presented that procedures which reduce sensory input will influence capillary vasomotion. The changes involve a tendency for the microvessels to remain open longer per unit time and to alternate between open and closed less frequently. It is concluded that cardiovascular deconditioning in a simplified sense is a manifestation of interpretation of sensory input data by the CNS under conditions of an altered environment. Further, it is concluded that the symptoms of cardiovascular deconditioning are a reflection of microvessel and myocardial changes brought about by this alteration of CNS activity. (Author)

**A67-21715 •**
ELECTROCARDIOGRAM PREPROCESSING UNIT.
Fred B. Vogt and Thor O. Hallen (Texas Institute for Rehabilitation and Research, Houston, Tex.).
Aerospace Medicine, vol. 38, Feb. 1967, p. 123-126.
Contracts No. NAS 9-1461; No. NSR-44-024-006.

This paper describes an analog preprocessing circuit for obtaining a pulsed output corresponding to each cardiac cycle using the electrocardiogram. The circuit is designed to present a fixed pulse output for each heart beat and is relatively unresponsive to false trigger signals on the electrocardiogram such as electromyogram, 60-cps interference, electrode movement artifact, false triggering on a T-wave, baseline shifts, and polarity changes of the QRS complex. The circuit diagram, principle of operation, and application of the unit are presented. The unit should be useful where electrocardiograms are obtained with associated high noise components, such as during flight conditions or exercise procedures. It also should prove useful when only the time of occurrence of the electrical activity of the heart is desired to operate other apparatus, such as to obtain heart rate or blood pressure. (Author)

**A67-21717 ***
FLIGHT RESEARCH PROGRAM. VI.
James Roman, John J. Perry, Lewis R. Carpenter (NASA, Flight Research Center, Edwards AFB, Calif.), and Shaiban A. Awni (Computing and Software, Inc., Edwards AFB, Calif.).
Aerospace Medicine, vol. 38, Feb. 1967, p. 128-132.

Two pilots were instrumented for electrocardiogram in a T-33 jet aircraft in the course of eleven flights in which pilot horizontal field of view was varied from 360 to 5.7°. Landing error was recorded in terms of distance from the desired touchdown point. A high degree of correlation was found to exist between heart rate and landing error. There was no significant correlation between heart rate and field of view, nor was there significant correlation between field of view and landing error for the fields of view tested. At the 5.7° field of view the monocular fields of view did not overlap, so that only one eye could be used. Landing error did not increase significantly when only one eye was used. This finding has implications with respect to aeromedical standards. (Author)

**A67-21718 •**
FLIGHT RESEARCH PROGRAM. VII.
James Roman (NASA, Flight Research Center, Edwards AFB, Calif.), Walton L. Jones (NASA, Office of Advanced Research and Technology, Washington, D.C.), and Harry Older.
Aerospace Medicine, vol. 38, Feb. 1967, p. 133-139. 7 refs.

The feasibility of medical monitoring in combat was demonstrated by instrumenting ten dive-bombing missions from a Navy attack aircraft carrier operating in the Gulf of Tonkin. Nine missions suitable for data analysis were obtained. The results were remarkable primarily for the low heart rates seen on these opposed missions. The overall heart rate for 18 hr of data was 87.6 beats/min. The heart rates at launch and recovery were substantially higher than the bombing heart rates, in spite of the significant normal acceleration experienced during the bomb runs. The difference between launch or recovery, and bombing was statistically highly significant. Comparisons between the first and the second combat missions of the day for the same pilots on the same day showed heart rate to be substantially lower on the second mission. The difference was statistically significant. The pilots were of an unusually high experience level, and the data presented could not be considered representative for a pilot group of average combat experience, or average carrier operations experience. (Author)

**A67-21719**
X-RADIATION EFFECTS ON VIBRATION TOLERANCE OF RATS.
L. L. Short, B. D. Newsom, and J. F. Brady (General Dynamics Corp., General Dynamics/Convair, Life Sciences Laboratories, San Diego, Calif.).
(Aerospace Medical Association, Annual Scientific Meeting, 36th, New York, N.Y., April 26-29, 1965, Paper.)
Aerospace Medicine, vol. 38, Feb. 1967, p. 140-144. 45 refs.

One hundred and forty-one Sprague-Dawley white rats were allotted into seven experimental groups to test the working hypothesis that a prior X-radiation exposure might weaken the rats and make them more susceptible to death from an acute vibration test. An X-ray dose of 632 roentgens, administered at a low dose rate and in an intermittent and prolonged manner, produced a low 30-day borderline mortality of 5 to 10%. An acute vibration test produced a mortality of 34% in the controls. The vibration test was applied at 7, 14, and 21 days post-irradiation to initially irradiated groups and their non-irradiated controls. The mortality from the vibration test did not differ significantly in the comparisons of the irradiated

*vs non-irradiated groups.* Although the results are not fully conclusive, no synergism in mortality from radiation and vibration in sequence was observed under the conditions of this experiment. (Author

**A67-21720**
SOME PSYCHOMOTOR AND PHYSIOLOGICAL TESTS ON HUMANS EXPOSED TO AIR IONS.
R. D. McDonald (HumRRO, Monterey, Calif.), C. H. Bachman, and P. J. Lorenz (Syracuse University, Physics Dept., Syracuse, N.Y.).
Aerospace Medicine, vol. 38, Feb. 1967, p. 145-148. 10 refs.
Research supported by the State University of New York; U.S. Public Health Service Grant No. AP-00305-1, 2.

Humans were exposed to air ions by inhalation only. The ion current to each subject was measured. Both psychomotor and physiological tests were performed with ions of both polarities. Reaction time measurements under ionization were ambiguous. In a vigilance task both negative ions and positive ions reduced the number of omissions, the positives being most effective. Neither polarity affected the heart rate. Reduction in respiration rates occurred for both polarities of ions as well as the control during the ion exposure. The reduction for positive ions was greater than for the control, the reduction for negatives was less than for the control. Measurements of dc potential between forehead and ear showed no correlation with ion treatment. (Author)

**A67-21721** •
EVOKED BRAIN RESPONSE AS A MEASURE OF HUMAN SLEEP AND WAKEFULNESS.
Donald I. Tepas (St. Louis University, Dept. of Psychology, St. Louis, Mo.).
Aerospace Medicine, vol. 38, Feb. 1967, p. 148-153. 15 refs.
USAF-supported research; Contract No. NAS 8-20006.

The report reviews the results of several experiments in which the evoked brain response to clicks was monitored to determine the feasibility of utilizing this measure as a sensitive and direct index of human sleep and wakefulness. The experiments conducted fall into two general categories: (1) those in which the evoked brain response was used to monitor the effects of various work-rest schedules on sleep-wakefulness behavior; (2) those directed towards a preliminary evaluation of man's ability to sleep while wearing a pressure suit. The results of these experiments indicate that the evoked brain response to clicks is a sensitive indicant of sleep-wakefulness behavior which can be recorded from a wide range of subjects. Thus, the evoked brain response may provide an objective central nervous system measure for monitoring and manipulating the performance of man in a complex space system environment. (Author)

**A67-21722**
DEVELOPMENT OF TECHNIQUES FOR DIRECT MEASUREMENT OF METABOLISM UNDER WATER.
Mary F. Foley, Charles E. Billings, and Charles R. Huie (Ohio State University, Dept. of Preventive Medicine, Columbus, Ohio).
Aerospace Medicine, vol. 38, Feb. 1967, p. 153-155. 17 refs.

In previous studies of metabolism and ventilation in flight, the Müller-Franz portable breath-powered respirometer has been found to be a precise and simple tool. The concept embodied in this instrument has been adapted for use in studies of the metabolic cost of activity under water. The criteria specified for a device for these studies were: it must utilize commercially available SCUBA (self-contained underwater breathing apparatus) gear; there must be no connections to the surface and the swimmer must not be hindered in any way; it must be usable at any depth which can be reached using SCUBA, and in any activity engaged in by divers. A device has been developed which meets these criteria. Pilot studies of metabolism in divers swimming at various rates have been conducted. (Author)

**A67-21723**
EFFECT OF BLUR AND SIZE ON TARGET RECOGNITION.
C. S. Hoffman and C. P. Greening (North American Aviation, Inc., Autonetics Div., Anaheim, Calif.).
Aerospace Medicine, vol. 38, Feb. 1967, p. 156-158. 5 refs.

A study was performed to determine the effect of blur and size on target recognition. Films of six different clock orientations of Landolt C's were made. Blur and size were varied by varying the angular velocity of the camera across the target field and the distance of the camera from the targets. The subjects were required to identify an assigned target orientation on each trial. The results were: (1) the effect of image smear on target recognition is dependent upon the ratio of smear in inches to the critical dimension of the target, in comparable units. If the amount of smear is less than twice the critical dimension, target recognition accuracy is unaffected. At a ratio of 2.0, performance begins to drop off rapidly until it levels off at a near chance level and (2) time to recognize targets falls off rapidly when the amount of blur equals the critical dimension. (Author)

**A67-21724**
INFLUENCE OF GRAVITATIONAL CHANGES ON THE DEPOSITION OF AEROSOLS IN THE LUNGS OF MAN.
D. C. F. Muir (London, University, London School of Hygiene and Tropical Medicine, London, England).
Aerospace Medicine, vol. 38, Feb. 1967, p. 159-161. 10 refs.
Research supported by the Medical Research Council.

Examination of the effect of a change in the gravitational field on the deposition of aerosols in the lungs of man during breathing. No increase in the deposition of particles in the alveolar regions results from the absence of gravity or from an increase in the force of gravity. Under the conditions of a reduced field as on the moon there is a reduction in the overall deposition of particles of unit density in the range 1 to 8 $\mu$ diam but an increase in the total quantity reaching the nonciliated regions of the lung. The potential danger from the results of inhaling pathogenic bacteria under these conditions remains to be established. M. F.

**A67-21725**
EFFECTS OF SOLAR RADIATION ON MEAN FACIAL SKIN TEMPERATURE.
R. M. Rocco (Litton Systems, Inc., Space Sciences Laboratories, Beverly Hills, Calif.).
Aerospace Medicine, vol. 38, Feb. 1967, p. 161-163.
Contract No. AF 33(615)-1875.

Test subjects, wearing simulated spacesuit helmets, underwent facial irradiance tests to determine the effects of absorbed solar electromagnetic radiation on facial skin temperature. Lead glass was used as visor material to protect subjects from ultraviolet radiation without significant attenuation or alteration of the visible and infrared spectra. A mercury-xenon solar simulator provided intensities from 0.4 to 0.7 solar constant at the skin surface. Skin temperatures were measured with thermocouples taped to the cheeks and forehead. Results indicate that a mean facial skin temperature not in excess of 100°F can be maintained in a 75°F spacesuit environment provided the skin does not absorb more than 0.22 solar constant (97 Btu/hr-ft$^2$) from solar irradiation, earth albedo and vehicle albedo and the visor temperature does not exceed 115°F. Since astronauts engaged in near-earth extravehicular missions may be exposed to intensities as high as two solar constants, spacesuit visors may require a heat reflecting coating to attenuate the solar and albedo facial irradiance. (Author)

**A67-21726**
PERFORMANCE OF CIVIL AVIATION PILOTS UNDER CONDITIONS OF SENSORY INPUT OVERLOAD.
Barbara L. Drinkwater.
Aerospace Medicine, vol. 38, Feb. 1967, p. 164-168. 10 refs.
Research supported by the University of California.

It was the purpose of this study to determine the effect of sensory input overload on the performance of nonprofessional civil pilots during simulated instrument flights in a Link AN 2550-1 trainer.

Parameters included track, altitude, and air-speed deviations measured under overload conditions induced by amended clearances and extraneous kinesthetic, visual, and auditory stimuli. Data from experimental flights for each subject were compared with his performance on control flights under similar flight plans. The analysis suggests that pilot performance may be facilitated by an auditory stimulus which does not require a response. A visual stimulus, whether or not a response was required, resulted in a performance decrement. The kinesthetic stimulus, a result of rough air activators, produced significant pilot errors when introduced alone and in combination with auditory or visual stimulus. Even with no additional sensory input, a single amended clearance delivered at a critical period of the flight was sufficient to cause gross errors in simulator control. (Author)

**A67-21727**

OXYGEN UNDER HIGH PRESSURE AND EXPERIMENTAL TETANUS.
Mackie A. Allgood (Federal Aviation Agency, Office of Aviation Medicine, Civil Aeromedical Institute, Oklahoma City, Okla.) and Donald D. Holmes (Veterans Administration Hospital, Oklahoma City, Okla.).
Aerospace Medicine, vol. 38, Feb. 1967, p. 169, 170. 13 refs.

Mice inoculated with tetanus spores were exposed to oxygen under high pressure (OHP) in two groups: immediate, beginning within an hour of inoculation; and delayed, beginning at 24 hr after inoculation. At the 90% mortality time for untreated controls, immediate OHP significantly increased the number of survivors in all experiments. But even when administration of OHP was delayed, the number of survivors was significantly greater in half the experiments. (Author)

**A67-21728**

REACTION TIME DURING VOLUNTARILY CONTROLLED ALVEOLAR HYPERVENTILATION.
J. C. Stoddart (Newcastle-upon-Tyne, University, School of Medicine, Dept. of Anesthetics, Newcastle-upon-Tyne, England).
Aerospace Medicine, vol. 38, Feb. 1967, p. 171-173.

Six subjects were asked to perform a choice reaction time task while undergoing voluntarily controlled alveolar hyperventilation. The results indicate that the level of alveolar ventilation governs the time of onset of deterioration in performance. At $V_A$ = 29 litres/min, prolongation of reaction time occurred when the alveolar carbon dioxide tension was 16 mm Hg. At $V_A$ = 18 litres/min, deterioration occurred when the alveolar carbon dioxide tension was 19 mm Hg. It is considered that this method can be used to assess the susceptibility of aircrew to the effects of hyperventilation. (Author)

**A67-21729**

HEARING DISCRIMINATION IN HYPERBARIC AIR.
John Adolfson and Erik Fluur (Göteborg, University, Psychological Laboratory, Gothenburg; Karolinska Sjukhuset, Dept. of Otolaryngology, Stockholm, Sweden).
Aerospace Medicine, vol. 38, Feb. 1967, p. 174, 175. 8 refs.
Research supported by the Ministry of Defence.

In order to determine to what extent the hearing discrimination was influenced by hyperbaric air intoxication 23 divers were tested by means of speech audiometry in a pressure chamber at 4, 7, and 11 atm abs. The hearing discrimination decreased with increased pressure and the impairment was statistically significant on 7 and 11 atm abs. It was concluded that even if the sound intensity was raised far above the hearing threshold the prolonged associative reactions caused by hyperbaric air intoxication led to severe difficulties for a diver to apprehend simple common words. It was also suggested that this state could be a reason for a diver not to obey orders from the surface when diving at depths greater than 60 m. No adaptation to the hyperbaric environment was found in this investigation. (Author)

**A67-21730** #

IMMERSION DIURESIS.
Noel C. Hunt, III (Duke Hospital, Dept. of Medicine, Durham, N.C.).
Aerospace Medicine, vol. 38, Feb. 1967, p. 176-180. 35 refs.

The effect of water immersion on urine composition was studied in twelve dehydrated subjects. Acting as their own controls, the subjects were submitted to three separate six-hour periods of (1) routine daily activity, (2) water immersion to neck level, reclining in a deck chair, and (3) reclining in a deck chair, nonimmersed. Reclining in a deck chair, relative to routine daily activity, was associated with a natruresis accompanied by a small volume of osmotically obligated water. Water immersion, relative to reclining in a deck chair, was associated with a marked diuresis, consisting primarily of nonsolute obligated water, and secondarily of water obligated to a significantly increased sodium excretion. In six subjects, Pitressin treatment tended to suppress immersion diuresis. Whereas the release of nonsolute obligated water is best explained by ADH inhibition accompanying the negative pressure breathing inherent to immersion, another reason must be sought for the enhanced sodium excretion. The mechanism for natruresis was not defined by indirect measurements of glomerular and tubular activity; possible mechanisms are discussed. (Author)

**A67-21731** *

STUDY OF HEAT BALANCE IN FULL PRESSURE SUITS.
E. C. Wortz, D. K. Edwards, III, R. A. Diaz, E. J. Prescott, and L. E. Browne (Garrett Corp., AiResearch Manufacturing Co., Los Angeles, Calif.).
Aerospace Medicine, vol. 38, Feb. 1967, p. 181-188. 14 refs.
Contract No. NAS 9-2886.

Studies were made of eight subjects who exercised on a level treadmill at 1.4 and 2.0 mph (2.25 and 3.22 km/hr) wearing a pressurized Gemini G2-C space suit at sea level and at simulated 32,500 ft (9906 m) altitude. The subjects' metabolic rates were measured by indirect calorimetry, and these rates were compared with heat removal rates from the suit. Avenues of heat removal other than by ventilation gas cooling were eliminated. Ventilation cooling removed only a portion of the metabolic heat generated; the remainder was expended as useful work or stored in the subjects' bodies. Because of the low efficiency of the human body in doing useful work, it appeared that the heat storage rates were fairly high. It was presumed that these rates were a result of the high heat storage that can occur in exercising muscle tissue. It was concluded that heat storages of as much as 1000 Btu (252 cal) can be safely tolerated under conditions of high muscular activity. (Author)

**A67-21732**

ABSORPTIONAL ATELECTASIS BREATHING OXYGEN AT SIMULATED ALTITUDE - PREVENTION USING INERT GAS.
Talvaris Turaids (U.S. Naval Air Engineering Center, Aerospace Crew Equipment Laboratory, Philadelphia, Pa.), Fred T. Nobrega (Mayo Clinic, Section of Medical Statistics, Epidemiology, and Population Genetics, Rochester, Minn.), and Thomas J. Gallagher (U.S. Navy, Bureau of Medicine and Surgery, Washington, D.C.).
Aerospace Medicine, vol. 38, Feb. 1967, p. 189-192. 25 refs.

A 38-year-old man, who had previously shown a tendency to develop atelectasis in an atmosphere of 100% oxygen, was exposed to mixtures of oxygen with 30, 5 or 2.5% nitrogen at 5 psi. This subject consistently developed atelectasis when the nitrogen concentration was 2.5% or below, whereas no lung pathology was observed when nitrogen in the atmosphere was present at 5 or 30%. The role of inert gas in preventing the development of atelectasis is discussed. (Author)

**A67-21733**

POST-FLIGHT DISCOMFORT IN AVIATORS - AERO ATELECTASIS.
Elihu York (U.S. Naval Air Development Center, Aerospace Medical Research Dept., Johnsville, Pa.).
Aerospace Medicine, vol. 38, Feb. 1967, p. 192-194. 7 refs.

Description of experiments showing that "aero-atelectasis" or the postflight chest syndrome is most likely to occur in pilots exposed to high G forces, breathing oxygen, and utilizing an anti-G suit. Three jet pilots recently flew high G bank maneuvers, while breathing 100% oxygen and wearing anti-G harnesses, as part of an in-flight project for weapons systems development. As a consequence, on more than one occasion, all three pilots experienced shortness of breath, cough, and aching in the chest - this latter symptom persisted

as long as 3 hr following flight. Pulmonary function study revealed a reduction in vital capacity, immediately following flight, of 20 to 28% as compared to preflight levels outside the aircraft. A partial reversible collapse of lung tissue ("aero-atelectasis") may be the mechanism for the observed finding, which could conceivably contribute to aircraft accidents, if not modified. M.F.

**A67-21734**
POSSIBLE MEDICAL FACTORS CONTRIBUTING TO THE FATAL CRASH OF A RACE PILOT - A CASE REPORT.
Richard G. Snyder and J. Robert Dille (Federal Aviation Agency, Aeronautical Center, Civil Aeromedical Institute, Oklahoma City, Okla.).
Aerospace Medicine, vol. 38, Feb. 1967, p. 195-197. 8 refs.

The fatal crash of an unlimited class aircraft during high-G pylon racing at the 1965 International Air Races at Boulder City, Nevada, raised questions of possible gastrointestinal symptoms and drug use which could have lowered the pilot's G tolerance and his ability to react adequately in an emergency situation. Discussion of the possible effects of sedation, fatigue, and reduced G tolerance due to acute gastroenteritis is presented. It is suggested that this be considered as a possible contributing cause of the accident. (Author)

**A67-21735**
MULTIFOCAL PREMATURE CONTRACTIONS - AN ECG FINDING OF GRAVE SIGNIFICANCE.
Philip R. Akre (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Internal Medicine Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 38, Feb. 1967, p. 197-201.

Evaluation of the cardiovascular system is important in determining an individual's ability to tolerate the stresses of flying. The electrocardiogram is an essential part of the cardiovascular evaluation. A case is presented of a USAF pilot of 19 years whose routine electrocardiogram demonstrated multifocal premature ventricular contractions. This man was thoroughly evaluated at the School of Aerospace Medicine and ultimately removed from flying duties. One year later, this individual expired suddenly as the result of ventricular fibrillation. Autopsy revealed diffuse severe interstitial fibrosis of the left ventricle. The demonstration of multifocal premature ventricular contractions is a grave finding. The frequency of this finding and its significance in flying personnel is discussed. (Author)

**A67-21901** #
GENETIC STUDIES IN SPACE [GENETICHESKIE ISSLEDOVANIIA V KOSMOSE].
G. P. Parfenov.
Kosmicheskie Issledovaniia, vol. 5, Jan.-Feb. 1967, p. 140-155. 150 refs. In Russian.

Review of Soviet and foreign papers on genetic studies in space covering the period from the late twenties through 1965. Discussed specifically are the results of free-balloon, rocket, and satellite experiments with microorganisms, plants, and animals. A brief analysis of these results is given. V.Z.

**A67-21940**
A FIELD EXPERIMENT ON HUMAN RESPONSE TO AIRCRAFT NOISE.
Karl D. Kryter (Stanford Research Institute, Sensory Sciences Research Center, Menlo Park, Calif.).
IN: CONFERENCE ON ACOUSTIC NOISE AND ITS CONTROL, LONDON, ENGLAND, JANUARY 23-27, 1967, PAPERS. [A67-21937 09-23]
Conference sponsored by the Institution of Electrical Engineers, the Institution of Electronic and Radio Engineers, the Institute of Electrical and Electronics Engineers, the Institute of Physics, the Physical Society, and the British Acoustical Society.
London, Institution of Electrical Engineers (IEE Conference Publication No. 26), 1966, p. 38-41. 15 refs.

Discussion of tests carried out to verify methods of predicting (on the basis of physical measurements) the subjective inacceptability of noise levels produced by aircraft. Differences between db(C), db(A), phons (S), PNdb, and db(N) measurements are noted. It is found that db(C), db(A), phons (S), and db(N) are slightly inferior in the prediction of judged noisiness to peak PNdb. V.P.

**A67-21982**
METABOLISM OF DIHYDROXYPHENYLALANINE IN HUMAN SUBJECTS.
P. Smith (Royal Air Force Institute of Aviation Medicine, Farnborough, Hants., England).
Nature, vol. 213, Feb. 25, 1967, p. 802, 803.

Investigation of the metabolism of dihydroxyphenylalanine (DOPA) and some allied compounds in human subjects. Urines collected at intervals of 2 hr before and after oral administration of suitable doses of DOPA (50 to 200 mg) to normal male subjects were examined by paper chromatography. Ingestion of DOPA is found to lead to the excretion of much apparently homogeneous 3-methoxytriamine. A mixture of acids was formed which could not be resolved completely, but which appeared to consist of homovanillic acid heavily contaminated with the isomeric 3-hydroxy-4-methoxy compound. B.B.

**A67-21986**
DESIGN OF THE BRONCHIAL TREE.
Theodore A. Wilson (Minnesota, University, Dept. of Aeronautics and Engineering Mechanics, Minneapolis, Minn.).
Nature, vol. 213, Feb. 18, 1967, p. 668, 669. 6 refs.
Research supported by the U.S. Public Health Service.

Demonstration that the value of tube diameter as a function of the location of the tube in the bronchial tree as reported by Weibel and Gomez is the same as the value for which gas of a given composition can be provided to the alveoli with minimum metabolism or entropy production in the respiratory musculature. The values of the diameters of the tubes making up the bronchial tree which have been calculated from the hypothesis agree with the values observed by Weibel and Gomez. It is concluded, therefore, that the diameters of the conductive air passages of the lung are those for which a given alveolar ventilation can be maintained with minimum entropy production. M.M.

**A67-21990** *
DEAGGREGATION OF CHLOROPHYLL a BY XANTHOPHYLLS.
S. Aronoff (Iowa State University of Science and Technology, Dept. of Biochemistry and Biophysics, Ames, Iowa) and Patricia Kirk (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).
Nature, vol. 213, Feb. 18, 1967, p. 722.
NSF-supported research.

Discussion of the finding that aggregated solutions of chlorophyll a in carbon tetrachloride can be deaggregated by approximately equimolar amounts of leaf xanthophylls, but not by carotenes. The deaggregation shows itself spectroscopically by loss of the shoulder band on the red side of the red absorption band and an increase in intensity of the latter, together with a shift from 668 to 665 nm. The corresponding spectra for $\beta$-carotene show no change over two orders of magnitude of concentration, the strongest having a carotene/chlorophyll ratio of approximately 2. M.M.

**A67-21991** *
RESPONSE OF FUNGI TO DIURNAL TEMPERATURE EXTREMES.
Charles R. Curtis (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).
Nature, vol. 213, Feb. 18, 1967, p. 738, 739. 6 refs.

Description of the results of a preliminary investigation of the response of various fungi to diurnal temperature extremes of -94 and 23 ± 2°C. The fungi were grown on malt agar (BBL), and two or four agar disks 10 mm in diameter were transferred to Petri dishes containing a sterilized soil mix. In those species of fungi that survived the exposure to diurnal temperature extremes but did not grow, growth on the agar plug may have occurred but was so

limited that it was not detected. Data indicated, however, that certain fungi were able to survive and produce limited mycelial growth when exposed to simulated Martian diurnal temperature extremes. Although most of the hyphae and spores were probably killed after the first few cycles, resistant portions apparently succeeded in growing and adapting to this temperature regime. M.M.

**A67-22015** *

EXTRATERRESTRIAL LIFE DETECTION BASED ON OXYGEN ISOTOPE EXCHANGE REACTIONS.

Bessel Kok and Joseph E. Varner (Martin Marietta Corp., Martin Co., Research Institute for Advanced Studies, Baltimore, Md.).

Science, vol. 155, Mar. 3, 1967, p. 1110-1112. 11 refs.
Contract No. NASw-747.

A method is described for detecting extraterrestrial life, based on catalysis of isotopic oxygen exchange between water and oxygen-containing anions such as phosphate, nitrate, or sulfate. This catalytic activity appears to be unique to living systems. Its applicability requires very few assumptions concerning the chemical nature of "life." Data obtained so far indicate that the experiment is sound and technically feasible. (Author)

**A67-22056** #

PSYCHOLOGY AND SPACE FLIGHT [PSYCHOLOGIE UND WELTRAUMFAHRT].

Hans-Konrad Remane.

Astronomie und Raumfahrt, no. 6, 1966, p. 174-184. 5 refs. In German.

Discussion of the principal aspects of human engineering, with particular reference to a man-spaceship system and to the psychological aspects of the collaboration of astronauts in the conditions of a space mission. The interaction between astronaut and spaceship is analyzed, together with the effect of "walking in space" on the astronaut. The rate of information processing of which an astronaut is capable and the most acceptable form of information coding are assessed; the processes associated with the reception and storage of information and the buildup of a decision by the astronaut are analyzed. V.P.

**A67-22058** *

IMMEDIATE AND SUBSEQUENT EFFECTS OF BRAIN DAMAGE IN RATS.

Roger K. Thomas, Jr. (Georgia, University, Athens, Ga.).

Journal of Comparative and Physiological Psychology, vol. 62, no. 3, 1966, p. 472-475. 11 refs.
Research supported by the University of Georgia; Grant No. NsG(T)-125.

Small bilateral, parietal lesions were made in 16 rats, and their performances were compared to sham-operated (N = 6) and normal (N = 6) control subjects on "closed-field intelligence test" problems using a repeated-measures design. An immediate deficit was observed in experimental subjects as compared to controls ($p < .025$). Complete recovery in performance of all experimental subjects was seen 1 week postoperatively. The results contradicted a previous investigation in which delayed deficits were reported in similarly lesioned subjects under comparable conditions of behavioral testing. (Author)

**A67-22290**

HUMAN FACTORS ENGINEERING IN REENTRY SYSTEM DESIGN.

W. P. Woodcock, H. L. Gilmore, and G. R. Hatterick (Avco Corp., Missile Systems Div., Wilmington, Mass.).

IN: 1967 ANNUAL SYMPOSIUM ON RELIABILITY, WASHINGTON, D.C., JANUARY 10-12, 1967, PROCEEDINGS. [A67-22286 09-34]
Symposium sponsored by the Institute of Electrical and Electronics Engineers, the Institute of Environmental Sciences, the Society for Nondestructive Testing, and the American Society for Quality Control.
New York, Institute of Electrical and Electronics Engineers, Inc., 1967, p. 137-147.

Discussion of the application of human-factors engineering to Minuteman reentry vehicle airborne and ground support equipment which both influences and is affected by system philosophy. Any system of this complexity has shortcomings. These limitations and the reasons for them are pointed out because significant breakthroughs are required to further improve system performance and/or costs. Consideration of human factors reduces subsequent human errors while contributing to increased reliability and safety from conceptual design through the operational environment in the field. Specific types of approaches, problems, and solutions are discussed. M.M.

**A67-22369** #

BAYESIAN ASPECTS OF TROUBLE SHOOTING BEHAVIOR.

Nicholas A. Bond, Jr. (Sacramento State College, Sacramento, Calif.) and Joseph W. Rigney (Southern California, University, Electronics Personnel Research Group, Los Angeles, Calif.).

Human Factors, vol. 8, Oct. 1966, p. 377-383.
Contract No. Nonr-228(22).

Analysis showing the degree to which a Bayesian computer program can simulate certain critical behaviors in the trouble-shooting process. Thirty-nine Navy technician trainees filled out a symptom-malfunction matrix on a blocking oscillator circuit. The technicians then attempted to solve six troubleshooting problems in the same oscillator circuit. The particular sequence of checks used by each man on each problem was combined with his symptom-malfunction matrix, via a Bayesian algorithm, to yield computer estimates of failure likelihoods for each component. The computer program predicted actual parts-replacement behavior in about half of the cases. Those technicians who start out with valid symptom-malfunction matrices are more likely to resemble the Bayesian processor. M.F.

**A67-22370**

THE MOTION OF THE HUMAN CENTER OF MASS AND ITS RELATIONSHIP TO MECHANICAL IMPEDANCE.

Edmund B. Weis, Jr. (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio) and Frank P. Primiano, Jr. (Technology, Inc., Dayton, Ohio).

Human Factors, vol. 8, Oct. 1966, p. 399-405. 6 refs.

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

**A67-22371**

THE FEASIBILITY OF A HELMET-MOUNTED SIGHT AS A CONTROL DEVICE.

Robert M. Nicholson (Honeywell, Inc., Systems and Research Div., Minneapolis, Minn.).

Human Factors, vol. 8, Oct. 1966, p. 417-425.

The purpose of the research was to investigate the practicality of a helmet-mounted sight as an operational element in a quick-reaction bore-sighting system. A three-phase experimental program was conducted to determine the human capabilities with the helmet-mounted sight. In a laboratory environment sighting accuracies were obtained on both static and moving targets. Field test data were obtained during high-speed, low-altitude flights. The series of tests indicated that the accuracy of the sighting process can be expected to vary between a fraction of a degree and four degrees depending on target angular rate and the target sighting angle. (Author)

**A67-22372**
EFFECTS OF DISPLAY MAGNIFICATION, PROPRIOCEPTIVE CUES, CONTROL DYNAMICS AND TRAJECTORY CHARACTERISTICS ON COMPENSATORY TRACKING PERFORMANCE.
Russell L. Smith, David R. Garfinkle, Hilde Groth, and John Lyman (California, University, Los Angeles, Calif.).
Human Factors, vol. 8, Oct. 1966, p. 427-434. 17 refs.
Contract No. N-123(60530)-23558A.

An experiment was performed on the NOTS-UCLA heavy inertia tracking simulator to assess effects of display magnification, proprioceptive cues, displacement aiding, trajectory characteristics and trajectory direction on tracking performance. Particular attention was paid to interactions among these variables. The results showed that: (1) 5 x magnification significantly decreased tracking error compared to tracking without magnification; (2) proprioceptive cues related to both azimuth and elevation significantly improved performance; (3) velocity plus displacement-aiding control dynamics (time constant = 0.1 sec) produced significantly lower error scores than unaided velocity control dynamics (time constant = 0.0 sec); (4) since no crossover tendencies were found, the effects of the variables appear to be independent. (Author)

**A67-22374** *
DELAYED FORCE FEEDBACK.
William R. Ferrell (Massachusetts Institute of Technology, Cambridge, Mass.).
(Human Factors Society, Metropolitan Chapter, Annual Meeting, New York University, New York, N.Y., June 12, 1965, Paper.)
Human Factors, vol. 8, Oct. 1966, p. 449-455.
Grant No. NsG-107-61.

Observation that, in master-slave manipulators, forces encountered by the remote hand are transmitted back to the operator. At very great distances there will be a transmission delay between an operator's movement and a resulting force. Investigation was made of the effect of long delays and differences in strategy on positioning time with force feedback alone. Positioning could be accomplished, but delay coupled with high loop gain creates serious instability. Experimental results suggest that alternative displays of the feedback force can overcome the stability problem. M.F.

**A67-22375**
CUTANEOUS SENSITIVITY COMMUNICATIONS.
John R. Hennessy (U.S. Army, Electronics Command, Avionics Laboratory, Fort Monmouth, N.J.).
(Human Factors Society, Metropolitan Chapter, Annual Meeting, New York University, New York, N.Y., June 12, 1965, Paper.)
Human Factors, vol. 8, Oct. 1966, p. 463-469. 11 refs.

Discussion of the general and specific problems facing emergence of cutaneous sensitivity devices into a useful subsystem of communications systems. Cutaneous communications subsystems are viewed as being immediately useful in low-density information situations, requiring limited alphabets, such as for warning and alerting signals. They are probably useful for high-density information situations, such as the passing of message traffic. Cutaneous sensitivity devices are also emerging in applications for the solutions of corollary problems of psychology, neurology, and bio-electronics. Transduction of electrical energy into living systems is only beginning to be understood. When suitable hardware is designed to match the nerve impulse and neuronal channels, the safety and user acceptability of cutaneous subsystems will enhance the reliability of modern communications under extremes of environment and provide an independent channel for the sensorially deprived. M.F.

**A67-22384** #
SOME REACTIONS OF THE CARDIOVASCULAR AND RESPIRATORY SYSTEMS OF COSMONAUTS DURING THE VOSKHOD-2 ORBITAL FLIGHT [NEKOTORYE REAKTSII SERDECHNO-SOSUDISTOI I DYKHATEL'NOI SISTEM KOSMONAVTOV V ORBITAL'NOM POLETE NA KOSMICHESKOM KORABLE "VOSKHOD-2"].
I. I. Kas'ian, P. V. Vasil'ev, D. G. Maksimov, I. T. Akulinichev, A. E. Uglov, A. E. Baikov, and N. A. Chekhonadskii.
Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, vol. 32, Jan.-Feb. 1967, p. 104-115. 9 refs. In Russian.

Results of an examination of the cardiovascular and respiratory reactions of the cosmonauts Beliaev and Leonov during the Voskhod-2 orbital flight, showing no sharp changes in the functioning of these systems. Temporary strains - primarily of emotional nature - were more pronounced in both cosmonauts during Leonov's exit and space walk, but the performance of both cosmonauts remained essentially unimpaired during the flight. V.Z.

**A67-22459** #
SOME FUNDAMENTAL PROBLEMS OF MEASUREMENT AND CONTROL METHODS IN THE AIRCRAFT-INSTRUMENT-PILOT LOOP [NĚKTERÉ ZÁKLADNÍ PROBLÉMY MĚŘICÍ A ŘÍDICÍ TECHNIKY VE SMYČCE LETOUN-PŘÍSTROJ-PILOT].
Theodor Duda.
(Měřicí a Výpočetní Metody při Zkouškách Letadel, Vědecká Konference, Prague, Czechoslovakia, Apr. 26, 27, 1966, Paper.)
Zpravodaj VZLÚ, no. 3, 1966, p. 67-69. In Czech.

Consideration of the complex problem of measurement and control of aircraft fundamental parameters where, in the closed aircraft-instrument-pilot loop, the possibilities of automation and of computer application are finally limited by the human organism. It is shown how to adapt, by means of a computer, the indications of the instruments in a way more suitable for the transmission function of the operator in the closed loop. Some fundamental problems of modern instrumentation techniques are discussed. F.R.L.

**A67-22461** #
IN-FLIGHT MONITORING OF PILOTS BY TELEMETRY [RADIOTELEMETRICKÉ MĚŘENÍ PILOTŮ ZA LETU].
Jan Hospodář.
(Měřicí a Výpočetní Metody při Zkouškách Letadel, Vědecká Konference, Prague, Czechoslovakia, Apr. 26, 27, 1966, Paper.)
Zpravodaj VZLÚ, no. 3, 1966, p. 75-79. 16 refs. In Czech.

Use of a telemetry method to make it possible to use standard radio equipment to measure physiological parameters during flight without altering the design of fighters and other aircraft. To monitor physiological parameters, characterized by activity potentials, a suitable system of electrodes is used. Variations in respiration level, hemodynamics, metabolism, etc., are monitored indirectly and converted into electrical signals by means of convenient sensors. F.R.L.

**A67-22493** * #
LANDING TASK AND PILOT ACCEPTANCE OF DISPLAYS.
R. A. Behan and F. A. Siciliani (Serendipity Associates, Chatsworth, Calif.).
(American Institute of Aeronautics and Astronautics, Royal Aeronautical Society, and Japan Society for Aeronautical and Space Sciences, Aircraft Design and Technology Meeting, Los Angeles, Calif., Nov. 15-18, 1965, Paper 65-722.)
Journal of Aircraft, vol. 4, Mar.-Apr. 1967, p. 141-145. 11 refs.
Contract No. NAS 2-1346.
[For abstract see issue 03, page 328, Accession no. A66-12579]

**A67-22905**
SOME BASIC CONSIDERATIONS ON ELECTRONIC DISPLAYS FOR AIRCRAFT.
A. G. Barnes (British Aircraft Corp., Ltd., Warton, Lancs., England).
Interavia, vol. 22, Mar. 1967, p. 403-405.

Description of two aircraft electronic displays that consider only the basic elements necessary for flight path control. The particular features of each display are analyzed. Because of the basic simplicity of the presentation, the displays incorporate many symbols. Extensive experience of one of the two displays on the Warton flight simulator has shown that there is no need for an aiming mark. For tasks which culminate in visual pickup of an external object, such as the runway, it is convenient to fly the display so that the lead aircraft does not occupy the critical area

of the windshield. This implies flying below and line-astern of the lead aircraft. M. M.

**A67-22928** *

PREVENTION OF PROTEIN DENATURATION DURING EXPOSURE TO STERILIZATION TEMPERATURES.

Emmett W. Chappelle, Edward Rich, Jr., and Norman H. MacLeod (NASA, Goddard Space Flight Center, Greenbelt, Md.).

Science, vol. 155, Mar. 10, 1967, p. 1287, 1288.

Outline of preliminary experiments which indicate a possible solution to the problem of sterilizing components by dry heat (135°C) in planetary experiments concerned with systems in which enzymes are used for the detection of life. Firefly luciferase exposed to a dry heat (135°C) for 36 hr retained up to 40% of its original activity. Prerequisites for heat stability of the luciferase were a vacuum of $5 \times 10^{-4}$ mm/Hg and the use of a molecular sieve. It is claimed that these studies present a possible solution to the problem of sterilization for exobiological experiments. B.B.

**A67-23312**

PHONEMIC ANALYSIS OF CONSONANTS IN HELIUM SPEECH.

Russell L. Sergeant (U.S. Naval Submarine Medical Center, Medical Research Div., Audio Branch, Submarine Base, Groton, Conn.).

(American Speech and Hearing Association, Annual Convention, San Francisco, Calif., Nov. 21-24, 1964, Paper.)
Acoustical Society of America, Journal, vol. 41, Jan. 1967, p. 66-69. 12 refs.

Evaluation of the phonemic characteristics of speech produced while breathing a mixture of 80% helium and 20% oxygen. A phonemic-confusion matrix for helium speech is formulated, and comparisons are made of the intelligibilities of helium speech and normal speech according to several phonemic-classification systems. It is concluded that frequency changes caused by breathing helium interfere with ranked intelligibilities of specific consonants, but general patterns of response according to phonemic classification are not noticeably affected. M. F.

**A67-23313**

TECHNIQUE FOR CORRECTING HELIUM SPEECH DISTORTION.

W. R. Stover (HRB-Singer, Inc., Behavioristics Laboratory, State College, Pa.).

Acoustical Society of America, Journal, vol. 41, Jan. 1967, p. 70-74. 6 refs.

Some qualitative data on the nature of the speech distortion caused by respiration of a helium-oxygen atmosphere are presented. Previous corrective-processing techniques are discussed, and an advanced technique that overcomes their disadvantages is described. The experimental system is based upon time-domain speech-processing methods and is capable of retaining the natural pitch rate of the speaker's voice while correcting the formant shifts caused by the helium-rich atmosphere. This system uses digital-processing methods and is capable of operating on continuous speech in on-line applications. It promises a practical solution to the problem of providing normal voice communication in a helium environment. (Author)

**A67-23328**

HAZARDS OF LASER RADIATION - MECHANISMS, CONTROL AND MANAGEMENT.

Martin S. Litwin (U.S. Veterans Administration Hospital, West Roxbury; Northeastern University; Harvard University, Harvard Medical School, Boston, Mass.), Samuel Fine, Harold Raemer (Northeastern University, Boston, Mass.), Edmund Klein (Roswell Park Memorial Institute, Buffalo, N. Y.), and Ben S. Fine (U.S. Armed Forces Institute of Pathology; George Washington University, Washington, D.C.).

American Industrial Hygiene Association, Journal, vol. 28, Jan.-Feb. 1967, p. 68-75. 10 refs.
U.S. Public Health Service Grant No. RH 00361-01-RAD; Contracts No. DA-49-193-MD-2436; No. DA-49-193-MD-2437; No. DA-49-193-MD-2680; No. AF 29(600)-5136.

Analysis of biological studies indicates the factors responsible for hazards associated with laser systems: (1) the laser radiation and its interaction with the biological system, (2) the pumping source, (3) the high voltage and current required for operation of a laser system and, (4) the environment in which this system is used. Short-term and long-term hazards associated with the beam are dependent on the properties of the radiation and those of the biological system. Hazards associated with flashtubes must be considered, particularly since misfire or accidental firing can occur. Long-term effects on the eyes due to either a single insult or to cumulative subthreshold insults are not yet known but continue to present a potential hazard. Hazards to the skin must also not be neglected in continued testing. (Author)

**A67-23348** *

FACTORS INFLUENCING THE RECOVERY OF VIABLE MICRO-ORGANISMS FROM SURFACES.

John R. Puleo, Martin S. Favero, and Gerald J. Twitz (U.S. Public Health Service, Communicable Disease Center, Technology Branch, Phoenix, Ariz.).

American Association for Contamination Control, Annual Technical Meeting and Exhibit, 5th, Houston, Tex., Mar. 29-Apr. 1, 1966, Paper V-12. 6 p. 10 refs.

NASA Contract No. R-137.

Evaluation of the procedures for enumerating microbial contamination on various types of surfaces. Three methods of so doing are compared - namely, mechanical agitation in a fluid menstruum, ultrasonication, and direct plating. In addition, a study is made of inoculated surfaces subjected to short dry-heat treatments in order to determine their effect on the removal of surviving micro-organisms. A. B. K.

**A67-23392** *

CARDIAC OUTPUT IN MAN IN REST AND WORK DURING AND AFTER ACCLIMATIZATION TO 3,800 M.

K. Klausen (Indiana University, Dept. of Anatomy and Physiology, Bloomington, Ind.).

Journal of Applied Physiology, vol. 21, Mar. 1966, p. 609-616. 30 refs.
U.S. Public Health Service Grants No. CD-00056-02; No. HE-06-308-04; Grant No. NsG-408.

Cardiac output ($\dot{Q}$) during rest and work was determined by a $CO_2$ method at an altitude of 3800 m. The change of $\dot{Q}$ was followed on three subjects during the first 8 to 12 days at altitude, and in rest and two work levels in five subjects after 3 to 4 weeks of acclimatization. $\dot{Q}$ was increased on the first day at 3800 m to a maximum in two young subjects, and decreased the following days to values slightly lower than at sea level. In the old subject no change of $\dot{Q}$ was found in rest while in work a slow increase was seen the first 3 days to a plateau, which was maintained until the last day at 3800 m. After 3 to 4 weeks of acclimatization it was found that $\dot{Q}$ was slightly below its sea level values both in rest and at the two work levels. The change of $\dot{Q}$ is discussed in relation to changes in other circulatory functions and in blood characteristics. (Author)

**A67-23393** *

EFFECT OF HIGH ALTITUDE ON MAXIMAL WORKING CAPACITY.

K. Klausen, S. Robinson, E. D. Micahel, and L. G. Myhre (Indiana University, Dept. of Anatomy and Physiology, Bloomington, Ind.).

Journal of Applied Physiology, vol. 21, July 1966, p. 1191-1194. 17 refs.
U.S. Public Health Service Grants No. AE-06-308-04; No. CD-00056-02; Grant No. NsG-408.

Maximal work capacity was measured on five subjects before, during and after a 5-week sojourn at an altitude of 3800 m. A modification of the Balke test was used having the subjects riding a bicycle ergometer to complete exhaustion. On the first day at high altitude it was found that maximal values of $O_2$ uptake, ventilation (STPD), heart rate, and respiratory exchange ratio, obtained during the last minute of work, were lower than at sea level. During the following 5 weeks at 3800 m a further decrease of the maximal heart rate was seen and increases in the average maximal values of ventilation at STPD (14%), $O_2$ consumption (4%), blood lactate (12%), and work

capacity on the ergometer (7%) were observed. Maximal values of $O_2$ uptake, ventilation, blood lactate, and work capacity were significantly higher upon return to sea level than in the control experiments before ascending to 3800 m. This increase in maximal work performance is explained as the combined result of the stay at high altitude and the increased physical activity during the stay at high altitude. (Author)

**A67-23394** *

BLOCKAGE OF PUPILLODILATION WITH CYCLOTRON-ACCELERATED ALPHA PARTICLES.

C. T. Gaffey (California, University, Lawrence Radiation Laboratory, Donner Laboratory of Medical Physics and Biophysics, Berkeley, Calif.).

Acta Radiologica - Therapy, Physics, Biology, vol. 5, 1966, p. 105-117. 36 refs.

AEC-sponsored research; NASA Contract No. R-104(2).

Experimental investigation in which contact with the pupillodilation center was made by inserting bipolar electrodes through burr holes in the skull of cats. Electrical stimulation of the pupillodilation center was made through the head socket of alert cats and the center of the cat's brain was irradiated by a crossfire technique. Since the implanted electrode was in the center of the irradiated volume, the time-course for the blockage of pupillodilation could be studied as a function of the delivered dose of alpha particles. It was found that the action of electrical stimulation on the pupillodilation center could be inhibited immediately and irreversibly by 100,000 rad. Below 8000 rad there was no detectable effect. With doses less than 32,000 rad the threshold voltage to produce pupillodilation followed a biphasic pattern. M.M.

**A67-23397** *

PROPERTIES OF THE INDUCED ACID PHOSPHATASE AND OF THE CONSTITUTIVE ACID PHOSPHATASE OF EUGLENA.

A. Bennun and J. J. Blum (Duke University, Medical School, Dept. of Physiology, Durham, N.C.).

Biochimica et Biophysica Acta, vol. 128, 1966, p. 106-123. 15 refs.

NSF Grant No. GB-2788; Grant No. NGR-34-001-005.

Account of how the induced acid phosphatase of Euglena gracilis has been made soluble and partially purified. The enzyme is competitively inhibited by arsenate and phosphate, but exhibits mixed competitive-non-competitive inhibition with molybdate. The enzyme migrates towards the cathode when electrophoresis is performed on cellulose acetate strips at pH 8.2. Euglena also contains several other acid phosphatases. The two major constitutive acid phosphatases, which remain particle-bound after a variety of extraction procedures, differ in their thermal stability from each other and from the induced phosphatase. M.M.

**A67-23416** *

REPRODUCTION AND GROWTH OF MICE AND RATS UNDER CONDITIONS OF SIMULATED INCREASED GRAVITY.

Jiro Oyama and William T. Platt (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.).

American Journal of Physiology, vol. 212, Jan. 1967, p. 164-166. 7 refs.

Mating studies were performed on rats and mice subjected to chronic centrifugation at various g loads. Rats conceived and delivered viable pups at 2.5 and 3.6 g but not at 4.7 g. Newborn pups, however, survived only when they were removed intermittently from the centrifuge during the first several weeks of exposure. Newborn mice, in contrast, exposed continuously to 2.5 g from birth were able to survive and grow. Growth rates of animals born and reared on the centrifuge were lower than those of controls. Measurements were made of changes in food and water consumption and body mass of rats born at and adapted to 2.5 g when shifted to 3.6 g or returned to normal gravity. A transient increase in food and water consumption of animals returned to normal gravity was the only significant change observed. Results of this study show that rats and mice can reproduce under conditions of simulated increased gravity. Compared to rats, newborn mice are better able to tolerate increased gravity. Animals born and reared in an increased gravitational environment appear normal in all respects except for a relatively smaller body mass. (Author)

**A67-23579** *

PLANETARY CONTAMINATION. I.

N. H. Horowitz (California Institute of Technology, Jet Propulsion Laboratory, Bioscience Section, Pasadena, Calif.), R. P. Sharp (California Institute of Technology, Pasadena, Calif.), and R. W. Davies (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).

Science, vol. 155, Mar. 24, 1967, p. 1501-1505. 58 refs.

Reassessment of the COSPAR recommendations concerning planetary quarantine and spacecraft sterilization, with particular regard to the Martian environment. It is shown that when the physical and biological assumptions underlying the COSPAR recommendations are compared with actual conditions on Mars it becomes apparent that the COSPAR assumptions are unrealistic in important respects. Specifically, the belief that eolian erosion on Mars can effect the release of spores trapped in the interior of solids in periods of time that are short compared with the time scale of the unmanned space program is unsupported by either observation or theory, analysis suggesting, on the contrary, that rates of eolian erosion on Mars are very low. Similarly, present knowledge of the Martin environment opposes the view that terrestrial micro-organisms would readily contaminate the planet. It is therefore suggested that the COSPAR-recommended constraints could be substantially relaxed without compromising to any significant degree the biological condition of Mars. A.B.K.

**A67-23580** *

PLANETARY CONTAMINATION. II.

Bruce C. Murray (California Institute of Technology, Pasadena, Calif.), Merton E. Davies (RAND Corp., Santa Monica, Calif.), and Philip K. Eckman (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).

Science, vol. 155, Mar. 24, 1967, p. 1505-1511. 23 refs.

Comparison of Russian and American practices and policies regarding planetary contamination. It is shown that policies of the two countries differ completely, the U.S. continuing a strict interpretation of the COSPAR agreement, while the USSR has adopted less stringent measures. It is concluded that Soviet practice has already led to the transfer to Venus, and probably to Mars, of a considerable number of viable terrestrial micro-organisms and that therefore both the COSPAR recommendations and current U.S. planetary quarantine policy should be reviewed and modified to reflect the probability of such a transfer. A.B.K.

**A67-23581** *

SINGLE FIBERS OF CAT OPTIC NERVE - "THRESHOLDS" TO LIGHT.

Wolf-Dieter Heiss (Vienna, University, Dept. of General and Comparative Physiology, Vienna, Austria) and David C. Milne (Massachusetts Institute of Technology, Research Laboratory of Electronics, Center for Communication Sciences, Cambridge, Mass.).

Science, vol. 155, Mar. 24, 1967, p. 1571, 1572. 7 refs.

National Institutes of Health Grant No. MH-04737-06; NSF Grant No. GK-835; Contract No. DA-36-039-AMC-03200(E); Grant No. NsG-496.

Absolute thresholds of 39 single fibers of the optic nerves of 20 cats were determined by inspection of post-stimulus time histograms, each computed from the responses to 60 to 100 identical flashes of white light. The values found - from $1.1 \times 10^{-7}$ to $6.8 \times 10^{-6}$ candella/$m^2$ (nits) - agree well with psychophysical thresholds found in previous investigations. (Author)

**A67-23626** *

ON THE NATURE OF MIXED CULTURES OF CHLORELLA PYRENOIDOSA TX 71105 AND VARIOUS BACTERIA.

G. R. Vela and Cleste N. Guerra (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).

Journal of General Microbiology, vol. 42, 1966, p. 123-131. 18 refs.

USAF-NASA-supported research.

The growth of several selected micro-organisms in rapidly dividing cultures of Chlorella pyrenoidosa TX 71105 was studied. Bacterial proliferation was a function of algal growth and bacterial growth occurred, at least in part, as a result of the excretion of organic substances into the culture medium by rapidly dividing algae. These substances capable of supporting bacterial oxidation and growth were varied in kind and were utilized selectively by the different bacteria. Only a small fraction of the soil and air bacteria grew in the algal cultures. The majority of soil and air bacteria survived in mixed culture for several days but did not increase in numbers. On the other hand, 6 out of 8 bacteria pathogenic for man died promptly in cultures of Chlorella pyrenoidosa; but Salmonella typhi and S. paratyphi grew well for extended periods of time. Fungi capable of producing macrocolonies on potato glucos agar at pH 3.5 did not increase in numbers during 8 days. Yeasts and actinomycetes were not detected by the methods used; bacteriophages were observed with some regularity. (Author)

**A67-23627** *

CHRONIC INTRAVASCULAR CATHETERIZATION - A TECHNIQUE FOR IMPLANTING AND MAINTAINING ARTERIAL AND VENOUS CATHETERS IN LABORATORY PRIMATES.

N. J. Barnstein, R. S. Gilfillan, N. Pace, and D. F. Rahlmann (California, University, Dept. of Physiology-Anatomy, Berkeley, Calif.).

Journal of Surgical Research, vol. 6, Dec. 1966, p. 511-521. 15 refs
Grant No. NsG-513.

Description of a transthoracic surgical technique for implanting and maintaining patent polyvinyl catheters for more than a year in the vascular system of the monkey. The results of implantation of these catheters in: (1) the superior vena cava via the azygos vein, (2) the thoracic aorta via the left subclavian artery, (3) the left pulmonary artery, and (4) the left atrium are cited. A. B. K.

**A67-23810**

SOME EFFECTS OF GRAVITATIONAL AND INERTIAL FORCES ON THE CARDIOPULMONARY SYSTEM.

Earl H. Wood (Mayo Clinic and Mayo Foundation, Section of Physiology, Rochester, Minn.).

(Aerospace Medical Association, Annual Scientific Meeting, 37th, Las Vegas, Nev., Apr. 18-21, 1966, Paper.)
Aerospace Medicine, vol. 38, Mar. 1967, p. 225-233. 15 refs.

Discussion of the effects of backward, forward, and transverse acceleration on the cardiopulmonary systems of men and dogs. The effects of forward acceleration on intrathoracic pressures and of "force environment" on mean pressures in pulmonary circulation are shown in diagrams. It is concluded that the lungs are man's most vulnerable organs with respect to his capability to withstand high acceleration levels. B. B.

**A67-23811** #

EFFECT OF HEAT STRESS UPON HUMAN RENAL FUNCTION.

Neil Abramson, Thomas E. Piemme, and William C. Kaufman (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

Aerospace Medicine, vol. 38, Mar. 1967, p. 234-238. 21 refs.

Six resting subjects were exposed on separate occasions to 27°C (8-14 mm Hg $P_{H2O}$), 46°C (8-13 mm. Hg $P_{H2O}$) and 55°C (4-8 mm Hg $P_{H2O}$) for 3 hr. Measurements were made of glomerular filtration rate (GFR), renal plasma flow (RPF), free water clearance ($C_{H2O}$), and electrolyte excretion. In a second study, spironolactone, an aldosterone-antagonist, was administered prior to 27°C and 46° exposures and renal function was again measured. Acute heat stress oliguria was confirmed. GFR was unchanged while RPF was significantly reduced at both 46°C and 55°C. Osmolar clearance and sodium excretion decreased. Free water was retained but not in excess of that which occurred at room temperature under minimal dehydration. Heat-induced oliguria primarily reflects the retention of sodium. In view of an unchanged GFR, this suggests the activity of aldosterone; however, the oliguria was not completely blocked with the aldosterone-antagonist. Thus, a change in GFR undetected by present clearance methods may be important. An initiating or additional factor may be the reduction in renal blood flow. Free water retention was not of major significance. That this should be the case in view of demonstrable increases in blood ADH is unexplained. (Author)

**A67-23812** #

EFFECT OF MONOMETHYLHYDRAZINE ON METHEMOGLOBIN PRODUCTION IN VITRO AND IN VIVO.

Sidney R. Fortney and Dale A. Clark (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiological Chemistry Section, Brooks AFB, Tex.).

Aerospace Medicine, vol. 38, Mar. 1967, p. 239-242. 6 refs.

In anesthetized dogs, 1 hr after intravenous injection of 0.54 mmoles/kg monomethylhydrazine (MMH), the blood methemoglobin level was greater than 30% of total hemoglobin; it thereafter decreased slowly. Methemaglobin was also produced from oxyhemoglobin in vitro with either whole blood or purified oxyhemoglobin preparation. Incubation of hemoglobin with higher levels of MMH produced a compound different from methemoglobin or oxyhemoglobin, having absorption peaks at 1005, 570, 542, and 438 mμ. Comparison of the effects of several hydrazine derivatives showed that MMH is the most toxic on a molar basis and is the most active in producing methemoglobin. However, MMH is less active than hydrazine in causing glycogen depletion, hypoglycemia, or lactate elevation. (Author)

**A67-23813** #

CUMULATIVE EFFECTS OF VENESECTION AND LOWER BODY NEGATIVE PRESSURE.

Raymond H. Murray, Loren D. Carlson, John A. Bowers (Indiana University, Cardiopulmonary Laboratory, Bloomington, Ind.; Kentucky, University, Medical Center, Dept. of Physiology and Biophysics, Lexington, Ky.; USAF, Office of Aerospace Research, Aerospace Research Laboratories, Wright-Patterson AFB, Ohio), and John Krog (Oslo, University, Dept. of Zoophysiology, Oslo, Norway).

Aerospace Medicine, vol. 38, Mar. 1967, p. 243-247. 46 refs.
Contracts No. AF 33(616)-8378; No. AF 33(615)-3311.

Study of the cumulative effects of venesection and lower-body negative pressure (LBNP) on the circulation. During each preliminary exposure of the human male subjects to LBNP, heart rate rose 14 beats/min and pulse pressure fell 7 to 15 mm. Forearm volume fell continuously over the course of both exposures on the test day; forearm blood flow varied directly and calf volume indirectly with chamber pressure. Estimated total plasma volume fell approximately 10%. All control values returned to near control levels within 30 min following completion of the exposures. B. B.

**A67-23814** *

PHAGOCYTIC ACTIVITY AND HEPATIC FUNCTION FOLLOWING LOCALIZED PROTON RADIATION TO THE LIVER.

Gustav Paumgartner, Jacques Longueville, and Carroll M. Leevy (New Jersey College of Medicine and Dentistry, Div. of Hepatic Metabolism and Nutrition, Jersey City; Veterans Administration Hospital, East Orange, N.J.).

Aerospace Medicine, vol. 38, Mar. 1967, p. 248-251. 26 refs.
National Institutes of Health Grant No. TI AM 5236-06; Grant No. NsG-594-31-02-002.

Adult Sprague Dawley rats were given proton radiation to an area of the liver (18 mm in diameter) and serial studies of colloidal carbon and indocyanine green clearance conducted to determine the effects of localized radiation on phagocytic activity and liver cell function, respectively. Neither low dose radiation (520 r) which produced only subcellular alterations, moderate dose radiation (12,500 r) which produced focal necrosis, nor high dose radiation (25,000 r) which produced autolytic necrosis altered the phagocytic index although there was an increase in DNA synthesis in mesenchymal cells following tissue injury. A significant reduction in indocyanine green clearance was noted in both animals receiving low and high dose radiation. These observations indicate studies of ICG removal rate may be useful in detecting minimal radiation injury to the liver and in following the course of tissue repair in more severe damage. (Author)

**A67-23815**
MICROWAVE RADIATION AND ITS EFFECT ON RESPONSE TO X-RADIATION.
R. A. E. Thomson, Sol M. Michaelson, and Joe W. Howland (Rochester, University, School of Medicine and Dentistry, Dept. of Radiation Biology and Biophysics, Rochester, N.Y.).
Aerospace Medicine, vol. 38, Mar. 1967, p. 252-255. 7 refs.
AEC Contract No. W-7401-eng-49; Contract No. AF 30(602)-224.

Dogs were exposed to simultaneous microwave (2800 Mc, 100 mw/cm$^2$) and X-ray (250 KVP, 1656 R, 4.6 R/min) exposure, or to the same X-ray exposure nine months after a total of 90 hr of multiple microwave exposure. Mortality was greater in animals treated with microwaves, and was most marked following simultaneous microwave and X-irradiation. Deaths were hemopoietic in nature. Survival appeared best in dogs showing minimal leukocyte and neutrophil changes immediately after X-irradiation. Hematocrit, erythrocyte sedimentation rate, reticulocyte, rectal temperature, body weight, food and water consumption changes are presented. Microwave treatment can modify the response to X-irradiation, and its effect appears related to the total microwave exposure, duration of microwave exposure, rectal temperature response, time interval before X-irradiation, total X-irradiation and X-ray dose rate. Modification of ionizing radiation injury at the hematopoietic level is indicated. (Author)

**A67-23816** #
SOME EFFECTS OF MACROFRACTIONATED GAMMA RAY IRRADIATION UPON THE RHESUS PRIMATE.
George S. Melville, Jr., George W. Harrison, Jr., Arnold A. McDowell, James F. Wright, W. Lynn Brown, and Gerrit L. Hekhuis (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB; Texas, University, Radiobiological Laboratory, Austin, Tex.).
Aerospace Medicine, vol. 38, Mar. 1967, p. 256-267. 18 refs.
Contract No. AF 41(609)-2005.

The study explores the effect of graded doses of gamma radiation delivered at intervals postulated to allow recovery from transient effects. Accumulated doses of 200 r up to 1000 r were delivered to 36 Macaca mulatta monkeys during a period estimated to be ten "monkey years" (1200 days). No changes due to chronic radiation were noted for hematology but a challenge dose of radiation to two of the lowest radiation dose groups near the end of the schedule caused a depression in total white blood cells and platelets. The principal early effect of the chronic radiation exposure was observed for behavioral measures. Chronic gastrointestinal disturbances were manifested about one year postexposure, especially in the higher dose groups. Pathologic examination shows radiation-induced damage in the high-dose animals that died. Observations of differences between the sexes were made both behaviorally and hematologically, but none of these could be attributed to the radiation exposure. (Author)

**A67-23817** *
DEVELOPMENT OF A STANDARD PROLONGED WORK TEST FOR THE EVALUATION OF FATIGUE AND STRESS IN MAN.
J. Shapira, D. R. Young, B. Datnow, and R. Pelligra (NASA, Ames Research Center, Moffett Field, Calif.).
Aerospace Medicine, vol. 38, Mar. 1967, p. 268-272. 9 refs.

Determination of the rate at which the human body reestablishes homeostasis when required to work for a prolonged period at about one-third maximal work capacity. The results, particularly those related to serum glucose and free fatty acids for 20 subjects, are given. It is concluded that a postabsorptive work situation that requires about one-third of their maximal work capacity can be tolerated in human male subjects for up to 24 hr. B.B.

**A67-23818** #
HEPATIC EFFECTS OF BREATHING PURE OXYGEN FOR EIGHT MONTHS UPON RATS, DOGS AND MONKEYS.
Franklin M. Klion, Fenton Schaffner, and Harold P. Kaplan (Mount Sinai School of Medicine, Dept. of Pathology, New York, N.Y.; USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).
Aerospace Medicine, vol. 38, Mar. 1967, p. 273, 274. 6 refs.
Contract No. AF 33(615)-3464.

Electron microscopic examination of livers of rats, dogs and monkeys exposed to pure oxygen at 258 mm Hg for eight months showed autophagic vacuoles and pigment granules suggesting continuing increased turnover of organelles, particularly mitochondria. The mild degree of abnormality indicated that the animals had adapted to the abnormal environment but that adaptation had been an active process. Species differences were sufficient to preclude extrapolations to man. (Author)

**A67-23819**
CHANGES PRODUCED IN URINARY SODIUM, POTASSIUM, AND CALCIUM EXCRETION IN MICE EXPOSED TO HOMOGENEOUS ELECTROMAGNETIC STRESS.
Garry D. Hanneman (General Dynamics Corp., Fort Worth Div., Applied Research Laboratory, BioScience Group, Fort Worth, Tex.).
(International Biomagnetics Symposium, 3rd, University of Illinois, Champaign, Ill., Mar. 22, 23, 1966, Paper.)
Aerospace Medicine, vol. 38, Mar. 1967, p. 275-277. 5 refs.
Research supported by the General Dynamics Corp.

Study of the concentration levels of sodium, potassium and calcium ions found in the urine excreted from white mice exposed to a high homogeneous magnetic field. Only sodium and potassium show a significant increase in concentration following exposure. The average sodium ion concentration of the urine from the exposed mice increased from 2.34 mg/cc before exposure to 4.29 mg/cc following exposure. The average potassium ion concentration increased from 9.14 mg/cc to 14.59 mg/cc. The concentration of calcium ions increased from 0.083 mg/cc to 0.138 mg/cc. B.B.

**A67-23820**
SOME SECONDARY DETERMINERS OF PSYCHOLOGICAL STRESS.
P. M. Curran and R. J. Wherry, Jr. (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.).
Aerospace Medicine, vol. 38, Mar. 1967, p. 278-281.

Investigation of certain secondary determiners of anticipatory physical-stress threat which are presumed to be components of the perceived proximity of the unpleasant event. The findings suggest that the secondary determiners of anticipatory physical stress threat are significant components of the perceived proximity of the unpleasant event and that they interact in a complex manner. A measure is devised which is considered to reflect differences in individual susceptibility to anticipatory physical-stress threat. B.B.

**A67-23821** #
ON THE MEASUREMENT OF THE TRANSMISSION OF EXTERNAL FORCE THROUGH FLUID SYSTEMS IN PRIMATES.
John B. Carmichael, Jr., John H. Henzel, George C. Mohr, and Henning E. von Gierke (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Biomedical Laboratory, Biodynamics and Bionics Div., Wright-Patterson AFB, Ohio).
Aerospace Medicine, vol. 38, Mar. 1967, p. 282-285.
USAF-sponsored research.

Discussion of the characterization of pressure changes in the cerebrospinal fluid in the cranial cavity of rhesus monkeys to an external force directed at the abdominal wall, and the relationship of these changes to other observable parameters. Alternating forces are applied to the abdominal wall; this allows the body to be kept at rest and facilitates the accuracy of the measurement techniques. One monkey is vibrated in the supine position, and oscillatory volume through the trachea is measured as a function of frequency; the resonance curve obtained is given. When the animal's abdominal wall is mechanically displaced in a sinusoidal manner, the measured amplitude ratio of intracranial pressure to airway volume velocity is found to be relatively constant for 2-to-30-cps driving frequencies. B.B.

**A67-23822**
TEMPORAL CHARACTERISTICS OF BODY TEMPERATURE DURING HIGH THERMAL STRESS.

Frederick H. Rohles, Jr., Ralph G. Nevins, and Wayne E. Springer (Kansas State University, Institute for Environmental Research, Manhattan, Kan.).
Aerospace Medicine, vol. 38, Mar. 1967, p. 286-290.
Army-supported research.

Eight subjects were exposed to six temperatures (95, 98, 100, 105, 110, and 120°F dry bulb) at each of four relative humidities, 60, 70, 80, and 90%. The time for the rectal temperature to increase 2°F was measured in each of the 24 conditions; the test was terminated if this did not occur in less than 4 hr. The results showed that when the Effective Temperature (ET) was below 91.3°F none of the subjects exhibited a 2°F increment in rectal temperature in less than 4 hr. Conversely, all of the subjects reached this criterion when the effective temperature was 97°F and above. Between Effective Temperatures of 92.9° and 95.5°F there was a transition zone in which some of the subjects reached the criterion and some did not. In general it was found that the higher the ET, the shorter the latency of the rectal temperature response to increase 2°F. The rank order correlation between ET and the time required for the rectal temperature to increase was -.987. (Author)

**A67-23823** *

EFFECT OF COMPLEX MEASURING INSTRUMENTATION UPON THE TILT TABLE RESPONSE.
Fred B. Vogt (Texas Institute for Rehabilitation and Research, Houston, Tex.).
Aerospace Medicine, vol. 38, Mar. 1967, p. 290-292. 5 refs.
National Institutes of Health Grant No. FB 00254; Contracts No. NAS 9-1461; No. NSR-44-024-006.

Results of an analysis of tilt-table data obtained in experiments with 10 healthy male individuals during four separate 20-min tilt procedures performed at weekly intervals at the same time of the day. Minimal instrumentation, limited to ECG leads and a blood pressure cuff, was used in three of the procedures and extensive instrumentation in the fourth procedure. It was found that these individuals, all of whom have had previous experiences with tilt procedures, showed no statistically different response to both simple tilt procedures and one requiring intravenous and intra-arterial catheterization. V.Z.

**A67-23824**

EFFECTS OF ELECTROMAGNETIC RADIATIONS ON PHYSIOLOGIC RESPONSES.
Sol M. Michaelson, R. A. E. Thomson, and William J. Quinlan, Jr. (Rochester, University, School of Medicine and Dentistry, Dept. of Radiation Biology and Biophysics, Rochester; USAF, Griffiss AFB, N.Y.).
Aerospace Medicine, vol. 38, Mar. 1967, p. 293-298. 12 refs.
AEC Contract No. W-7401-eng-49; Contract No. AF 30(602)-2248.

Studies were performed on dogs exposed to 1240-Mc pulsed microwaves, at a field intensity of 50 mw/cm$^2$, six hours per day for five consecutive days. Some dogs with additional exposures were included. For comparison, dogs previously irradiated with 1000 KVP X-rays (50 R/min) either to the whole-body (300 R) upper-body (1900 R) or lower-body (900 R) were exposed to microwaves in a similar manner. Alterations in cardiopulmonary, thyroid and erythropoietic function of normal dogs and greater sensitivity of X-irradiated dogs to microwaves are noted. In general, these studies indicate that repeated exposure to 1240-Mc microwaves at 50 mw/cm$^2$, can produce functional changes in the dog which if extrapolated to man would be indicative of homeostatic insufficiency and decrement in performance capability even though overt incapacitation may not take place. Whether thermal, nonthermal, or both of these are the contributing factors in the response to microwave exposure, there are sufficient experimental and human survey evidence to indicate that microwave exposure results in alteration in compensatory and homeokinetic mechanisms of the body. The effects of microwave exposure at 50 mw/cm$^2$ in the normal animal should alert us to the caution that has to be exerted when any consideration is given to raising the presently accepted maximum permissible exposure of 10 mw/cm$^2$. (Author)

**A67-23825**

HUMAN TOLERANCE TO CHANGES IN AIRCRAFT CABIN PRESSURIZATION.
James N. Waggoner (Garrett Corp., AiResearch Manufacturing Co., Dept. of Life Sciences, Los Angeles, Calif.).
Aerospace Medicine, vol. 38, Mar. 1967, p. 299-301.

Account of a research study to determine suitable rates for changing aircraft cabin pressurization. It is urged that present outdated rates (introduced 30 years ago on the basis of statistically inadequate pressure chamber experiments) be revised. This statistically more complete study indicates that presently recommended rates of cabin ascent and descent appear to be excessively stringent; even more important is adequate instruction of passengers on how to remedy ear symptoms during pressure changes. V.Z.

**A67-23826**

DECOMPRESSION SICKNESS IN HIGH-ALTITUDE FLIGHT.
Willard L. Meader (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 38, Mar. 1967, p. 301-303. 9 refs.

Review of 5 years of a WU-2 squadron's daily records shows 36 cases of decompression sickness entirely confined to reports of bends pain among 11 crewmembers in 958 flights. Generally, 40 min were spent in denitrogenation in a partial pressure suit and helmet before achieving cabin altitudes of close to 29,000 feet. The majority of bends occurred within the first 3.5 hr affecting the knee joints in almost two-thirds of the cases with a tendency to recur at the same joint. Only 1 case required descent to lower altitude to afford relief from pain. (Author)

**A67-23827** #

ALTITUDE DECOMPRESSION SICKNESS WITH FOCAL NEUROLOGICAL MANIFESTATIONS.
E. Liske, William J. Crowley, Jr., and James A. Lewis (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Neurology Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 38, Mar. 1967, p. 304-306. 15 refs.
USAF-sponsored research.

Brief description of neurological dysbarism with clearly pronounced focal neurological features, shown by medical records of 13 USAF pilots out of a group of 37 neurological dysbarism cases. It is concluded that no unique topological vulnerability in the brain is involved in this disorder but that the absence of cortical irritative phenomena and other considerations suggest that the white matter is probably the usual site of the lesions and could account for both the initial and late focal signs. V.Z.

**A67-23828** #

VALUE OF ROUTINE X-RAY EXAMINATION OF THE ABDOMEN DURING AEROMEDICAL EVALUATION.
Charles L. Randolph, Jr. (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Radiology Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 38, Mar. 1967, p. 307-309. 9 refs.
USAF-sponsored research.

A roentgenogram of the abdomen was obtained on each of 2132 flying personnel undergoing aeromedical evaluation. Included were 544 men being considered for space pilot selection and other special missions. The remainder were being examined for determination of their fitness for continued flying duties. The abdominal film showed 43 men to have significant, previously undiagnosed abnormalities including one renal carcinoma and one abdominal aortic aneurysm. From considerations of the incidence of abdominal abnormalities with age, and potential radiation induced genetic changes, this study suggests that routine abdominal X-ray examination would have its greatest usefulness in the over-35 age group. (Author)

# LC ENTRIES

**A67-80628**
**OXYGEN CONSUMPTION AND ALVEOLAR VENTILATION DURING INTERMITTENT POSITIVE PRESSURE BREATHING.**
Stephen M. Ayres and Stanley Giannelli, Jr. (N.Y.U., School of Med. and St. Vincent's Hosp. and Med. Center, Depts. of Med. and Surg., New York).
*Diseases of the Chest,* vol. 50, Oct. 1966, p. 409–414. 14 refs.
Am. Thoracic Soc., N. J. Med. Res. and Teaching Fund, and Council for Tobacco Res. supported research.

Assisted ventilation with a volume-cycled intermittent positive pressure breathing (IPPB) apparatus decreases arterial carbon dioxide tension by both increasing alveolar ventilation and decreasing the oxygen cost of breathing. In this study, IPPB was shown to reduce the oxygen cost per unit of ventilation by an average of 34%. Dead space ventilation was unchanged, but the alveolar-arterial oxygen difference was increased in all patients, indicating that the distribution of ventilation with IPPB is different from that with spontaneous respiration. These studies indicate that properly administered IPPB increases the efficiency of the respiratory muscles and decreases their entropy.

**A67-80629**
**IDENTIFICATION AND INJURIES OF AIR-CRASH VICTIMS.**
Elliot M. Gross and Joe M. Blumberg (Armed Forces Inst. of Pathol., Washington, D. C.).
*(Am. Acad. of Occupational Med., Philadelphia, Pa., Feb. 9, 1966).*
*Archives of Environmental Health,* vol. 13, Sep. 1966, p. 289–291.

Several fatal aircraft accidents are reported to illustrate the necessity for proper identification of the victims in order to return the body to the family and for litigation of insurance and inheritance claims. Fingerprints and dental records constitute virtually foolproof means of identification. Footprints of American flying personnel are currently taken because flying boots constitute ample foot protection in a post-crash fire when thermal injury of the hands precludes use of fingerprints. Less satisfactory means of identification involve use of personal effects and physical characteristics of the deceased. In determining the cause of death, traumatic injuries, thermal lesions, and pre-existing diseases are evaluated. The effects of deceleration and contact with aircraft structures are particularly assessed. When fire occurs, either prior to impact or after the crash, it is important to determine whether death resulted from impact trauma, the effects of fire (thermal burns, carbon monoxide poisoning, or smoke inhalation), or a combination of factors. Determination of blood carbon monoxide by gas chromatography or other suitable methods and inspection of the tracheobronchial tree for the presence of soot allow the proper conclusion in most instances. In any accident the possibility that pre-existing disease in the flight crew, especially coronary arteriosclerosis, as a cause cannot be excluded except by thorough postmortem examination.

**A67-80630**
**CONDITIONS ON THE PLANET VENUS.**
William T. Plummer and John Strong (Johns Hopkins U., Baltimore, Md.).
*Astronautica Acta,* vol. 11, Nov.–Dec. 1966, p. 375–382. 48 refs.
Contract AF 19(628)-4334.

The recent proof that the Venus clouds are composed of water and ice particles and a new interpretation of radio brightness measurements have led to a model for the planet which is not unfavorable to life. A fraction of the microwave brightness is derived to be nonthermal, and presumably originates in the cloud layer. Terrestrial clouds have exhibited similar brightness. Surface temperatures corrected for this cloud emission—the fraction is estimated to be 30%—range from 172°C. through 300°C. along the equator, but reach −13°C. at the colder poles. A surface pressure of 5 atm. is adopted. The atmosphere rises convectively near the subsolar point and descends convectively near the antisolar point. This pattern is modified by convection upward from the hot equator and downward to the cold poles. Progressive condensation and freezing of water explains the nearly uniform infrared cloud temperatures. Snowfall at the poles is expected to have produced ice caps. It is shown that high latitude seas formed by melting snow or rain would escape radar observation. There have been tentative identifications of oxygen, and possibly the slight yellow tint is the result of ozone absorption in the violet. With this model, characterized by favorable temperatures, positive identification of water vapor and ice clouds, and a possible identification of a significant quantity of oxygen, conditions on Venus cannot be declared inhospitable to life. The available observational material is shown to be consistent with this model, and some suggestions are made for future work.

**A67-80631**
**ACTIVITY OF THE HUMAN ECCRINE SWEAT GLAND DURING EXERCISE IN A HOT HUMID ENVIRONMENT BEFORE AND AFTER ACCLIMATIZATION.**
J. Peter and C. H. Wyndham (Transvaal and Orange Free State Chamber of Mines, Human Sci. Lab., Johannesburg, South Africa).
*Journal of Physiology,* vol. 187, Dec. 1966, p. 583–594. 21 refs.

Six unacclimatized African mine laborers were subjected to exercise for 4-1/2 hours in a hot humid environment (90°–93° F. wet-bulb/dry-bulb; approximately 90% r. h.). The patterns of glandular activity and the densities of active glands on the chest and back were assessed half-hourly from plastic impressions. Acclimatization increased and prolonged glandular activity. The increment in activity of the sweat glands on the back was greater than that on the chest. There was no significant increase in the maximum number of active glands on either site after acclimatization. Acclimatization greatly reduced the number of inactive glands, subsequent to the maximum count, on the back, but this was not observed on the chest. The increased sweat rates with acclimatization were due mainly to increased glandular activity. The decline in sweat rates and activity on prolonged exposure to hot humid environment was attributed to glandular fatigue. Other factors, such as increased body temperature, hydration of the skin and fatigue of the central nervous system, suggested by other investigators as possibly causing the decline in sweat rates, did not have support in this study.

**A67-80632**
**THE INFLUENCE OF POSITION ON SELECTED BREATHING PARAMETERS AND PULSE RATE.**
Dorothy E. Fess (WRAMC, WRAIR, Metab. Ward, Washington, D. C.).
IN: EXPLORING PROGRESS IN MEDICAL-SURGICAL NURSING PRACTICE; Proc. of the 1965 Reg. Clin. Conf. of the Am. Nurses' Assn., Washington, D. C., Nov. 3-5, 1965 and Chicago, Ill., Nov. 10-12, 1965.
New York, Am. Nurses' Assn., 1966, p. 23-29. 17 refs. Am. Nurses' Assn. supported research.

A study was made of breathing parameters and pulse rates in 13 young men measured in four body positions: supine, left lateral, sitting, and semi-sitting. Comparison of the data showed that the sitting position provided the most effective ventilation, though it was also the least comfortable of the positions studied. Tidal volumes differed significantly in different positions ($P > .01$). The differences in respiratory minute volume in the various positions were statistically significant ($P > .01$). Values obtained in the sitting position were greater than those noted in all other positions. Vital capacity measure was slightly larger in the sitting position. Carbon dioxide percentage computed for 11 subjects remained within the range of normal values in all positions. The supine position was not comfortable; the sitting position least comfortable. The study did not show that position affects the respiratory rate in any way.

**A67-80633**
**RESCUING MEN IN SPACE.**
Kenneth W. Gatland (Brit. Interplanet. Soc., London, Great Britain).
*New Scientist*, vol. 32, Dec. 15, 1966, p. 614-615.

The technical and political problems associated with space rescue systems are discussed. Difficulties arising in orbit are usually dealt with using human judgment in conjunction with reserve attitude control and retro-rocket systems. Loss of cabin pressure can be dealt with by the space-suited astronaut closing the helmet visor and pressurizing his suit for an emergency supply. It is stressed that rescue craft be specially designed with adequate capacity and that the crew be trained in extravehicular activity and able to move rapidly between orbiting spacecraft using special equipment. Ideally, rescue facilities should be part of the design of all future spacecraft and possibly include repair kits, the Astronaut Maneuvering Unit for transfer of crew to rescue ship, bale-out pack, retro-rockets, etc. Mention is made of proposed manned space stations having a standby rescue vehicle attached.

**A67-80634**
**FIRE AND HYPERBARIC OXYGEN.**
D. M. Denison, J. Ernsting, A. W. Cresswell (Roy. AF Inst. of Aviation Med., Farnborough, Great Britain).
*(Second Intern. Congr. on Res. in Burns, Edinburgh, 1965).* *Lancet*, vol. 2, Dec. 24, 1966, p. 1404-1405. 11 refs.

Little is known of the fire-risks to man in oxygen-rich environments such as those obtained with hyperbaric oxygen therapy. Experimental evidence shows that the risks of ignition and the subsequent burning-rate are strikingly increased when compared with normal conditions. The risk of ignition will be further increased as more equipment fitted with electronic instruments is brought into use and by grease or petrol stained clothing. The fires are more serious because of the high burning-rate. Established methods of fire extinction are ineffective under these conditions. Some precautions have already been urged but others might include: administration of hyperbaric oxygen by oronasal tube whenever possible; replacement of a patient's clothing by a tight-fitting, fireproofed garment; and the incorporation of an automatic flame-detector and suitable water supply into the system.

**A67-80635**
**EFFECTS OF AGE ON ORGANIZATION AND RECALL OF TWO SETS OF STIMULI.**
Harvey A. Taub and Shirley Greiff (N. Y. State U., Upstate Med. Center, Syracuse and Syracuse VA Hosp., N. Y.).
*Psychonomic Science*, vol. 7, Jan. 15, 1967, p. 53-54.
Grant PHS FR-5402.

Short-term recall of sequences of 8 letters was measured for 12 young and 12 aged subjects in a control condition with a single stimulus set and three experimental conditions which differed in arrangement of two sets of color-coded stimuli. The results indicated that there were no differences in performance for the stimuli to be recalled first while both age and conditions were significant effects for the stimulus set to be recalled second.

**A67-80636**
**EFFECTS OF REINFORCEMENT ON RETENTION AND TRANSFER: PATTERN DISCRIMINATION.**
Elvis C. Jones and Richard L. Narver (Tex. Christian U., Fort Worth).
*Psychonomic Science*, vol. 7, Jan. 15, 1967, p. 51-52.

In two experiments, subjects learned to discriminate between patterns drawn from different pattern populations. Different groups received consistent, intermittent, or no extrinsic reinforcement. The groups which received extrinsic reinforcement tended to remember pattern characteristics, and demonstrated transfer to a new task, better than did the unreinforced groups. Results were generally consistent with an earlier experiment which indicated that monetary rewards improve recall, relearning and transfer in a verbal learning task.

**A67-80637**
**RELATIVE PROBABILITY, INTERSTIMULUS INTERVAL, AND SPEED OF THE SAME-DIFFERENT JUDGMENT.**
Shizuhiko Nishisato and Jack S. Wise (McGill U., Montreal, Canada).
*Psychonomic Science*, vol. 7, Jan. 15, 1967, p. 59-60.
Contract Nonr-4896(00)) and Grant DRB, Canada 9425-10.

Pairs of tones were judged to be "same" or "different" by four well-practiced subjects. The speed of these judgments, measured as reaction time (RT), was studied as a function of the relative probability of "same" trials and the interstimulus interval. Three levels of probability (.75, .50, and .25) and three interstimulus intervals (1 sec., 0.5 sec., and simultaneous presentation) were used. A four-way analysis of variance showed the judgment "same" to have longer RT than the judgment "different" and the middle interval (0.5 sec.) to have a shorter reaction time than either of the other intervals. Probability did not show any significant main effect; possible reasons for this are discussed.

**A67-80638**
**SLANT JUDGMENTS OF SINGLE RECTANGLES AT A SLANT.**

Howard R. Flock, Bruce Stephenson (York U., Toronto, Canada), David Graves (Dartmouth Coll., Hanover, N. H.), and James Tenney (Harvard U., Cambridge, Mass.).
*Psychonomic Science*, vol. 7, Jan. 15, 1967, p. 57–58.
Grants NSF GB 2474 and NRC, Canada APA-143.

Twelve rectangles varying in angular height from 54° to 1.2° were presented singly at 4 to 6 slants. Accuracy of slant judgments decreased with angular height and reached chance level with the 1.2° shape. The results are contrasted to the output of other laboratories.

**A67-80639**
**ALL-NIGHT EEG SLEEP MEASUREMENTS IN YOUNG ADULTS.**
Anthony Kales, Allan Jacobson, Joyce D. Kales, Thomas Kun, and Randall Weissbuch (Calif. U., Depts. of Psychiat. and Anat., Los Angeles).
*Psychonomic Science*, vol. 7, Jan. 15, 1967, p. 67–68. 10 refs.
Grants PHS MH-10083, Calif. DMH 66-2-44, and NIMH 5-TI MH-6415.

The electroencephalogram (EEG) sleep characteristics of normal, young adults were measured for three consecutive nights. The mean percentage of Stages 1-rapid eye movement (REM), 3 and 4 showed an increase with each consecutive night. Within a night's sleep, Stages 3 and 4 decreased markedly and Stage 1-REM increased considerably from the first to the second half of the night. The mean duration of rapid eye movement periods (REMPs) increased from the first to the third REMP and then leveled off. The mean interval between REMPs ranged from 90 to 110 minutes with some indication that the cycle shortened late in the morning.

**A67-80640**
**WORD LABELS AND PERCEPTUAL RECOGNITION.**
Eugene S. Gollin.
*Psychonomic Science*, vol. 7, Jan. 15, 1967, p. 63–64.
Contract NICHHD PH 43 65-1011.

Adults were tested for recognition of incomplete line drawings of common objects after they had been given prior experience with more complete representations of those objects or with the word names of those objects. Groups trained on the more complete representations of the drawings recognized significantly more of the test displays than did control subjects given no prior experience. Subjects trained on word names did not differ significantly from controls in the number of incomplete displays recognized.

**A67-80641**
**ADAPTIVE CHANGES IN THE RELATIONSHIP BETWEEN VISUAL AND TACTUAL-KINESTHETIC PERCEPTION.**
Jill Rierdan and Seymour Wapner (Clark U., Worcester, Mass.).
*Psychonomic Science*, vol. 7, Jan. 15, 1967, p. 61–62. 6 refs.
Grants NIMH MH 00348 and NSF GY 116.

Visual and tactual-kinesthetic indications of apparent verticality (adjust a rod so that it appears vertical) were made by 16 subjects under conditions of prolonged exposure to 20° clockwise rotation of the visual field. Significant changes were found in the relationship between visual and tactual-kinesthetic verticality. The results are interpreted in terms of a principle of perceptual correspondences.

**A67-80642**
**EFFECT OF RESPIRATORY ALKALOSIS ON BLOOD LACTATE AND PYRUVATE IN HUMANS.**
Frederic Eldridge and John Salzer (Stanford U., School of Med., Dept. of Med. and Veterans Hosp., Palo Alto, Calif).
*Journal of Applied Physiology*, vol. 22, Mar. 1967, p. 461–468. 36 refs.
Grant NHI HE-03224.

Arterial lactate and pyruvate were determined at various levels of hypocapnia and alkalemia in humans during active hyperventilation. Lactate and pyruvate increased in all subjects, and the increases showed an inverse relationship to the decrease in $PCO_2$ and $H^+$ concentration. However, even the maximum changes were relatively small, the mean lactate increasing less than one mmole/1. $H_2O$ at $PCO_2$ = mm. Hg, pH = 7.61. Lactate uniformly rose more than pyruvate with consequent rise in lactate/pyruvate ratio. In subjects studied over a period of two hr. lactate and pyruvate rose to a peak at 45–75 min. and then declined. In no case was there progressive elevation of lactate or pyruvate nor was there progressive deficit of "true" bicarbonate. It is concluded that respiratory alkalosis in humans leads neither to large increases in lactate and pyruvate nor to progressive shifts in the buffer curve of the blood. When such increases occur in association with hypocapnia and alkalemia it becomes necessary to invoke some metabolic or circulatory distrubance as a contributing factor.

**A67-80643**
**STIMULUS UNCERTAINTY AND THE LATENCY OF CATEGORY JUDGMENT.**
Lawrence E. Jones and Allen Parducci (Calif. U., Los Angeles).
*Psychonomic Science*, vol. 7, Jan. 15, 1967, p. 71–72.
Grants PHS HD-00923 and NSF GB-1768.

The latencies of category judgments of size varied inversely with the skewness of the frequency distribution of stimuli (squares). Although the task did not permit one-to-one identification of the stimuli, the data suggest that one function of category judgment is to reduce the uncertainty about which stimulus has been presented.

**A67-80644**
**CARDIOVASCULAR AND RENAL FUNCTION DURING CONTINUOUS NEGATIVE PRESSURE BREATHING IN DOGS.**
John A. Godley, James W. Myers, and Donald A. Rosenbaum (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio). *(Federation of Am. Soc. for Exptl. Biol., 50th Ann. Meeting, Atlantic City, N. J., Apr. 11–16, 1966).*
*Journal of Applied Physiology*, vol. 22, Mar. 1967, p. 568–572. 47 refs.

Ten chloralosed beagles were studied for two hr. under control conditions and then for two hr. with −10 cm. $H_2O$ breathing pressure. Ten others were studied for four hr. as controls. There were no significant changes in any variables during the four hr. of control. During negative pressure breathing (NPB), there was a significant fall in central venous pressure, significant increases in respiratory rate, heart rate, and mean arterial pressure. There was a significant increase in urine flow of 61% due to decreased tubular reabsorption of sodium during NPB. The cardiac output, central blood volume, effective renal plasma flow, glomerular filtration rate, filtered load of sodium, free water clearance, potassium excretion, and urea excretion were not significantly changed during NPB. The Henry–Gauer reflex did not appear to be active. The natriuretic response to NPB appeared to be initiated by an increase in mean arterial pressure. It is speculated that

the decreased tubular reabsorption of sodium, which accompanied the increase in arterial pressure, could have been due to an increase in renal medullary blood flow and/or the action of a natriuretic hormone.

**A67-80645**
**MUSCULAR EXERCISE IN YOUNG MEN NATIVE TO 3,100 M ALTITUDE.**

Robert F. Grover, John T. Reeves, Estelle B. Grover, and James E. Leathers (Colo. U., Med. Center, Dept. of Med., High Altitude Res. Lab., Denver and Ky. U., Med. Center, Dept. of Med., Lexington).

*Journal of Applied Physiology*, vol. 22, Mar. 1967, p. 555–564. 30 refs.
Contract DA-49-193-MD-2551 and Grants NIH HE 08728, HE 06780, K3-HE-29,237.

Five young athletes native to 3,100 m altitude were studied during standardized submaximal and maximal treadmill exercise. Their performance was compared with that of similar athletes living near sea level. Both groups had impressively high values for maximum oxygen uptake ($V_{O_2}$) 66–68 ml/kg per min., at low altitude. Maximum $V_{O_2}$ was decreased more than 25% for the altitude natives as well as the newcomers at high altitude. The altitude natives hyperventilate at high altitude to the same degree as the newcomers, and do not display the relative hypoventilation seen in men native to the Andes and Himalayas. Limitations in the pulmonary diffusion of oxygen and probably a depression of cardiac output, but not pulmonary ventilation, reduce exercise capacity at high altitude. It appears, therefore, that the young athlete of European ancestry acclimatized to high altitude from birth has an oxygen transport system very similar to that of the athlete at sea level.

**A67-80646**
**OXYGEN CONSUMPTION AND BODY TEMPERATURES OF ESKIMOS DURING SLEEP.**

Frederick A. Milan and Eugene Evonuk (Arctic Aeromed. Lab., Fort Wainwright, Alaska).

*Journal of Applied Physiology*, vol. 22, Mar. 1967, p. 565–567. 20 refs.

This paper reports the results of measurements of metabolism and body temperatures taken during 14 nights of comfortably warm sleep in six male Eskimos from the village of Wainwright on the arctic coast of Alaska. The mean age of these subjects was 20.8 (±1.26) years, mean height 169.1 (±5.08) cm., mean weight 66.6 (±2.0) kg. and mean value for percent body fat 9.1 (±1.08)%. These data show the effects of the sleep cycle on metabolism and body temperature. The sleeping metabolic rate declined from 51 (±7.35) kcal./m.$^2$ per hr. at 2230 hr. to 39 (±5.22) kcal./m.$^2$ per hr. at 0600 hr. Concomitantly, rectal temperature fell 1.6°C. from 37.0 (±.386)°C. at 2230 hr. to 35.4 (±.386)°C. by 0600 hr. The level of metabolic activity was directly related to the calculated mean body temperature. The basal metabolic rate (BMR) of 43–45 kcal./m.$^2$ per hr. in these subjects is consistent with the findings of a majority of the investigators who have reported an elevated BMR for Eskimos.

**A67-80647**
**SEX DIFFERENCES IN PHYSIOLOGICAL REACTIONS TO THERMAL STRESS.**

T. Morimoto, Z. Slabochova, R. K. Naman, and F. Sargent II (Ill. U., Dept. of Physiol. and Biophys., Urbana).

*Journal of Applied Physiology*, vol. 22, Mar. 1967, p. 526–532. 14 refs.
Grant NSF GB-967.

Thirteen young men, aged 17–32, and 13 young women, aged 18–23, were exposed five times for two hr. to increasing heat with either low or high humidity. Measurements were made of the total body and forearm sweat rate, sweat chloride concentration, rectal and skin temperature, blood pressure, pulse rate, and respiratory metabolism. A remarkable sex difference was observed in the sweat rates; they were significantly higher in the men, especially under higher heat either dry or moist. There was a definite depression of sweating by high humidity in both sexes. As heat stress increased, systolic blood pressure rose slightly in the women, diastolic decreased much more in the men. Total heat production, lower in the women, increased relatively more among them under the influence of heat and treadmill walking. In the other parameters, no influence of the humidity or sex was found. Large individual variations of sweat chloride concentration were observed. No signs of acclimation developed. It is concluded that even at equivalent levels of four-hour sweat rate the effects of dry and moist heat on sweating differ.

**A67-80648**
**BACKWARD FIGURAL MASKING AS A FUNCTION OF INTERCONTOUR DISTANCE.**

Helen W. Streicher and Robert H. Pollack (Inst. for Juvenile Res., Chicago, Ill.).

*Psychonomic Science*, vol. 7, Jan. 15, 1967, p. 69–70.
Grant NICHHD HD 01433.

The intervals over which a ring whose inner diameter subtended 30′ visual angle masked disk test figures of 10, 15, 20, and 25′ and a square test figure with 20′ sides were obtained for two subjects. In the case of parallel contours, masking increased as intercontour distance decreased. For the 10′ disk and the square, masking was negligible. The data were discussed with regard to the apparent "facilitation" effect found in forward masking when a large masking disk is followed by a small disk test figure.

**A67-80649**
**EQUATING STIMULUS INTENSITIES BY MEANS OF THE GSR.**

H. D. Kimmel (Ohio U., Athens).

*Psychonomic Science*, vol. 7, Jan. 15, 1967, p. 77–78.
Contract Nonr 580(09).

The purpose of this study was to match intensities of stimuli of different sense modalities on the basis of the magnitude of galvanic skin response (GSR). Twenty-five college students received repeated presentations of each of six different intensities of a 1,000 c.p.s. tone (43, 48, 53, 58, 63, and 68 db. re: .0002 dynes/cm.$^2$ in 42 db. of background noise) alternating with a 1/4 in. square patch of white light of 0.36 ft.-c. Average GSR magnitude was determined for each of these stimuli. A graph of the relationship between tone intensity and magnitude of GSR was plotted separately for each subject and a tone intensity equivalent to the light was determined by interpopulating the average magnitude of response to the light in this graph. Most subjects showed the same type of variation in GSR as a function of stimulus intensity.

**A67-80650**
**TRANSIENT FACIAL PARALYSIS DURING ASCENT TO ALTITUDE.**

Donald R. Bennett and E. Liske (School of Aerospace Med., Neurol. Branch, Brooks AFB, Tex.).

*Neurology*, vol. 17, Feb. 1967, p. 194–198. 11 refs.
USAF Systems Command supported research.

The case histories of two pilots suffering five episodes of transient seventh nerve paresis are presented. These episodes occurred during ascent to high altitude. The anatomy, pertinent middle ear pressure dynamics, and pathophysiology are discussed. It was concluded that "pneumatic compression of the facial nerve" is a cause of "idopathic facial nerve palsy."

**A67-80651**
**TURNOVER OF CATECHOLAMINES IN ACTIVE AND HIBERNATING GROUND SQUIRRELS.**
Paul R. Draskóczy and Charles P. Lyman (Harvard Med. School, Depts. of Pharmacol. and Anat., Boston, Mass.).
*(Am. Soc. for Pharmacol. and Exptl. Therap., Fall Meetings, 1964 and 1965).*
*Journal of Pharmacology and Experimental Therapeutics,* vol. 155, Jan. 1967, p. 101–111. 31 refs.
Grants PHS 5 RO1-NB04939, GM 05197, and GM 05611.

The turnover of endogenously labeled norepinephrine and epinephrine was studied in different tissues of active and hibernating ground squirrels. The animals were injected with d1-3,4-dihydroxy-phenylalanine-$H^3$ to label the catecholamine stores and the rate of fall of specific activity of endogenously labeled norepinephrine and epinephrine was taken as an index of the turnover of these amines in different organs. In the active state the turnover rate of catecholamines was highest in the brown adipose tissue where the specific activity of norepinephrine and epinephrine fell by 97% in 24 hr. It was lowest in the adrenal medulla where the fall of specific activity was 45% in 24 hr. In the heart and brain the rate of fall of specific activity of catecholamines was similar: 90% in 24 hr. In hibernating ground squirrels the turnover rates of norepinephrine and epinephrine were greatly diminished in all organs studied, indicating a considerably reduced sympathetic activity. The highest turnover rate in this state was observed again in the brown adipose tissue, where the specific activity of norepinephrine and epinephrine fell by 32% in 24 hr. The turnover of norepinephrine and epinephrine in the brain stopped completely from the very beginning of hibernation when the temperature of the animal was still in the normal range, suggesting that the lack of function of central adernergic neurons might in some way initiate hibernation, rather than simply be a consequence of it.

**A67-80652**
**CONCEPTUAL LEVEL AS A COMPOSITION VARIABLE IN SMALL-GROUP DECISION MAKING.**
Paul Stager (Princeton U., N. J.).
*(Eastern Psychol. Assn., Meeting, New York, 1966).*
*Journal of Personality and Social Psychology,* vol. 5, Feb. 1967, p. 152–161. 22 refs.
Contract Nonr 1858-(42).

Decision making was investigated from the standpoint of the emergent distribution of functional roles, conflict generation, utilization of conflict in decision synthesis, and information acquisition. Twenty four-man groups of male undergraduate and graduate students were composed to yield four combinations of conceptual level. Each group participated in a complex simulated tactical decision-making situation. The group interaction was coded into functional role categories and rated with respect to conflict generation and utilization. The information measure H was used to assess uncertainty in the functional role distributions, in terms of which group structure was construed. Uncertainty of group structure, utilization of generated conflict, and search for novel information were linearly related, while interpersonal conflict was curvilinearly related to an increasing percentage of members of a high conceptual level in the group.

**A67-80653**
**PARALLEL FUNCTIONS OF SERIAL LEARNING AND TACHISTOSCOPIC PATTERN PERCEPTION.**
E. Rae Harcum (William and Mary Coll., Williamsburg, Va.).
*Psychological Review,* vol. 74, Jan. 1967, p. 51–62. 59 refs.
Grant PHS HD 00207-06.

The similarity of the distribution of errors in the reproduction of elements within tachistoscopic patterns to the serial-position curve of errors in rote learning is noted and discussed. From this examination of data a hypothesis is derived, that this similarity occurs because the "perceptual" and "learning" tasks invoke similar psychological processes. This hypothesis implies that each observation in perception is a miniature task of serial learning. The present analyses of perception and learning tasks support the hypothesis. Certain common processes, which determine the relative numbers of errors for individual stimulus–elements in both tasks, are inferred. These processes, grouped under the rubric of information–translation, include element discrimination, selective analysis of persisting traces, and the organization of information for storage in memory.

**A67-80654**
**EFFECT OF ANXIETY ON ALPHA RESPONSIVENESS TO LIGHT STIMULATION.**
Karen E. Sayer and Aurelio A. Torres (Wells Coll., Aurora, N. Y.).
*Psychological Reports,* vol. 19, Dec. 1966, p. 1143–1146. 10 refs.
Grant NSF GB-2954.

Subjects scoring high and low on four tests of the Objective Analytic Anxiety Battery and having at least 25% time alpha rhythm in their resting electroencephalograms received 100 trials of a single photic flash in the presence of alpha rhythm. Analysis of variance of the alpha blocking responses in right and left parieto-occipital derivations yielded a significant anxiety effect, with the low-anxiety group giving consistently more responses than the high-anxiety group. This effect was discussed in relation to the alpha blocking "conditioned" response and habituation.

**A67-80655**
**HYPOXIA AND CARBON DIOXIDE RETENTION FOLLOWING BREATH-HOLD DIVING.**
Poul-Erik Paulev and Noe Naeraa (Aarhus U., Inst. of Physiol., Denmark).
*Journal of Applied Physiology,* vol. 22, Mar. 1967, p. 436–440. 13 refs.
Reinholdt W. Jorch and Hustrus Fond, Aarhus U. Forskiningsfond, F. L. Smidth and Co. A/S Jubilaeumsfond, and Christian and Ottilia Brorsons Fond supported research.

Experimental data from six subjects performing repeated breathhold dives to 62 ft. in fresh water are presented. Rate of descent was 0.8 m./sec., ascent 1.5 m./sec., and diving time 36–124 sec. Surface intervals varied between 60 and 120 sec. The divers submerged with a lung volume containing residual volume plus 85% of vital capacity. About 650 ml. (STPD) oxygen was transferred from the lungs to the body in 42-sec. dives (mean of seven dives), while 260 ml. carbon dioxide was given off from the body to the lungs. During the first 16 min. after a seven-dive series (representing a total submerged time of 330 sec. and a total surface time of 420 sec.) and excess elimination of approximately 3,500 ml. (STPD) carbon dioxide was found. Carbon dioxide retention with acute, respiratory acidosis may–because of the repetitive factor–be more dangerous to breath-hold divers than hitherto believed.

A67-80656
**POSTHYPERVENTILATION HYPOXIA.**
S. F. Sullivan, R. W. Patterson, and E. M. Papper (Columbia U., Coll. of Physicians and Surgeons, Dept. of Anesthesiol., New York City, N. Y.).
*Journal of Applied Physiology*, vol. 22, Mar. 1967, p. 431–435. 12 refs.
Grants NIH GM09069 and NHI 1-K3-HE-11,900.

Body $CO_2$ stores are larger and require a longer period of adjustment when altered, compared to body $O_2$ stores. The hyperventilation with air which depletes body $CO_2$ stores does not significantly increase the body $O_2$ stores. Recovery from this $CO_2$ depletion can be produced only by hypoventilation. During air breathing, this hypoventilation must produce a decrease in alveolar and arterial oxygen tension. Dogs were hyperventilated for one hr. with air to examine this disturbance. In 11 studies the average value for arterial carbon dioxide tension ($PA_{CO_2}$) at the end of one hr. of hyperventilation was 16 mm. hg. When mechanical hyperventilation was discontinued apnea lasted 1-1/4 min. Hg. At the end of two min. arterial oxygen tension ($PA_{CO_2}$) had fallen from 110 to 35 mm. Hg. Although $PA_{CO_2}$ reached a stable level of 35 mm. Hg at the end of 15 min. of spontaneous ventilation, minute volume increased progressively as did $PA_{O_2}$ throughout the remainder of the hour. It was concluded that the obligatory hypoventilation necessary to restore depleted body $CO_2$ stores must result in hypoxia during air breathing which lasted up to one hr. in these studies.

A67-80657
**AORTIC FLOW AND OTHER HEMODYNAMIC RESPONSES TO THE VALSALVA MANEUVER IN THE DOG.**
Howard Cohen (Michael Reese Hosp. and Med. Center, Dept. of Med., Div. of Cardiovascular Disease and Cardiovascular Inst., Chicago, Ill.).
*American Heart Journal*, vol. 72, Dec. 1966, p. 784–789. 30 refs.
Grant NHI HE-5252.

One hundred sixteen Valsalva maneuvers were performed on 13 anesthetized closed-chested dogs, and recordings were made of aortic flow with an electromagnetic flowmeter, and of aortic pressure with catheters threaded into the femoral or carotid arteries. Of 36 trials which showed no pressure overshoot during Phase IV, half showed a flow overshoot. In 47%, loss of pressure overshoot was ascribed to peripheral vasodilatation. The other 53% showed that a drop in flow rate (or flow rate and peripheral resistance) was the etiology of the loss of pressure overshoot. In 80 trials demonstrating a pressure overshoot during Phase IV of the Valsalva maneuver, 72 (90%) showed a concomitant flow overshoot. Of the 80 pressure overshoots, 30 showed a decrease in peripheral resistance during the overshoot. This study supports the classic concept that there is a flow overshoot associated with the pressure overshoot of the Valsalva maneuver. It also indicates that the pressure overshoot can occur in the face of decreased peripheral resistance in dogs under the conditions of this experiment.

A67-80658
**STIMULUS CHARACTERISTICS AND SPATIAL ENCODING IN SEQUENTIAL SHORT-TERM MEMORY.**
Richard A. Monty, Dennis F. Fisher, and Robert Karsh (U.S. Army Human Eng. Labs., Supporting Res. Lab., Aberdeen Proving Ground, Md.).
*Journal of Psychology*, vol. 65, Jan. 1967, p. 109 116. 8 refs.

Performance of the keeping-track task described by Monty, Taub, and Laughery was examined as a function of the class of stimuli employed. It was found that a stimulus class possessing a natural or built-in order led to better performance than did a stimulus class lacking such order. It was suggested that the differences stem from the speed with which subjects complete encoding of the information to be remembered rather than from the time available for rehearsal between successive stimuli.

A67-80659
**RECOVERY TIME OF HEART FREQUENCY IN HEALTHY MEN: ITS RELATION TO AGE AND PHYSICAL CONDITION.**
David Cardus and William A. Spencer (Baylor U., Coll. of Med. and Tex. Inst. for Rehabil. and Res., Houston).
*(Am. Congr. of Phys. Med. and Rehabil., 43rd. Ann. Session, Philadelphia, Aug. 24, 1965).*
*Archives of Physical Medicine and Rehabilitation*, vol. 48, Feb. 1967, p. 71–77. 12 refs.
HEW, Dept. supported research.

Seventeen subjects were tested with the bicycle ergometer. Each subject was tested six times at three different total work loads and two work intensities. The instantaneous frequency of the heart beat was calculated from the R-R interval of the electrocardiogram. The points representing heart frequency observed during the recovery phase were fitted with an exponential function by means of an electronic computer. The time to recover 63% of the change in heart frequency (exercise minus resting heart frequency) was calculated ($T_{0.63}$). $T_{0.63}$ was found to be related to age, work intensity, total work, interaction of total work and work intensity, and to the physical condition of the individual.

A67-80660
**REGULATION OF VENTILATION DURING EXERCISE AT 10,200 FT. IN ATHLETES BORN AT LOW ALTITUDE.**
John T. Reeves, Robert F. Grover, and Jerome E. Cohn (Ky. U., Dept. of Med., Cardiovascular Lab., Lexington and Colo. U., School of Med., Dept. of Med., High Altitude Res. Lab., Denver).
*Journal of Applied Physiology*, vol. 22, Mar. 1967, p. 546–554. 11 refs.
Contract DA-49-193-MD-2551 and Grants PHS HE-08728, HE 06780-05, and HE 08932-02.

Five champion high school track runners from Lexington, Ky. were studied at low altitude (1,000 ft.) and during three weeks in Leadville, Colo. (10,200 ft.). Measurements of min. ventilation ($\dot{V}E$ BTPS) respiratory frequency (*f*), tidal volume (VT), mixed expired oxygen concentration ($FE_{O_2}$), and oxygen consumption ($\dot{V}_{O_2}$) were obtained at performance levels ranging from the basal state to maximum treadmill exercise. During maximal effort, $\dot{V}_{O_2}$, was approximately 25% less in Leadville than in Lexington, whereas $\dot{V}E$ BTPS, VT, f, and $FE_{O_2}$ were similar at both altitudes. When each parameter was related to the absolute values of $\dot{V}_{O_2}$, a distinct curve was obtained for each altitude. However, when related to $\dot{V}_{O_2}$ as a percent of maximum $\dot{V}_{O_2}$ for the respective altitudes, then the altitude variable was virtually eliminated. The complex relationships between ventilation, altitude, and level of exertion was thereby simplified. This method of data analysis was tested against previous data, and was found to be in reasonable agreement considering the many altitudes involved. In fact, the similarities in data from a wide range of altitudes suggest that ventilation is regulated in part by some mechanism which senses a given effort in terms of exercise capacity.

**A67-80661**
**INFLUENCE OF AGE, SEX, AND BODY WEIGHT ON THE ENERGY EXPENDITURE OF BICYCLE RIDING.**
William C. Adams (Calif. U., Phys. Educ. Dept., Human Performance Lab., Davis).
*Journal of Applied Physiology,* vol. 22, Mar. 1967, p. 539–545. 31 refs.

Energy expenditure observations were made on 60 normal adult men and women, ranging in age from 20 to 52.2 years, while riding a narrow-tire bicycle at a previously determined average speed. Analysis of variance indicated that age had no effect on gross energy expenditure and that, when the latter was divided by total body weight, there was no significant difference between men and women. The results of multiple regression analysis confirmed the dominant effect of total body weight, in that neither the addition of age, height, body surface area, lean body weight, fat body weight, or tricep skinfold contributed significantly to the prediction of energy expenditure for the ride.

**A67-80662**
**REACTIONS OF MEN AND WOMEN TO REPEATED EXPOSURE TO HUMID HEAT.**
K. P. Weinman, Z. Slabochova, E. M. Bernauer, T. Morimoto, and F. Sargent II (Ill. U., Dept. of Physiol. and Biophys., Urbana).
*(Seminar on Bioclimatol., Sapporo, Japan, Nov. 1964).*
*Journal of Applied Physiology,* vol. 22, Mar. 1967, p. 533–538. 19 refs.
Grant NSF GB-967.

Ten healthy young subjects, five men and five women, underwent a series of experiments, walking on a treadmill for four hr. under conditions of 33.9°C. DB, 32.±°C. WB, and 88% relative humidity. Measurements were made of sweat rate, skin and rectal temperatures, pulse rate, blood pressure, and metabolic rate. Two similar experiments under temperature ambient conditions served as bases for evaluating the influence of the work in the humid heat and that of the work itself. The increment of rectal temperature was smaller in the men than in the women and decreased progressively. Total body sweat rate was significantly higher in the men and rose during the course of the repeated exposures. Among women the increment of pulse tended to reach a plateau within two hr.; it did not in men. No differences nor changes were found in the blood pressure, skin temperature, and total heat production. The results suggest sex differences in acclimation mechanisms.

**A67-80663**
**CENTRAL CIRCULATORY RESPONSES TO WORK IN DRY HEAT BEFORE AND AFTER ACCLIMATIZATION.**
Loring B. Rowell, Kenneth K. Kraning II, J. Ward Kennedy, and Thomas O. Evans (Wash. U., School of Med., Div. of Cardiol., Dept. of Med., Seattle).
*Journal of Applied Physiology,* vol. 22, Mar. 1967, p. 509–518. 35 refs.
Grants PHS HE-9773, FR-37, HIS-5147, and HE-5281.

Cardiac output, central blood volume (CBV), aortic blood pressure, heart rate, $V_{O_2}$, and skin ($T_s$) and rectal temperature ($T_r$) were measured repeatedly during prolonged exercise (70 min.) in six normal young men before and after 11–12 days of acclimatization to work in dry heat (48.4°C. dry bulb –25.6°C. wet bulb). Heart rate, $T_s$, $T_r$, and total sweat loss followed the usual course with acclimatization. Work $V_{O_2}$ was unaffected. In five men cardiac output and CBV changed minimally. Stroke volume increased markedly in four men and was unchanged in one. A sixth subject showed very high cardiac output, CBV, and stroke volume before and decreased to normal after acclimatization. Results from five men indicate that decreased heart rate during acclimatization usually attends increased stroke volume, not decreased cardiac output. Increased stroke volume did not result from increased CBV via thoracic redistribution of peripheral blood but by decreased heart rate attending lower surface and "core" temperatures and increased sweating.

**A67-80664**
**MAINTENANCE OF AORTIC PRESSURE AND TOTAL PERIPHERAL RESISTANCE DURING EXERCISE IN HEAT.**
H. J. Marx, L. B. Rowell, R. D. Conn, R. A. Bruce, and F. Kusumi (Wash. U., Div. of Cardiol., Dept. of Med., Seattle).
*Journal of Applied Physiology,* vol. 22, Mar. 1967, p. 519–525. 30 refs.
Grants NHI HE-00908-C14, F2-HE-21,316-01, and NIH FR-37.

At 25.6 and 43.3°C., proximal aortic blood pressure was recorded with a specially designed manometric system before and after cardiac output determinations in six normal, unacclimatized young men during four grades of treadmill exercise requiring from 43 to 87% of maximal oxygen intake. Unlike peripheral arterial blood pressure, proximal aortic pressure remained almost constant, indicating close regulation at baroreceptor sites during exercise. Constancy of pulse pressure exceeded that of systolic, diastolic, or mean pressure. At 43.3°C., blood pressure was always slightly lower than at 25.6°C. Total peripheral resistance (TPR) fell as workload increased; it diminished more at low workloads at 43.3° C. but equaled values at 25.6°C. at the two higher workloads. Exercise to exhaustion in the heat was not associated with peripheral circulatory collapse and hypotension. Summation of vasodilation in skin and working muscles was previously shown to initiate even greater regional redistribution of blood flow. This effectively maintained central blood pressure and TPR.

**A67-80665**
**DISTRIBUTION OF PULMONARY BLOOD FLOW AS AFFECTED BY TRANSVERSE ($+G_x$) ACCELERATION.**
Frederic G. Hoppin, Jr., Elihu York, David E. Kuhl, and Richard W. Hyde (U.S. Naval Air Develop. Center, Aerospace Med. Res. Dept., Johnsville and Pa. U., Hosp. and School of Med., Dept. of Radiol. and Dept. of Physiol., Graduate Div., Philadelphia).
*Journal of Applied Physiology,* vol. 22, Mar. 1967, p. 469–474. 20 refs.
Contract AEC AT (30-1)-3175 (NYO-3175-20), Grants PHS C-4456, and NCI CA-14,020.

The distribution of blood flow in the pulmonary vascular bed under $+G_x$ (forward or transverse acceleration) was studied by intravenous injection of radioactive iodine 131-macroaggregated albumin ($^{131}$I-MAA) in three normal subjects while they were under $+1\ G_x$, $+4\ G_x$, and $+8\ G_x$ on a human centrifuge. The resulting distribution of radioactivity in the lungs, representing the distribution of pulmonary blood flow at the time of injection, was assessed 1–3 hr. later by lateral radioisotope scanning. The distribution of pulmonary blood flow was not markedly different at $+1\ G_x$, $+4\ G_x$, and $+8\ G_x$ despite a difference between anterior and posterior pulmonary arterial pressures estimated to be 88 mm. Hg under $+8$

$G_x$. These findings indicate that under $+G_x$ (forward or transverse acceleration), unlike $+G_z$ (headward or positive acceleration), the distribution of pulmonary blood flow is not markedly altered and the regional flow of blood in the lung may not be significantly changed by high intravascular pressures.

**A67-80666**
**CARDIOVASCULAR AND RENAL FUNCTION DURING TOTAL BODY WATER IMMERSION OF DOGS.**
James W. Myers and John A. Godley (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
*(Aerospace Med. Assn., 37th Ann. Sci. Meeting, Las Vegas, Nev., Apr. 18–21, 1966).*
*Journal of Applied Physiology*, vol. 22, Mar. 1967, p. 573–579. 39 refs.

Ten chloralosed dogs were studied during two hr. of control followed by two hr. of water immersion. Another ten animals were studied during four hr. of control conditions. During water immersion, a significant ($P<.05$) diuresis occurred, due to an increase in the excretion fraction of sodium. Urea excretion and creatinine, para-aminohippuric acid, and free water clearances were not significantly altered. Respiratory rate, heart rate, and cardiac output increased significantly ($P<.01$). Mean arterial pressure increased 11 mm. HG ($P<.06$). These data indicate that the observed diuresis was due to decreased tubular reabsorption of sodium and not due to changes in antidiuretic hormone activity. Water immersion probably augmented cardiac filling and increased end-diastolic volume, resulting in increases in cardiac output and mean arterial pressure. It is thought that the increased cardiac output and mean arterial pressure stimulated intra-arterial receptors which initiated decreased tubular reabsorption of sodium due to increased renal medullary blood flow and/or the action of a natriuretic hormone.

**A67-80667**
**DETERMINATION OF CARDIAC OUTPUT, USING DOW'S FORMULA.**
A. Oriol (Roy. Victoria Hosp., Joint Cardiorespirat. Serv., Montreal and Montreal Children's Hosp., Canada).
*Journal of Applied Physiology*, vol. 22, Mar. 1967, p. 588–590. 7 refs.
Grant MRC, Canada (MT-1241) and John A. Hartford Found. supported research.

Cardiac output values obtained by the conventional Hamilton technique from 130 "normal" dye curves were obtained from the same curves by use of Dow's formula for area calculation. Appearance and peak concentration of curves obtained with an interposed sampling system were corrected according to the volume/flow ratio of the system. The cardiac output predicted by Dow's formula was within ±10% of the value obtained by the conventional method in 90% of curves and within ±18% in all. Provided that correction is made for distortions introduced by the sampling system, Dow's formula can be employed with confidence for rapid calculation of cardiac output. A nomogram is presented which is a graphic solution to Dow's equation and further simplifies routine work.

**A67-80668**
**LASER ACTION AT THE CELLULAR LEVEL.**
Leon Goldman and R. James Rockwell (Cincinnati U., Med. Center, Laser Lab., Ohio).
*(Am. Med. Assn., 115th Ann. Conv., Chicago, Jun. 28, 1966).*
*Journal of the American Medical Association*, vol. 198, Nov. 7, 1966, p. 641–644. 16 refs.
Grant PHS OH-00118 and Children's Hosp. Res. Found. and John A. Hartford Found. supported research.

Laser reactions on living tissues when directly applied are presented in detail. These include electric burns, the elastic stress (ultrasonic wave), and the production of free radicals. Techniques for detecting free radicals and processes are discussed. Types of biological specimens are described. The effect of laser reactions on cell structures and the possible uses in therapy are noted. The application of laser microholography in medicine is discussed.

**A67-80669**
**THE SATURATION EFFECT IN RETINA MEASURED BY MEANS OF HE–NE LASER.**
J. Blabla and J. John (Czechoslovak Acad. of Sci., Inst. of Radio Eng. and Electron. and Postgraduate Med. Inst., Dept. of Ophthalmol., Prague).
*American Journal of Ophthalmology*, vol. 62, Oct. 1966, p. 659–663. 9 refs.

Using a He–Ne gas laser continuously operating at 6328 Å, an analogous dependence between retinal threshold coagulation doses and time exposure was obtained. Measurements were made on gray chinchilla rabbit retinas. For mild lesions the output power of the laser was not sufficient. Therefore, the irreversible spot on the retina becoming evident one min. after exposure was accepted as a standard for the threshold coagulation effect. Threshold values were obtained by averaging four or five exposures at the same output power and at different exposure times, and vice versa. The measurements suggested that retinal coagulation is possible with medium-power gas lasers. One min. after exposure a fine edematous spot was observed on the retina. The lesions produced above threshold demonstrated more marked gray–yellow spots, most of which were craterlike. The relation between power (energy) and exposure time measured by the He–Ne laser was plotted, and from the curve it was evident that for diameters of image sizes less than 100$\mu$, a saturation effect takes place between incident energy and exposure time. For image diameters around 70 $\mu$ a saturation threshold energy density of approximately 45 J./cm$^2$ was obtained.

**A67-80670**
**THRESHOLD LESIONS IN RABBIT RETINAS EXPOSED TO PULSED RUBY LASER RADIATION.**
A. Kohtiao, I. Resnick, J. Newton, and H. Schwell (N. Y. Eye and Ear Infirmary, Res. Dept., New York City).
*American Journal of Ophthalmology*, vol. 62, Oct. 1966, p. 664–669. 10 refs.
John A. Hartford Found. supported research.

A total of 160 exposures on the retinas of 41 rabbits were made with the regular pulsed ruby laser and 152 exposures on 32 rabbits were made with the Q-switched laser. After each exposure of the retina to laser beam the lesion site was examined immediately and at intervals of five min., one hr., 24 hr. and every 24 hr. thereafter. Near threshold the lesion size was about 0.2 mm. A histologic section of a near threshold lesion 48 hr. after exposure to the Q-switched laser revealed some dissolution of the rods and cones centrally and a condensation of the pigment epithelium. Also there was choroidal round-cell infiltration. No gross microscopic changes were noted in the upper retinal layers. The general features of the lesions produced by both types of lasers were similar. It was evident, however, that equal energy from the regular pulsed ruby laser and from the Q-switched laser did not produce equal effects. The Q-switched laser

required 40 times less energy to produce a lesion as did the regular pulsed laser. The Q-switched pulses were about 80 nanoseconds in duration whereas the regular pulsed laser was about 0.5 milliseconds in duration.

**A67-80671**
**BINOCULAR FUSION: A TEST OF THE SUPPRESSION THEORY.**
Robert Fox and Ronald Check (Vanderbilt U., Nashville, Tenn.).
*Perception and Psychophysics,* vol. 1, Oct. 1966, p. 331–334. 9 refs.
Grant PHS MH0834.

Binocular fusion may be due to interocular inhibitory suppression, an hypothesis difficult to evaluate by phenomenal inspection. A test probe method (reaction time to a light pulse) was used to measure visual sensitivity during binocular rivalry and fusion. The absence of inhibitory effects during fusion fails to support the suppression theory of fusion.

**A67-80672**
**BRIGHTNESS AS A FUNCTION OF RETINAL LOCUS.**
Lawrence E. Marks (Harvard U., Lab. of Psychophys., Cambridge, Mass.).
*Perception and Psychophysics,* vol. 1, Oct. 1966, p. 335–341. 18 refs.
NSF and NIH supported research.

Brightness functions were determined for the dark-adapted fovea and periphery. In one series of experiments, observers matched numbers to the brightness of a 1° white target at various intensities, presented half the time to the fovea, the other half to one of the five peripheral loci: 5°, 12°, 20°, 35°, and 60°. In a second series, observers matched the brightness of a 1° white target in the fovea of one eye to the brightness of an identical target in the periphery of the other eye at various intensities. Thresholds were also determined for the fovea and for the five peripheral loci by a staircase procedure. The magnitude estimations and the interocular matches concur in showing that a stimulus of fixed luminance appears brighter in the periphery than in the fovea. The brightness was found to be maximal at 20°. Brightness grows as a similar power function of luminance at all six retinal positions.

**A67-80673**
**CONTRAST AND ASSIMILATION IN LIGHTNESS JUDGMENTS.**
Jacob Beck (Harvard U., Cambridge, Mass.).
*Perception and Psychophysics,* vol. 1, Oct. 1966, p. 342–344.
Grant NSF GB-2901 and Carnegic Corp. supported research.

Experiments studied how assimilation and contrast varied as a function of the reflectance of figures above and below the reflectance of a gray background. The results showed that (a) contrast always occurs when the reflectance of lines is above the reflectance of the background, (b) assimilation occurs when the reflectance is below that of the background, (c) circles produce the same degree of assimilation and contrast as lines of equal width, and (d) repeated judgments do not affect contrast but reduce assimilation; as line darkness and line width increase assimilation gives way to contrast following repeated judgment. The results are discussed in connection with the hypothesis that assimilation and contrast arise from opponent processes in the visual system.

**A67-80674**
**STIMULUS NOVELTY AND INTRASERIES PRIMACY IN GSR ADAPTATION.**
Robert Fried, Livingston Welch, and Miriam Friedman (N.Y. City U., Hunter Coll., New York City).
*Perception and Psychophysics,* vol. 1, Oct. 1966, p. 345–346. 5 refs.

Galvanic skin response (GSR) records were obtained for four groups of 20 subjects. Group I was presented with a series of four different lights (amber, blue, green, and white) appearing 20 times each, in apparent random order. The procedure was similar for the other three groups except that in group 2, a novel stimulus (a red light) appeared instead of the sixth amber light; in group 3, it appeared instead of the 11th amber light; and in group 4, it appeared instead of the 16th amber light. Typical GSR adaptation phenomena were observed in all groups. The introduction of the novel stimulus appeared to have no effect on the course of GSR adaptation.

**A67-80675**
**THE EFFECT OF REPETITION ON THE PERCEPTION OF SINGLE LETTERS.**
Ralph Norman Haber and Elaine R. Hillman (Rochester U., N. Y.).
*Perception and Psychophysics,* vol. 1, Oct. 1966, p. 347–350. 6 refs.
Grants PHS MH-03244, MH-10753, and NSF GB-2909.

Single letters were presented for from one to five flashes, with subjects required to report what he saw after each flash. The clarity of the letter increased sharply with repetition. Since the letters were no larger than one-third of a degree in size, clarity could not have been increased by subject making different fixations from flash to flash and combining them into a total percept. Nor was subject guessing, since this could be ruled out by other indicators. Thus, it was concluded that repetition of the stimulus can have a direct effect on the clarity of a subject's percept of that stimulus.

**A67-80676**
**IMMEDIATE CORRECTION AND ADAPTATION BASED ON VIEWING A PRISMATICALLY DISPLACED SCENE.**
Irvin Rock, Joel Goldberg, and Arien Mack (Yeshiva U., New York City, N. Y.).
*Perception and Psychophysics,* vol. 1, Oct. 1966, p. 351–354. 7 refs.
Grant NSF GB 3410.

When observers view a scene of a room through displacing prisms there is an immediate correction of the prismatic distortion. Objects appear to lie in a direction closer to their true direction than to that produced by the refraction of the prisms. A brief period of exposure to the prismatically viewed scene, without movement or sight of the body, results in substantial adaptation to the displacement.

**A67-80677**
**REACTION TIME TO THE ONSET AND OFFSET OF ELECTROCUTANEOUS STIMULI AS A FUNCTION OF RISE AND DECAY TIME.**
Thomas G. Sticht and Emerson Foulke (Louisville U., Ky.).
*Perception and Psychophysics,* vol. 1 Oct. 1966, p. 361–365. 8 refs.
NASA supported research.

Reaction times (RT) were obtained to the onset and offset of 70-c.p.s. electrocutaneous signals of five rise and decay times and five intensity levels. The results show that both onset and offset RTs increase linearly with increased rise and decay times. With fast rates of rise or decay, the onset produces faster RTs than the cessation of stimulation. The opposite effect is found when long rise and decay times are used. Interpretations of these results are given in terms of neural adaptation and accommodation.

**A67-80678**
**GENERALIZATION AND RESPONSE LATENCY.**
In-Mao Liu (Natl. Taiwan U., Taipei, Republic of China).
*Perception and Psychophysics*, vol. 1, Oct. 1966, p. 366–368.
Grant NIH F05-TW-774-01 and Natl. Council on Sci. Develop., Republic of China supported research.

The present experiments investigated generalization in a reaction time situation where the generalization stimulus, a tone, preceded the reaction time signal, a light. The hypotheses under investigation were that the duration of the cue stimulus would determine the degree of generalization (Experiment I) and that the response latency independent of the stimulus duration would be related to the amount of generalization (Experiment II). A particular generalization test stimulus (a tone of 40 45, 50, 60, 65, or 70 db), was presented only once always following two bar-pressing responses to training stimulus (tone of 55 db.) under each of two conditions of stimulus duration in Experiment I and under each of two conditions of response latency in Experiment II. It was found that under the condition of short response latency generalization was broader.

**A67-80679**
**THE EFFECT OF CHRONIC EXPOSURE TO 100% OXYGEN IN NEWBORN MICE.**
G. Polgar, W. Antagnoli, L. W. Ferrigan, E. A. Martin, and W. P. Gregg (Pa. U., Philadelphia).
*American Journal of the Medical Sciences*, vol. 252, Nov. 1966, p. 580 587. 19 refs.
Grants PHS H-7046/CV and 5-K3-HE-9471.

The effect of exposure to nearly 100% oxygen at atmospheric pressure was studied for a maximum of 8 days on a total of 144 newborn and 97 adult male albino mice. The newborns were nursed by a total of 21 dams. Under conditions of intermittent nursing, the newborn mice exposed to oxygen perished earlier and at a higher rate (15/18) than the adults (4/10). However, when the newborns were kept under the continuous care and warming influence of the dam at slightly warmer air temperature, at least 11 out of 64 survived to 100 hours or longer; the rest of these newborns were sacrificed earlier. Among the mother animals an appreciable mortality (6/15) occurred when they were exposed to oxygen intermittently for 6 hours after breathing air for 6 hours. There was no mortality among 6 dams exposed with intervals of 2 to 3 hours. The lung pathology in both newborn and adult mice which died during exposure was similar to that described in the literature for oxygen toxicity. In adult mice a progression of the pathological changes was observed with increasing length of exposure. Newborn mice that survived exposure to oxygen had essentially normal lungs. The explanation for the mechanism of the relative resistance of the newborns to oxygen toxicity under physiological conditions and for the potentiating effect of secondary factors, such as low environmental temperature with insufficient nursing care in newborns and postpartum state in nursing dams is not known.

**A67-80680**
**FURTHER EXPERIMENTS ON MOVEMENT MASKING.**
G. C. Grindley and Valerie Townsend (Psychol. Lab., Cambridge, Great Britain).
*Quarterly Journal of Experimental Psychology*, vol. 18, Nov. 1966, p. 319–326. 8 refs.
Med. Res. Council supported research.

Voluntary attention to one of two static objects in the peripheral field of one eye makes this object more liable to masking by a moving object in the corresponding area of the field of the other eye (Experiment I). Positive afterimages (and probably negative afterimages) are subject to (binocular) movement masking (Experiment 2). Movement masking can occur in the field of either eye, but with the displays so far tried the inhibitory influence of a moving object is less in the field of the eye to which it is shown than in the field of the other eye (Experiment 3).

**A67-80681**
**PRIMITIVE ATMOSPHERE OF THE EARTH.**
S. I. Rasool (NASA, Goddard Space Flight Center, Inst. for Space Studies, New York City, N.Y.) and W. E. McGovern (N.Y. U., Dept. of Meteorol. and Oceanog., New York City).
*Nature*, vol. 212, Dec. 10, 1966, p. 1225–1226. 7 refs.

An attempt is made to calculate the exospheric temperature in a model of the primitive atmosphere. It is assumed that the upper atmosphere is in conductive equilibrium and that the following equation describes the energy balance: $u\,dT/dz = \int_z^\infty Q\,dz - \int_z^\infty R\,dz$ where u is the thermal conductivity of the gas which varies as $\sqrt{T}$, Q is the amount of energy available for heating, and R is the thermal emission by the atmospheric constituents. The calculations indicate that mainly because of the high conductivity, and also as a result of the high emission rates, R, in the infra-red of methane and its dissociation products, the exospheric temperature for this primitive model atmosphere would be considerably less than the present value of 1,500°K and would lie in the range of 500°–900°K, depending on the various amounts of methane and hydrogen assumed in the model. Preliminary calculations of escape indicate that for an exospheric temperature of 600°K, a methane atmosphere, with small amounts of ammonia, nitrogen and hydrogen, could be stable against gravitational escape for as long as $10^9$ yr.

**A67-80682**
**METEOROLOGY AND SUPERSONIC FLIGHT.**
R. F. Jones.
*Nature*, vol. 212, Dec. 10, 1966, p. 1181–1185.

The special meteorological problems associated with supersonic flight are discussed in terms of the subsonic, transonic, and supersonic flight phases. At subsonic speeds the effect of impact damage from water droplets, hail and ice crystals on the forward facing part of the aircraft increases. To aid in avoiding these conditions airborne weather radar equipment is used on the aircraft as well as weather reports given by trained personnel continuously surveilling airport radar displays. During the transonic phase accurate forecast of wind and temperature variations is necessary as well as the radar determination of the location of active cumulonimbus clouds with associated large hydrometeors which can inflict damage on aircraft surfaces. The supersonic, or cruise phase of the flight is exposed to sudden temperature variations; the rare but potentially disastrous possibility of encountering cumulonimbus cloud tops; turbulence and lee waves; ozone; cosmic radiation during solar flares; and radioactive debris, although considered presently unimportant.

**A67-80683**
**X-IRRADIATION INFLUENCE ON HIGH NERVOUS ACTIVITY OF DOGS BY APPLYING VITAMIN COMPLEX [DEISTVIE RENTGENOVSKOGO OBLUCHENIIA NA VYSSHUIU NERVNUIU DEIATEL'NOST' SOBAK V USLOVIIAKH PRIMENENIIA KOMPLEKSA VITAMINOV].**
B. I. Shal'nev (I. M. Sechenov First Moscow Med. Inst., USSR).
*Radiobiologiia,* vol. 6, no. 5, 1966, p. 760–763. 6 refs. In Russian.

Total body exposure in dogs to a 350–500 r dose of x-rays caused a progressive development of acute radiation sickness which was expressed in disturbances of the central nervous system functions, obliteration of conditioned reflexes, and a general degeneration in physiological and clinical states. In a second group of dogs the diet was supplemented by a man's normal daily requirements of vitamins C, P, $B_1$, $B_2$, $B_3$, $B_6$ and folic acid before and after the irradiation. In these treated animals the symptoms of radiation sickness were less severe which indicated a lesser degree of degeneration of the cerebral cortex due to the systemic reaction of these vitamins.

**A67-80684**
**DYNAMICS OF VESSEL PENETRABILITY BY COMBINED INFLUENCE OF WHOLE-BODY GAMMA IRRADIATION AND BURN [DINAMIKA SOSUDISTOI PRONITSAEMOSTI PRI KOMBINIROVANNOM VOZDEISTVII OBSHCHEGO GAMMA-OBLUCHENIIA I OZHOGA].**
E. P. Stepanov (Kharkov Med. Inst., UkrSSR).
*Radiobiologiia,* vol. 6, no. 5, 1966, p. 756–758. 11 refs. In Russian.

After thermal burns or during acute radiation sickness one of the symptoms in an animal organism is a disturbance of the vascular permeability. The effect of both these factors was studied in rats. After the exposure the animals were injected with a dose of radio-active albumin, sacrificed one hour later, and the tissues of various organs of the body were tested for the rate of the albumin loss from the blood into the tissue. After the combined exposure the rate of blood escape was greater than after the exposure to each factor separately, and it remained at the high level during the following seven days in all organs. These findings indicated a greater increase in vascular permeability of vital organs after the combined action of irradiation and the thermal burn.

**A67-80685**
**LUNG VOLUMES IN TEMPORARY RESIDENTS OF HIGH ALTITUDE AREAS [LEGOCHNYE OB"EMY U VREMENNYKH ZHITELEI VYSOKOGOR'IA].**
K. IU. Akhmedov (USSR, Acad. of Med. Sci., A. V. Vishnevskii Inst. of Surg., Lab. of Physiol., Moscow).
*Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 63, Jan. 1967, p. 18–21. 12 refs. In Russian.

A method using diluted helium in a closed system was used to study lung volumes in residents of the plains (control group), in temporary residents of high altitude (3600 m.) and in members of an expedition before ascent, at the altitude of 3600 m. and after descent. As compared to data of the control group the lung volumes in temporary residents of high altitudes differ by considerable increase of residual volume, leading to an increase of the functional residual volume and the total lung volume. The ratio of the residual volume to total lung volume is also increased. In members of expedition the residual volume towards the 40–45th day of residence at high altitude increases on the average by 0.5 l. as compared to the initial volume. This increase is related to the increase of the total lung volume, preservation of the vital lung capacity and reserve expiratory volume. After descent to the plain the lung volumes rapidly revert to initial figures. A regular trend in the increase of the residual volume, of the functional residual capacity and the total lung volume in temporary residents of high altitude areas and in the members of expedition making the ascent is regarded by us as one of the adaptation mechanisms of the body to the conditions of chronic decrease of partial pressure of oxygen.

**A67-80686**
**THE MECHANISM OF THROMBOCYTOSIS CAUSED BY ULTRAVIOLET IRRADIATION IN MICE.**
F. Krizsa, I. Cserháti, and K. Rák (U. Med. School, First Dept. of Med., Szeged, Hungary).
*Medicina et Pharmacologia Experimentalis,* vol. 15, 1966, p. 539–544. 14 refs.

Earlier the authors investigated the thrombocytosis of mice caused by ultraviolet (UV) irradiation. Since that time experimental thrombocytosis has served as a model in the experimental investigation of thrombocytopoiesis. In earlier investigations it was found that a humoral factor is responsible for the appearance of thrombocytosis lasting several days, but owing to methodical difficulties the exact mechanism of its development and the role of the medullary megacaryocytes remained obscure. From the point of view of thrombocytopoiesis it seems important to examine whether the factor produced by UV irradiation and appearing in the serum of treated mice, and which is in many respects similar to the serum factor responsible for human thrombocytosis, produces its effect by increasing the number of the precursor cells or possibly in some other way (by emptying the thrombocyte stores or by speeding up the formation of platelets).

**A67-80687**
**PLASMA AMINO ACID LEVELS IN SU JECTS FED ISONITROGENOUS DIETS CONTAINING DIFFERENT PROPORTIONS OF FAT AND CARBOHYDRATE.**
Marian E. Swendseid, Chisae Yamada, Elizabeth Vinyard, William G. Figueroa, and Ernst J. Drenick (Calif. U., Center for Health Sci., Dept. of Med. and School of Public Health and Veterans Admin. Center, Los Angeles).
*American Journal of Clinical Nutrition,* vol. 20 Jan. 1967, p. 52–55. 13 refs.
Grant NIH AM-01347 and Natl. Dairy Council supported research.

Six subjects were fed either high carbohydrate or high fat diets each containing 21.5 g of N/day during alternate periods of study. When the subjects were receiving the high fat diet they excreted more urinary N than when they were given the high carbohydrate diet. The plasma amino acid levels as measured during postabsorption did not change significantly during the six-day period of ingesting the high carbohydrate diet. When the high fat diet was fed, the concentration of each of the three branched chain amino acids in plasma was elevated significantly, the alanine value decreased slightly and the amount of $\alpha$-aminobutyric acid was increased. It is suggested that an elevated level of branched chain amino acids in plasma during postabsorption might be a useful indicator of enhanced gluconeogenesis.

**A67-80688**
**PUPILLARY RESPONSE TO MOMENTARY LIGHT STIMULATION TO EYES UNEQUALLY ADAPTED TO LIGHT.**

Stanley J. Simons, Jr. and Kenneth N. Ogle (Mayo Clin. and Mayo Found., Sect. of Ophthalmol., Rochester, Minn. and Minn. U., Mayo Graduate School of Med., Sect. of Biophys., Minneapolis).
*American Journal of Ophthalmology*, vol. 63, Jan. 1967, p. 35–45. 15 refs.
Grant NINDB NB-2003.

Carefully controlled experiments with the infrared electronic pupillograph and eight arc degree fields in an attached stereoscope showed that the light threshold for pupillary constriction for foveal stimulation in one eye was essentially *independent of the light adaptation level of the other eye.* This finding suggests that insofar as pupillary thresholds are concerned there is no interocular influence. It was shown also that, although there is a decrease in latency periods with increase in intensity of the light stimulus, there was no effect of different adaptation luminances between the two eyes on those latencies. These results are contrasted with the psychophysical sensation of resulting brightness in which a type of brightness averaging may occur for light areas of different luminances between the two eyes under certain conditions dependent on contours.

**A67-80689**
**STRUCTURE OF RAT LUNG AFTER PROTRACTED OXYGEN BREATHING.**
*Fenton Schaffner, Esther Trachtenberg* (Mount Sinai Hosp. and Mount Sinai School of Med., Dept. of Pathol., New York City, N. Y.), and Philip Felig (6570 Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
*(Am. Soc. for Exptl. Pathol., Ann. Meeting, Atlantic City, N. J., Apr. 15, 1966).*
*Archives of Pathology*, vol. 83, Jan. 1967, p. 99–107. 33 refs.

Exposure to pure oxygen atmosphere at 700 mm pressure for ten days produced changes in rat lungs which were characterized electron microscopically. These were increase in alveolar cells, especially type two epithelial cells or granular pneumocytes and macrophages, increase in the thickness of the alveolar capillary endothelium, decrease in the surface area of the alveolar capillary exposed to the air space by widening of the septum, and increase in the number of septal or nonalveolar capillaries. While these changes could be adaptive they may be dangerous on sudden return to ambient air since they would produce, at least temporarily, alveolar capillary block.

**A67-80690**
**COMPARISON OF SOME BIOCHEMICAL AND HEMATOLOGICAL CHARACTERISTICS IN RADIATION SICKNESS AND BY INFLUENCE OF ALKYLATIVE AGENTS, ON THE EXAMPLE OF THIO-TEP [SRAVNENIE NEKOTORYKH BIOKHIMICHESKIKH I GEMATOLOGICHESKIKH KHARAKTERISTIK PRI LUCHEVOI BOLEZNI I PRI DEISTVII ALKILIRUIUSHCHIKH AGENTOV NA PRIMERE TIOTEFA].**
A. V. Alesenko, E. B. Burlakova, N. M. Dziuba, L. V. Slepukhina, and N. M. Emanuel' (USSR, Acad. of Sci., Inst. of Chem. Phys., Moscow).
*Radiobiologiia*, vol. 6, no. 5, 1966, p. 718–723. 7 refs. In Russian.

Mice were exposed to various doses (350 r to 750 r) of ionizing radiation and developed radiation sickness. The severity of leucopenia and the degree of structural changes in the white cells were greater with an increase in the amount of radiation received. The antioxidizing activity of the liver lipids was decreased with an increase in the amount of radiation. Mathematical expressions of both reactions indicated an involvement of antioxidants in the control of cell divisions. Some alkylating agents, used as radiomimetics, were tested to investigate the degree of the induced leucopenia, and its effect on the alkylating processes. The effect was similar to irradiation when an antienoplastic compound, Thio TEP (tris(1-aziridinyl-phosphine sulfide) was used. These effects could be modified by introduction of inhibitors of the free radical reactions which are analogous to natural inhibitors present in the organism. If 150 mg/kg of 2, 4, 6-trimethyl-3-oxipyridin was injected 15 min. before the exposure, some hemotological and hepatic changes occurred. The antioxidative effect was lasting and led to a faster leucopoiesis in the surviving animals.

**A67-80691**
**SOME EFFECTS OF NEODYMIUM LASER RADIATION UPON THE HEADS OF DOGS.**
Kenneth M. Earle, F. M. Garner, Keith L. Kraner (Armed Forces Inst. of Pathol., Washington, D. C.), William B. McKnight (U.S. Army Missile Command, Directorate of Res. and Develop., Electromagnetics Lab., Appl. Phys. Branch, Redstone Arsenal, Ala.), and James R. Dearman.
*Military Medicine*, vol. 132, Feb. 1967, p. 122–127.

Four beagle cross dogs were exposed to single focused and unfocused shots of neodymium laser radiation directed upon their shaved foreheads. The energy of the shots on target were as follows: (1) 610 joules unfocused over an area about one cm. in diameter, (2) 490 joules focused over an area about two mm. in diameter, (3) 800 joules unfocused over an area about one cm. in diameter, (4) 610 joules focused over an area about two mm. in diameter. The sequence of events was studied by high speed movies (up to 7000 frames/sec.), by regular speed movies, and by closed circuit television. On television the heads of the dogs appeared to move as a direct result of the shot, but high speed photographs revealed that the movement came approximately 0.1 second after the shot. The movement of the head came after the burning off period had completely cleared and could not have been due to any explosive, rocket-like, or other propulsive effect. The time interval is compatible with reaction to startle or pain. The dogs appeared normal after the shots with no evidence of concussion. Two dogs were observed for three months after the shots and two dogs were observed for six months. Autopsy revealed superficial scarring of skin with failure of hair to re-grow at the sites of the initial burns. The skull, dura, and brain of each dog showed no evidence of damage from the laser radiation on gross or microscopic examination.

**A67-80692**
**EFFECT OF CALCIUM ON IODINE METABOLISM IN MAN.**
Michael T. Harrison, Ronald McG. Harden, and W. Donald Alexander (Glasgow U., Dept. of Med., Gardiner Inst., Western Infirmary, Great Britain).
*Metabolism*, vol. 16, Jan. 1967, p. 84–86. 9 refs.

The intestinal absorption of iodine is unaffected by calcium ingestion, irrespective of the level of iodine intake. In patients maintained on a high intake of calcium, withdrawal of calcium does not result in any change in levels of plasma protein-bound and inorganic iodine, thyroid and renal clearance or absolute uptake of iodine by the thyroid, suggesting that calcium does not interfere with trapping or binding of iodine by the thyroid gland.

**A67-80693**
**THE INCREASING PROBLEM OF PHOTOSENSITIVITY.**
Donald M. Pillsbury and William A. Caro (Pa. U., School of Med., Philadelphia).
*Medical Clinics of North America*, vol. 50, Sep. 1966, p. 1295–1311. 25 refs.

Various types of skin lesions may develop after exposure to sunlight in amounts much below that sufficient to produce ordinary sunburn. Such reactions are due to an increased vulnerability of the skin to sunlight produced by (1) cosmetic and bactericidal preparations applied to the skin, (2) a wide variety of drugs administered internally, (3) a background of systemic disease, including particularly porphyria cutanea tardsa, erythropoietic protoporphyria, and lupus erythematosus and (4) a disease sui generis, polymorphous photosensitivity, in which no explanation for the reaction is apparent. The clinical recognition of the various photosensitivity reactions, and the methods of management, are discussed.

**A67-80694**
**SUBCLINICAL CORONARY ARTERY DISEASE AT RCAF GREENWOOD.**
J. C. Hogg (RCAF, Inst. of Aviation Med., Toronto, Ontario, Canada).
*(Can. Forces Med. Serv., 7th Ann. Clin. Conf., Ontario, May 2–4, 1966).*
*Medical Services Journal Canada*, vol. 22, Oct. 1966, p. 799–806. 7 refs.

From September 1964 to September 1965, an attempt was made to document the incidence of subclinical coronary artery disease in the over-40 population of RCAF Greenwood using post-exercise electrocardiography. In addition, a simple clinical formula was developed in an attempt to select those who were most likely to show an ischaemic electrocardiographic response to exercise. Out of a total over-40 population of 282, 83 were randomly selected for triple Master two-step tests. Using the criteria of Mattingly (962), four of the 83 selected, or 4.8%, showed an ischaemic RS-T depression. Two of these four were then exposed to a double Master two-step and they showed similar ischaemic responses. Of the 15 selected by the clinical formula and tested, none showed an ischaemic response. It was concluded that the incidence of undiagnosed coronary artery disease in the over-40 population of RCAF Greenwood was similar (i.e. 4.6%) to that estimated by Master (1964) for the general population in this age group. The clinical formula developed in an attempt to select these people was of no value. The double Master two-step appeared to be as effective as the triple Master two-step in the diagnosis of subclinical coronary artery disease.

**A67-80695**
**VESTIBULAR HABITUATION [VESTIBULARNI HABITUACE].**
B. Uchytil and Z. Bochemek.
*Ceskoslovenskà Otolaryngologie*, vol. 15, Dec. 1966, p. 355–360. 10 refs. In Czech.

A description is given of the course and results of rotational habituation according to nystagmatic symptoms (duration, number of beats and total amplitude) and the subjective feeling of antirotation. A comparison is made of the development of habituation and spontaneous compensation of peripheral vestibular disorders. Emphasis is made on the importance of habituation for the prevention of vestibular complaints, training and for the promotion of spontaneous compensation of labyrinthine changes.

**A67-80696**
**PROBLEM OF DIFFERENCE IN THE RADIOPROTECTING MECHANISM OF BETAMERCAPTOETHYLAMINE AND MEXAMINE (COMPARATIVE INVESTIGATION ON BACTERIA AND WHITE MICE) [K VOPROSU O RAZLICHII V MEKHANIZME ZASHCHITNOGO DEISTVIIA BETA-MERKAPTOETILAMINA I MEKSAMINA (SRAVNITEL'NOE ISSLEDOVANIE NA BAKTERIIAKH I BELYKH MYSHAKH)].**
R. B. Strelkov and K. N. Kavtaradze (USSR, Acad. of Med. Sci., Inst. of Exptl. Pathol. and Therapy, Sukhumi).
*Radiobiologiia*, vol. 6, no. 5, 1996, p. 768–769. In Russian.

A comparative effect of mexamine and $\beta$-mercapto-ethylamine were studied in white mice and in *Escherichia coli-675*. The drugs were injected subcutaneously in mice, and was added in known amounts into test tubes containing bacterial suspensions. After a lapse of one hr. the animals were exposed to gamma radiation in total dose 1050 r. Bacteria were exposed to 80 kr. The results showed that in mice both compounds exhibited the same degree of radioprotection. In bacteria, however, only $\beta$-mercapto-ethylamine prevented cell destruction, while mexamine had no protection effect.

**A67-80697**
**SOME CHARACTERISTICS OF DROWSY CONSCIOUSNESS [OSOBENNOSTI DREMOTNOGO SOZNANIIA].**
A. M. Khaletskii.
*Voprosy Psikhologii*, vol. 12, Nov.–Dec. 1966, p. 103–110. 5 refs. In Russian.

The author presents results of self-observation of gradually falling asleep with frequent wakings demanding the delineation of certain "vigilance points". Even before the switching off of self-control there were noted hypnagogic perceptions, visualization of thoughts and recollections. At the next stage (while in a state of quasi-alertness) fragments of images and separate phrases began to appear. The former were harmonic, the latter were agrammatical and often made no sense, although perceived as having definite meaning. Visual images were remembered and retained somewhat easier. The author was able to establish that while falling asleep his thoughts assumed an aural form: and the movements and speech in hallucinatory images were accompanied by his own corresponding speech-motor activity and body movements. The consideration of inhibitory stages in the central nervous system while falling asleep shows that first of all the trace activity of the first signal system is increased, whereas the highest levels of the second signal system-self control and self-observation are inhibited.

**A67-80698**
**FEAR, FLYING AND FANTASY.**
W. G. Lamberd (Deer Lodge Hosp., Winnipeg, Manitoba, Canada).
*Medical Services Journal Canada*, vol. 22, Oct. 1966, p. 792–798. 9 refs.

Some aspects of the fear-of-flying syndrome are reviewed. Fifty cadets interviewed psychiatrically following voluntary or involuntary "ceased training" have been studied with particular reference to 14 of these cadets who had life-dominating fantasies which had led to their choice of flying as a career and to their failure in this career.

A67-80699
**INTERACTION OF TEMPERATURE AND HYPOXIA ON RESPIRATORY AND CARDIAC RESPONSES IN THE LIZARD, SAUROMALUS OBSEU.**
Don R. Boyer (Topeka, Washburn U., Kan.).
*Comparative Biochemistry and Physiology*, vol. 20, Feb. 1967, p. 437–447. 12 refs.
Grant NIH GM 07168.

Exposure of the lizard, Sauromalus obesus to a series of increasing temperatures and decreased oxygen tensions presents a stress that produces cardiac disfunction and death at 2% oxygen and 35°C. and up. Increased temperature causes an increase in both breathing rate and volume from 15° to 35°C., with little effect from hypoxia until that point, where hypoxic rates are faster than in room air, to 40°C. Increased oxygen uptake and heart rate are increasingly augmented by hypoxia exposure, from low to high temperatures. Periods of cardiac electrical activity decrease with both temperature and hypoxia, as does $O_2$ uptake per heart beat.

A67-80700
**BLASTOGENIC ACTION OF 120 MEV ENERGY PROTONS [MATERIALY PO BLASTOMOGENNOMU DEISTVIIU PROTONOV S ENERGIEI 120 MEV].**
V. N. Strel'tsova and IU. I. Moskalev.
*Radiobiologiia*, vol. 6, no. 5, 1966, p. 660–665. 6 refs. In Russian.

Rats exposed to a stream of high energy protons (120 MeV) developed benign or malignant neoplasms in various organs and tissues. A higher number of cases and rate of development was found among the females. After a 50 rad dose the number of leukemia cases was twice as high as in the non-irradiated animals. A dose of 200–400 rad led to a 10% increase as compared with the control. However, the neoplasms of the hypophisis occurred in males after a lower dose than in females. The increase in the radiation doses resulted in the increase in the incidence of different organs with a certain regularity. It required a dose up to 600 rad to induce renal or gastro-intestinal tumors, and lesser doses to produce other types of new growth.

A67-80701
**FUNCTIONAL ACTIVITY OF LEUCOCYTES BY EXPERIMENTAL RADIATION DISEASE [FUNKTSIONAL'NAIA AKTIVNOST' LEIKOTSITOV PRI EKSPERIMENTAL'NOI LUCHEVOI BOLEZNI].**
V. A. Almazov, L. M. Broun, and N. V. Kuz'mina (I. P. Pavlov Leningrad Med. Inst., USSR).
*Radiobiologiia*, vol. 6, no. 5, 1966, p. 700–703. In Russian.

Rabbits were exposed to increasing doses (300r to 900r) of ionizing radiation to create an experimental radiation sickness in order to study the behavior of leukocytes during the progress of the radiation disease. Following the irradiation the changes were observed in the peripheral blood: neutro-philic leucocytosis alternating with leucopemia and a depression of the white cell biochemical activity. The degree of damage depended on the radiation dose. The resistance of leucocytes to the osmotic pressure was noticeably affected by the radiation, with a maximum effect five–seven days after the exposure. This effect also depended on the dose. There was a slight variation between the polymorphonuclear and mononuclear cells. Because the stronger effect was observed in the granulocytes it could be suggested that their life span in the circulating blood was reduced. The neutrophile mobility was also decreased to a certain degree, particularly after a large dose (900r).

A67-80702
**OXIDATIVE PHOSPHORYLATION IN RAT LIVER MITOCHONDRIA AFTER IRRADIATION AND BY AGING OF MICROSTRUCTURES [OKISLITEL'NOE FOSFORILIROVANIE V MITOKHONDRIIAKH PECHENI KRYS POSLE OBLUCHENIIA I V PROTSESSE "STARENIIA" MIKROSTRUKTUR].**
T. N. Smirnova and E. F. Romantsev.
*Radiobiologiia*, vol. 6, no. 5, 1966, p. 678–681. 15 refs. In Russian.

The effect of ionizing radiation on the process of oxidative phosphorylation was studied in liver mitochondria in rats exposed to gamma radiation ($CO^{60}$). The minimal lethal dose did not cause any noticeable change in the P/O coefficient of the freshly isolated mitochondria during oxidation of succinic or pyroracemic acids. Preincubation of mitochondria for 30 min. led to an increase of succinic acid oxidation and greater utilization of the inorganic phosphate. With pyrorasemic acid as a substrate there was an inhibition of the oxidative processes. Radiation exposure of the mitochondria prior to oxidation of succinic acid produced the same results as in normal mitochondria. However, with pyrorasemic acid as a substate after 30 min. of preincubation no correlation was noted between the rate of oxidation and phosphorylation. It could be concluded that the radiation affected the respiratory cellular chain connected with the nucleotide (DPN) processes, and resulted in the aging of mitochondria.

A67-80703
**CHANGES OF FUND OF FREE AMINO ACIDS IN LIVER AND SPLEEN OF RATS BY IRRADIATION AND INJECTION OF RADIOPROTECTORS [IZMENENIIA FONDA SVOBODNYKH AMINOKISLOT V PECHENI I SELEZENKE KRYS PRI DEISTVII IONIZIRUIUSHCHEI RADIATSII I VVEDENII PROTEKTORA].**
L. P. Belavina, V. D. Blokhina, and E. F. Romantsev.
*Radiobiologiia*, vol. 6, no. 5, 1966, p. 724–727. 13 refs. In Russian.

The effect of irradiation and the radiation protectors on the concentration of amino acids in liver and spleen was conducted on white rats in order to learn the mechanism of protectors' action and the primary disturbances in the protein synthesis in radiation sickness. Injections of 300 mg. of $\beta$-mercaptopropylamine per kg. of body weight was used for protection of animals against the absolute lethal dose of 850 r. Gamma irradiation caused a decrease in glycine, serine and lysine in both organs, and an increase in other amino acids. Arginine was higher in liver and decreased in spleen. Injection of $\beta$-mercaptopropylamine 10 min. before the irradiation caused an increase in alanine and aspartic acid in spleen while the concentration of other acids decreased. In the liver, however, only cysteine, serine and arginine showed an increase. It can be seen that the propylamine affects the level of amino–nitrogen, and the compound itself was accumulated in liver. It may have taken part in the synthesis of amino acids.

A67-80704
**RADIOPROTECTIVE ACTION OF BACTERIAL NUCLEIC ACIDS AND THEIR DERIVATIVES IN GAMMA IRRADIATION OF EXPERIMENTAL ANIMALS [RADIOZASHCHITNOE DEISTVIE BAKTERIAL'NYKH NUKLEINOVYKH KISLOT I IKH PROIZVODNYKH PRI GAMMA-OBLUCHENII EKSPERIMENTAL'NYKH ZHIVOTNYKH].**
M. A. Tumanian, N. G. Sinilova, A. P. Duplishcheva, and K. K. Ivanov (N. F. Gamaleia Inst. Epidemiol. and Microbiol., Moscow, USSR).
*Radiobiologiia*, vol. 6, no. 5, 1966, p. 712–717. 16 refs. In Russian.

Intraperitoneal injections of the high molecular weight DNA derived from various types of intestinal bacteria produced in mice and rats a radioprotective effect against lethal doses of gamma-radiation when introduced 24 hr. before exposure. Denaturation of the derivative by heating or splitting into oligonucleotides and mononucleotides by enzymes and hydrolysis did not decrease this protective action. However, the final DNA hydrolysis to bases completely destroyed this action. The RNA of the same bacteria produced the same effect and a less effective action was noted when it was introduced intravenously and not intraperitoneally.

**A67-80705**

**RADIOACTIVE CONTAMINATION OF HIGH ALTITUDE AIRCRAFT AND AIR-INDIA MONITORING PROGRAMME.**

K. N. M. Yelahanka (Air-India, Bombay).

*(17th Ann. Gen. Meeting of the Soc., Tech. Session, Bangalore, Apr. 9 and 10, 1965).*

*Journal of the Aeronautical Society of India,* vol. 18, Aug. 1966, p. 84–89. 7 refs.

A radioactive contamination survey of Air-India Boeing 707 airplanes revealed that aircraft and engine parts became contaminated in flight either by cosmic effects or by nuclear explosion and radioactive fall-out. Decontamination procedures established begin with segregation of contaminated parts, general cleanliness, use of gloves, washing facility for personnel, clean aprons, etc. The monitoring survey includes measurement of beta–gamma activity by swipe sampling. From the results of continued survey significant radioactivity levels were found on airframe, painted surfaces, engine pods and cabin air intake areas. A generalized type of decontamination procedure which includes wiping, mopping, washing, and use of normal detergent was adopted in case of airframe. For the engine parts, the cleaning (chemical cleaning, washing, degreasing, vapor blast) depends on the extent of the radioactivity level. It was experimentally observed that agents like parafin, SDG-3, trichloroethylene, ardox, acid-wash, etc., while cleaning the parts also decontaminated them effectively. A brief account is given of contamination levels and dose rates adopted.

**A67-80706**

**PRODUCTION AND REACTIONS OF FREE RADICALS IN OUTER SPACE.**

Francis Owen Rice.

*American Scientist,* vol. 54, Jun. 1966, p. 158–169. 14 refs. AEC supported research.

Free radicals were investigated in the laboratory by studying their interaction with electromagnetic fields, by electron spin resonance, and by spectroscopy. It is assumed that free radical reactions occur in far outer space and in the solar system. Knowledge of the chemical composition of all outer space matter comes from a study of light, either that emitted directly from that body or that which is reflected or transmitted having originally been emitted by a hot body. Identification has been made of radicals in the earth's upper atmosphere: the most abundant are $N_2^+$, $O_2^+$, $NO^+$, $O^-$ $O_2^-$, $O_3^-$, $NO_2^-$, $N_2$, $O_2$, NO, N, O, $N_2O$, and $NO_2$. Speculation is presented for the existence of free radicals in meteorites, comets, Mercury and the terrestrial planets (Venus, Earth, Mars), and Jupiter and the major planets (Saturn, Uranus, Neptune). Mention is made of the possible rate of free radicals in the origin of life.

**A67-80707**

**THE INFLUENCE OF ACOUSTIC AND SEMANTIC SIMILARITY ON LONG-TERM MEMORY FOR WORD SEQUENCES.**

A. D. Baddeley (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).

*Quarterly Journal of Experimental Psychology,* vol. 18, Nov. 1966, p. 302–309. 18 refs.

It has been shown that short-term memory (STM) for word sequences is grossly impaired when acoustically similar words are used, but is relatively unaffected by semantic similarity. This study tests the hypothesis that long-term memory (LTM) will be similarly affected. In Experiment I subjects attempted to learn one of four lists of ten words. The lists comprised either acoustically or semantically similar words (A and C) or control words of equal frequency (B and D). Lists were learned for four trials, after which subjects spent 20 min. on a task involving immediate memory for digits. They were then asked to recall the word list. The acoustically similar list was learned relatively slowly, but unlike the other three lists showed no forgetting. Experiment II showed that this latter paradox can be explained by assuming the learning score to depend on both LTM and STM, whereas the subsequent retest depends only on LTM. Experiment III repeats Experiment I but attempts to minimize the effects of STM during learning by interposing a task to prevent rehearsal between the presentation and testing of the word sequences. Unlike STM, LTM proved to be impaired by semantic similarity but not by acoustic similarity. It is concluded that STM and LTM employ different coding systems.

**A67-80708**

**THE EFFECT OF INFORMATION CONTENT UPON THE PERCEPTION AND AFTER-EFFECTS OF A ROTATING FIELD.**

N. F. Dixon and Linda Meisels (U. Coll., London, Great Britain and Grinnell Coll., Iowa).

*Quarterly Journal of Experimental Psychology,* vol. 18, Nov. 1966, p. 310–318. 6 refs.

From an investigation of movement after-effects induced by a rotating field, it seems that the information content of the inspection field is an important determinant of the subsequent movement after-effects (M.A.E.). This finding, considered in conjunction with phenomena evoked during perception of high information content and highly redundant fields, is discussed in connection with work on the role of retinal stimulation in the production of M.A.E.s.

**A67-80709**

**STIMULUS VARIATION AND SEQUENTIAL JUDGMENTS OF DURATION.**

G. von Sturmer (Monash U., Dept. of Psychol., Victoria, Australia).

*Quarterly Journal of Experimental Psychology,* vol. 18, Nov. 1966, p. 354–357. 11 refs.

When a series of reproductions of an interval is made in the absence of a standard the judgments progressively lengthen. The similarity between stimulus conditions in this type of time estimation experiment and the conditions which produce a decrement in human vigilance is discussed. It is argued that failure to detect cues for the passage of time reduces the amount of time perceived to elapse. Reproduced judgments must consequently be increased in length to match remembered standards. The hypothesis is then made that the kind

of variation in background stimulation which facilitates vigilance should increase the frequency of detection of cues for duration and reduce reproduced judgments. This hypothesis is tested with 80 subjects and a reversal of the serial reproduction effect is found on trials with changed background conditions.

**A67-80710**
**TIME FOR TRANSITIONS BETWEEN HAND AND FOOT RESPONSES IN A SELF-PACED TASK.**
Patrick M. A. Rabbitt (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
*Quarterly Journal of Experimental Psychology,* vol. 18, Nov. 1966, p. 334–339. 10 refs.

In a self-paced task subjects responded to each of four equally probable signals with a different one of their four limbs. Response times were examined as a function of the 16 possible transitions between limbs. Repeated responses were shown to be faster than any other transitions, while responses following responses with an ipsilateral limb were relatively slow. The implications of these results for models for the "repetition effects" are discussed.

**A67-80711**
**TRANSFER OF TRAINING AFTER GUIDANCE OR PRACTICE.**
A. W. Macrae and D. H. Holding (Leeds U., Great Britain).
*Quarterly Journal of Experimental Psychology,* vol. 18, Nov. 1966, p. 327–333. 9 refs.
Sci. Res. Council supported research.

On a pursuit tracking apparatus presenting target courses of three levels of complexity, provision was made for either normal practice or forced-response guidance; the guidance training was gained by holding the control knob during automatic tracking. After five training trials on the most complex course, or on the simplest course, subjects were transferred to the intermediate course. The effects of guidance on the intermediate course were also examined. Normal practice on the simple course produced more transfer than normal practice on the most complex. Further, guidance on the complex course gave significantly better transfer than did practice on that course. The superiority of guidance is tentatively ascribed to the opportunity it provides for the development of anticipation.

**A67-80712**
**CHANGES IN THE AMOUNT OF URINARY ANDROGEN HORMONES IN STUDENTS DURING INTENSIVE INTELLECTUAL WORK.**
T. Gotsev, As. Ivanov, N. Nachev, Tsv. Bratanova, St. Belcheva, and L. Jordanova.
*Nauchni Trudove,* vol. 45, no. 2, 1966, p. 15–19. 8 refs.

Daily urinary 17-ketosteroid excretion was determined in students between 20–30 years of age (22 men and 5 women) one month prior to examination, one day before and one day after an examination. Analysis of the results showed that in the majority of cases daily urinary 17-ketosteroid excreted one day before and one day after the examination was significantly increased in comparison with the amount excreted one month before the examination. It was postulated that intensive intellectual work caused an increase in ACTH excretion and activation of adrenocortical function, thereby leading to an increase in urinary 17-ketosteroid excretion.

**A67-80713**
**SHORT-TERM MEMORY FOR WORD SEQUENCES AS A FUNCTION OF ACOUSTIC, SEMANTIC AND FORMAL SIMILARITY.**
A. D. Baddeley (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
*Quarterly Journal of Experimental Psychology,* vol. 18, Nov. 1966, p. 362–365. 8 refs.

Experiment I studied short-term memory (STM) for auditorily presented five word sequences as a function of acoustic and semantic similarity. There was a large adverse effect of acoustic similarity on STM (72.5%) which was significantly greater ($p < 0.001$) than the small (6.3%) but reliable effect ($p < 0.05$) of semantic similarity. Experiment II compared STM for sequences of words which had a similar letter structure (formal similarity) but were pronounced differently, with acoustically similar but formally dissimilar words and with control sequences. There was a significant effect of acoustic but not of formal similarity. Experiment III replicated the acoustic similarity effect found in Experiment I using visual instead of auditory presentation. Again a large and significant effect of acoustic similarity was shown.

**A67-80714**
**THYROCALCITONIN AND THE RESPONSE TO PARATHYROID HORMONE.**
Constantine Anast, Claude D. Arnaud, Howard Rasmussen, and Alan Tenenhouse (Pa. U., School of Med., Dept. of Biochem., Philadelphia and Mo. U., School of Med., Dept. of Pediat., Columbua).
*Journal of Clinical Investigation,* vol. 46, Jan. 1967, p. 57–64. 28 refs.
Grants NIH AM-09650, AM-09494-01, and AM-01351-08.

In the absence of the thyroid gland, the infusion of parathyroid hormone leads to a prompt rise in plasma calcium and to prompt increase in the rate of excretion of calcium in the urine. In the presence of the thyroid gland, the parathyroid hormone-induced rise in plasma calcium is less marked; the rate of urinary calcium excretion falls initially and rises only after 20 to 30 hours of continuous parathyroid hormone infusion. The infusion of exogenous thyrocalcitonin along with the parathyroid hormone into a thyroparathyroidectomized animal leads to a pattern of response similar to that seen in the animal with an intact thyroid gland. Thyrocalcitonon has little apparent effect upon the immediate changes in renal function induced by parathyroid hormone. It is concluded that bone is a major site of action of thyrocalcitonin and that it probably inhibits bone resorption.

**A67-80715**
**BIOLOGICAL ACTION OF 240 MEV ENERGY PROTONS [O BIOLOGICHESKOM DEISTVII PROTONOV S ENERGIEI 240 MEV].**
IU. I. Moskalev and I. K. Petrovich.
*Radiobiologiia,* vol. 6, no. 5, 1966, p. 651–659. 8 refs. In Russian.

An extensive study of the biological effect of 240 MeV protons on white rats showed that the lethal dose ($LD_{50}$) of this radiation can be achieved by combinations of the time of exposure and amount at each single dose such as seven days at 776 rads or fifteen days at 736 rads, etc. Leucopenia was evident 3–14 days after the beginning of irradiation and was followed by normalization within one two months, and a development of myelogenous leukemia within 16–18 months

at the end of exposure. Only after very high doses was mild anemia developed. The most frequent type of malignancy caused by 240 MeV protons was neoplasma of the mammary glandular tissue.

**A67-80716**
**SPECIAL REVIEW. PART I. PHYSIOLOGICAL EFFECTS OF EXTREME HEAT.**

Jeddi Hasan, Martti J. Karvonen, and Pekka Piironen (Inst. of Occupational Health and Lab. of the Sauna Soc., Helsinki, Finland).

*American Journal of Physical Medicine,* vol. 45, Dec. 1966, p. 296–314.
Grant AF EOAR 65-71.

A review is presented of the literature up to 1962 dealing with the immediate effects of a sauna bath on normal human physiology. Included is most of the general literature dealing with the physiological effects of ambient air temperature above 60°C. Sauna bathing essentially consists of exposure (in the resting state) to an extremely hot and relatively dry atmosphere with alternate exposures to cold water and atmospheric heat as well as bodily washing. The topics discussed are as follows: (1) the prototype sauna and taking a bath; (2) exposure to ambient heat (exchange of water vapor, convective heat and radiant heat exchange, body temperature); (3) energy expenditure; (4) water balance (sweating, rate of sweating, composition of sweat, urine excretion, plasma electrolytes); (5) pulmonary ventilation; and (6) blood changes (erythrocytes, leukocytes, erythrocyte sedimentation rate and fibrolysis, blood chemistry).

**A67-80717**
**A COMPUTER-AIDED INSTRUMENTATION SYSTEM FOR STUDIES IN TACTUAL PERCEPTION.**

J. C. Bliss and H. D. Crane (Stanford Res. Inst., Menlo Park, Calif.).

*Bio-Medical Engineering,* vol. 1, Dec. 1966, p. 591–596. 9 refs.

A system consisting of a small digital computer, special electronic equipment, and an array of tactile stimulators has been developed for investigation of human perception of spatial-temporal patterns displayed tactually. The system can present tactual patterns consisting of up to 96 stimulators according to several scan routines, present a number of patterns in sequential order, and record and tabulate the subject's responses. The design of the airjet stimulator and a computer-aided instrumentation system is diagrammed and described in detail. Discussion is included of tactual perception studies being undertaken with this equipment.

**A67-80718**
**TURNOVER OF INDIVIDUAL PHOSPHOLIPID FRACTIONS IN THE RAT BRAIN DURING HYPOXIA.**

V. Ya. Dvorkin (USSR, Acad. of Sci., I. P. Pavlov Inst. of Physiol., Leningrad).

*Nature,* vol. 212, Dec. 10, 1966, p. 1239–1240. 6 refs.

Immediately after subcutaneous injection of radioactive phosphate (5 μc. of labelled sodium phosphate) male rats were subjected to hypoxia in a barometric chamber. Group 1, consisting of 41 rats, was exposed to a pressure of 240 mm. Hg for two hr. (moderate hypoxia). Seizures and death occurred only in single cases. Group 2, consisting of 39 rats, was subjected to severe hypoxia (180 mm. Hg or lower). In this group seizures were observed in almost all rats, and the death rate was about 40%. Controls (group 3) and experimental rats were killed after 120 min. following isotope injection and tests made of brain tissue. A two hr. exposure to low air pressure caused no marked alteration in the content of any brain phospholipid fraction even in severe cases of hypoxia. On the other hand, oxygen deprivation resulted in a decline in the rate of turnover of phosphate groups in all fractions. These changes were statistically significant, but the extent of this decrease was different for every fraction. The most pronounced decrease was different for every fraction. The most pronounced decrease in turnover rate was in the aminophosphatide and lecithin fractions; the least in the phosphatidic acid and polyglycerophosphatide fraction.

**A67-80719**
**POSSIBLE MECHANISMS OF DEPRESSION OF CEREBRAL PHOSPHOLIPID METABOLISM DURING A DEFICIENCY OF BODY OXYGEN.**

D. A. Chetverikov and S. V. Gasteva (USSR, Acad. of Sci., I. P. Pavlov Inst. of Physiol., Leningrad).

*Nature,* vol. 212, Dec. 10, 1966, p. 1236–1238.

The relative specific cerebral phospholipid radioactivity was reduced by 31% and 53% at pressures of 240 and 180 mm. Hg, respectively, in male rats kept for two hrs. in a barochamber. A study of the intensity of phospholipid metabolism of the brain during the first six hrs. of the post-hypoxic period showed that the relative specific radioactivity of phospholipid returned to normal level within the first 2–4 hrs. after the animal left the barochamber. When the floor of the barochamber was heated, a decrease in pressure to 240 mm. Hg caused the death of more than 50% of the animals. The rate of radioactive phosphorus incorporation into brain phospholipid did not differ, however, from normal values. In the next series of experiments the rats were cooled by immersion in cold water (8–10°C.) for 3–5 min., and placed in special restraining cages within the barochamber at a pressure of 240 mm. Hg. The relative specific brain phospholipid content was lowered by 54.5% relative to the normal value. In another experiment rats were divided into several groups corresponding to the degree of fall in rectal temperature and the mean value of relative specific brain phospholipid radioactivity was calculated for each group during mild and severe hypoxia. A dispersion analysis of the data showed that in conditions of lowered barometric pressure the value of the relative specific radioactivity of cerebral phospholipid depended significantly on body temperature ($P<0.001$) and was independent of air or content ($P>0.10$). Inhibition of brain phospholipid metabolism in brain oxygen deficiency appears to result from hypothermia caused by this deficiency rather than reduced oxygen content in cerebral tissues.

**A67-80720**
**ON THE BIOENERGETICS OF ASSIMILATORY CELLS OF CHLORELLA PYRENOIDOSA CHICK [O BIOENERGETIKE ASSIMILIRUIUSHCHIKH KLETOK CHLORELLA PYRENOIDOSA CHICK].**

T. A. Glagoleva and O. V. Zalenskii (USSR, Acad. of Sci., V. L. Komarov Botan. Inst., Leningrad).

*Botanicheskii Zhurnal,* vol. 51, Dec. 1966, p. 1683;1693. 19 refs. In Russian.

An investigation of the relationship of photosynthesis respiration in the intact cells of *Chlorella pyrenoidosa* Chick from the standpoint of energetics was undertaken. The rate of photophosphorylation and oxidative phosphorylation was

estimated indirectly, on the basis of the data of the work that can be performed by the cells at the expense of ATP. One of the processes, known to require the energy, is the biosynthesis of polysaccharides. Therefore, this process was chosen as an index for the determination of the phosphorylation rate. The rate of biosynthesis of polysaccharides was estimated on the basis of the intensity of incorporation of $C^{14}$ into these compounds. The suspension of *Chlorella pyrenoidosa* after photosynthesis in the atmosphere with $C^{14}O_2$ was exposed to different gas mixtures. It was necessary to discern the photophosphorylation and oxidative phosphorylation. A conclusion was drawn that the energy necessary for biosynthesis of polysaccharides in the light is supplied exclusively at the expense of photophosphorylation. In the dark oxygen was necessary for this biosynthesis. Such a conclusion was arrived at on the basis of the results of the experiments in the dark where the rate of biosynthesis of polysaccharides was correlated with the concentration of oxygen. In the light the rate of biosynthesis of polysaccharides did not depend on the concentration of oxygen. The work on the biosynthesis of polysaccharides performed in the dark by oxydative phosphorylation amounted to 30-40% of that performed in the light when photo-phosphorylation took place. The exclusion of $CO_2$ from the atmosphere decreased the incorporation of $C^{14}$ into polysaccharides approximately by 25-30%.

**A67-80721**
**ELECTROGRAPHIC DATA ON THE WORK OF BIOLOGICAL CLOCKS [ELEKTROGRAFICHESKIE DANNYE O RABOTE "BIOLOGICHESKIKH CHASOV" GOLOVNOGO MOZGA CHELOVEKA].**

L. G. Voronin and V. F. Konovalov (S. M. Kirov Mil.-Med. Acad., Leningrad, USSR).

*Voprosy Psikhologii,* vol. 12, Nov.-Dec. 1966, p. 87-94. 27 refs. In Russian.

Some electrographic indices—electroencephalogram, electrodermal response and eye movement manifested as the reflex to time in trace conditioning—were investigated with the help of the polygraphic registration procedure. The schedule of experiments was as follows. A sound stimulus (the conditioned stimulus) was coupled with a light stimulus (the reinforcement). The interval between these stimuli was 60 sec. The dynamics of electrographic reactions in the process of formation of the link between the coupling stimuli was described. The possible mechanisms involved in the counting off time by the human brain are discussed in the paper.

**A67-80722**
**THE SIGNIFICANCE OF A STATISTICAL STRUCTURE IN CASE OF THE SIMPLY DETERMINED RESPONDING TO SIGNALS OF TWO TYPES [ZNACHENIE STATISTICHESKOI STRUKTURY PRI ODNOZNACHNO-DETERMINIROVANNOM REAGIROVANII NA SIGNALY DVUKH VIDOV].**

V. A. Bodrov, A. A. Genkin, and G. M. Zarakovskii (S. M. Kirov Mil.-Med. Acad., Leningrad, USSR).

*Voprosy Psikhologii,* vol. 12, Nov.-Dec. 1966, p. 77-86. 26 refs. In Russian.

The study investigates features of man's determined responses to binary sequences of signals of a certain statistical structure. It was found that the frequence of errors increases as the probability of signal occurrence decreases both in case of positive and in case of inhibitory choice, as well as while performing mental operations. An analysis of data obtained suggests that there are two types of behavioral responding in man (according to the criterion of the influence of probabalistic characteristics of the environment): simply determined and stochastically determined. It is assumed that the stochastically determined type of behavior should be referred to the information processing through the automatized channel and by its physiological mechanism—to sterotype activity of the CNS. The sociobiological significance of stochastic responding consists of releasing the informational capacity of the higher parts of the brain for searching activity and of securing the behavioral reliability when conditions of responding worsen.

**A67-80723**
**MODIFICATION BY BETA-ADRENERGIC BLOCKADE OF THE CIRCULATORY RESPONSES TO ACUTE HYPOXIA IN MAN.**

David W. Richardson, Hermes A. Kontos, A. Jarrell Raper, and John L. Patterson, Jr. (Va. Med. Coll., Dept. of Med., Richmond).

*Journal of Clinical Investigation,* vol. 46, Jan. 1967, p. 77-85. 29 refs.
Grants DA MD 49-193-65-9153, NIH H-3361, HTS-5573, and FR 00016-02.

In 17 healthy men, beta-adrenergic blockade reduced significantly the tachycardia and the elevation of cardiac output associated with inhalation of 7.5% oxygen for seven to ten min. Hypoxia did not increase plasma concentrations of epinephrine or norepinephrine in six subjects. Furthermore, blockade of alpha and beta receptors in the forearm did not modify the vasodilation in the forearm induced by hypoxia, providing pharmacologic evidence that hypoxia of the degree and duration used was not associated with an increase in the concentrations of circulating catecholamines in man. Part of the increase in cardiac output and heart rate during acute hypoxia in man is produced by stimulation of beta-adrenergic receptors, probably by cardiac sympathetic nerves. The mechanism of the vasodilation in the forearm during hypoxia remains uncertain.

**A67-80724**
**SOME CARDIOVASCULAR AND RESPIRATORY REACTIONS OF THE CREWMEN DURING THE VOSKHOD-2 ORBITAL FLIGHT [NEKOTORYE REAKTSII SERDECHNO-SOSUDISTOI I DYKHATEL'NOI SISTEM KOSMONAVTOV V ORBITAL'NOM POLETE NA KOSMICHESKOM KORABLE "VOSKHOD-2"].**

I. I. Kas'ian, P. V. Vasil'ev, D. G. Maksimov, I. T. Akulinichev, A. E. Uglov, A. E. Baikov, and N. A. Chekhonadskii.

*Izvestiia Akademii Nauk SSSR, Seriia Biologicheskaia,* no. 1, Jan.-Feb. 1967, p. 104-115. 9 refs. In Russian.

It has been shown that orbital flight of the Voskhod-2 spacecraft and extravehicular excursion caused no severe changes in the functional state of the crewmen or deteriorations of their performance. The command pilot P. I. Beliaev exhibited a most pronounced cardiovascular and respiratory reaction during the second (when the pilot returned to the spacecraft) and 17th (when he performed manual control of the spacecraft) orbits. The second pilot A. A. Leonov showed the highest reaction during his extravehicular excursion and return aboard the spacecraft (the second orbit). The changes were related to a great emotional strain caused by the fulfillment of most complicated tasks.

A67-80725
**ADAPTATION TO COLD IN THREE HOURS.**
Jacques Leblanc (Laval U., School of Med., Dept. of Physiol., Quebec City, Canada).
*(Intern. Symp. on Temperature and Altitude, Kyoto, Japan, 1966).*
*American Journal of Physiology*, vol. 212, Feb. 1967, p. 530–532. 14 refs.

It was shown in previous studies that rats kept continuously at 6°C. become adapted only after three–four weeks exposure. Increased survival and protection against frostbite at extreme temperatures are given as evidence of this adaptation. Using the same criteria it was shown that adaptation can be obtained in a much shorter time. Indeed 15 exposures of 10-min. duration at −29°C. over a period of two days were sufficient to develop adaptation as estimated by the tests mentioned above. In this short term adaptation increased sensitivity to noradrenaline was not detected. By reference to previous recent studies in humans and to the present investigation it is concluded that adaptation to cold can be achieved in much shorter time than has been previously suspected.

A67-80726
**METABOLIC CHANGES IN RATS EXPOSED TO AN OXYGEN-ENRICHED ENVIRONMENT.**
A. D. Bond, John Patrick Jordan, and John B. Allred (Oklahoma City U., Dept. of Chem., Okla.).
*American Journal of Physiology*, vol. 212, Feb. 1967, p. 526–529. 23 refs.
NASA Grant NsG 300.

Male Holtzman rats were maintained in an oxygen atmosphere at 259 mm. Hg for periods as long as 90 days. Acetylative capacity of tissues (coenzyme A concentration) was observed to decrease during the first four–five weeks to approximately 50% of control values. Longer exposure resulted in restoration of normal activity. Incorporation of ($^{14}C$) acetate into lipid was seen to decrease and reapproach normal in a parallel manner. Conversion of ($^{14}C$) acetate to $^{14}CO_2$ also was found to decrease during initial exposure and later reapproach normal.

A67-80727
**TIME-DEPENDENT RESPONSES OF BROWN FAT IN COLD-EXPOSED RATS.**
Jane C. Roberts and Robert E. Smith (Calif. U., School of Med., Dept. of Physiol., Los Angeles).
*American Journal of Physiology*, vol. 212, Feb. 1967, p. 519–525. 50 refs.
NASA Grant NsG 721 and Grant PHS HD-01826.

Brown fat of rats exposed to cold for one hr. to 60+ days has been examined for time-dependent changes in mass, composition, $q_{O_2}$ ($\mu$1. $O_2$/mg. N per hr.) and estimated caloric output. In both homogenate and mitochondrial ($M_w$) systems the $q_{O_2}$ was depressed in rats exposed to cold for three hr. In the $M_w$ this returned to control values by six hr. and in homogenates by 12–24 hr. Near maximum $q_{O_2}$'s were reached in all systems by eight days. Brown fat mass increased on exposure to cold and reached near maximum levels by eight days, whereas the nitrogen content (mg. N/g.) continued to increase throughout the period of exposure. Estimated heat production of brown fat from 60-day cold-acclimated rats was some five to eight times higher than the control levels. The coincidence between the development of the increased potential for heat production in brown adipose tissue and the onset of nonshivering thermogenesis in the cold-exposed rat is discussed.

A67-80728
**TEMPERATURE REGULATION AND EVAPORATIVE COOLING IN THE OSTRICH.**
Eugene C. Crawford, Jr. and Knut Schmidt-Nielsen (Duke U., Dept. of Zool., Durham, N. C.).
*American Journal of Physiology*, vol. 212, Feb. 1967, p. 347–353. 23 refs.
Grants NIH HE-02228, 5 T1GM929, 1-F2-HE24619, and 1-K6-GM-21,522.

Cloacal temperature, respiratory rate, evaporative water loss, and oxygen consumption were determined in a 100-kg. ostrich. Normal cloacal temperature was about 39.3°C. and remained unchanged at 51°C. ambient temperature. At low ambient temperature the respiratory rate was about 5/min., increasing at 25°C. to 45/min. with no intermittent rates. The rate did not increase further as ambient temperature was raised to 51°C. At low ambient temperature respiratory evaporation was 0.4 g. $H_2O$/min. At 20–25°C. the evaporation began to increase and reached 4.5 g./min. at 45°C. Since evaporation increased throughout this temperature range without change in respiratory rate, it appears that tidal volume increased. Metabolic rate was about 455 ml. $O_2$/min. Little change occurred as ambient temperature increased from 20 to 45°C. When exposed to temperatures of 25°C. or higher the ostrich fluffed its feathers, increasing the thickness of the feather layer about 7 cm. After seven days without drinking and daily exposure to 45°C. for 7.5 hr., the bird lost 14% of its initial body weight. Tissue loss due to starvation was estimated at 3% of the initial weight, the remainder being water loss. After seven days the evaporation and respiratory rate during heat exposure were reduced to about one-half the values on the first day, and body temperature had increased 4°C.

A67-80729
**INHALATION OF OXYGEN AND CARBON DIOXIDE GAS.**
John S. Meyer, Fumio Gotoh, and Yasuyuki Takagi (Wayne State U., Dept. of Neurol., Detroit Gen. Hosp., Wayne Center for Cerebrovascular Res., Harper Hosp., Detroit, Mich. and Keio U., Dept. of Internal Med., Tokyo, Japan).
*Archives of Internal Medicine*, vol. 119, Jan. 1967, p. 4–15. 18 refs.
PHS and Detroit Gen. Res. Corp. supported research.

Inhalation of various gas mixtures was used to challenge the capacity of cerebral vasomotor reactivity in subjects with and without cerebrovascular disease and of different age groups. Effects of inhalation of 100% $O_2$, 5% $CO_2$ plus $O_2$, and 5% $CO_2$ plus air on the composition of arterial and jugular blood were measured. Blood $P_{O_2}$, $P_{CO_2}$ and pH were continuously recorded. No relationship was found between the state of consciousness or any electroencephalogram abnormality and the cerebral vasomotor response to the challenge gas mixtures. Inhalation of 100% oxygen or 5% $CO_2$ plus oxygen increases the oxygen available to the ischemic or anoxic brain and, therefore, appears to be a justifiable form of therapy in occlusive cerebrovascular disease (stroke).

A67-80730
**THE INFLUENCE OF MANNED SPACE FLIGHT ON CARDIOVASCULAR FUNCTION.**
L. E. Lamb (School of Aerospace Med., Brooks AFB, Tex.).
*Cardiologia*, vol. 48, 1966, p. 118–133. 18 refs.

Manned space flight alters cardiovascular function. Confinement and weightlessness cause function changes similar

to inactivity, designated as cardiovascular deconditioning. This includes decreased exercise and orthostatic tolerance. The influence of weightlessness as a separate environmental factor cannot yet be determined since manned space flights involve multiple changes in environmental factors that also affect cardiovascular function. Preliminary data and laboratory studies suggest that with a good life support system man can tolerate the weightlessness of space flight for at least one month.

**A67-80731**

**SOME DATA OF PENTOSE-PHOSPHATE CYCLE IN ACUTE RADIATION SYNDROME IN DOGS [NEKOTORYE POKAZATELI PENTOZOFOSFATNOGO TSIKLA PRI OSTROI LUCHEVOI BOLEZNI U SOBAK].**

R. V. Trebukhina (Grodno State Med. Inst., USSR).

*Radiobiologiia*, vol. 6, no. 5, 1966, p. 766-768. 10 refs. In Russian.

Radiation sickness was induced in dogs by exposure to X-rays. The symptoms appeared within two three days, and the animals died 10 15 days after irradiation. During this period the blood was analyzed for the intermediary compounds and their enzymes of the pentose-phosphate cycle. The results showed a drop in the transketolase activity which may indicate a secondary adaptation mechanism because of the suppression of the pentose concentration in blood at the onset of sickness. The normal concentration of pyrorasemic acid indicated a relative stability of glycolysis after the irradiation. It could be concluded that in acute radiation sickness suppression of the early phase of the pentose-phosphate cycle took place. The transketolase was the most affected enzyme of the reaction. It may have a relationship to the distribution of thiamine in animal tissues by radiation.

**A67-80732**

**PHYSIOLOGICAL MECHANISMS OF THE EFFECT OF EXTERNAL CONTRAPRESSURE (COMPENSATION) ON RESPIRATION IN EXCESSIVE INTRAPULMONARY PRESSURE [FIZIOLOGICHESKIE MEKHANIZMY VLIIANIIA VNESHNEGO PROTIVODAVLENIIA (KOMPENSATSII) NA DYKHANIE PRI IZBYTOCHNOM VNUTRILEGOCHNOM DAVLENII].**

V. A. Safonov (M. V. Lomonosov Moscow U., Dept. of Animal Physiol., USSR).

*Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia*, vol. 10, Nov.-Dec. 1966, p. 85-88. 29 refs. In Russian.

A review of the recent experimental data on the mechanisms of the compensation of thorax and abdominal muscles in cases of increased intrapulmonary pressure indicated a role for muscles of the extremities, neck and head. The important factor in this mechanism is the normalization of blood circulation which may be disturbed due to the change in pressure which affects the reflex action on the regulatory systems of respiration.

**A67-80733**

**SOME MATERIALS ON BLASTOMOGENOUS EFFECT OF IONIZING RADIATION UPON TISSUE STRUCTURE OF THE CENTRAL NERVOUS SYSTEM [MATERIALY K IZUCHENIIU BLASTOMOGENNOGO DEISTVIIA IONIZIRUIUSHCHEI RADIATSII NA TKANEVYE STRUKTURY TSENTRAL'NOI NERVNOI SISTEMY].**

I. N. Dimant, D. M. Abdurasulov, G. M. Loktionov, A. G. Stoliarova, and M. M. Sataev (Min. of Health, Sci.-Res. Inst. of Roentgenol., Radiol., and Oncol., Sect. of Exptl. Oncol., Tashkent, UzbekSSR).

*Arkhiv Anatomii Gistologii i Embriologii*, vol. 51, Dec. 1966, p. 61-70. 16 refs. In Russian.

A brief review of the papers bearing on radiation cancerogenesis in the central nervous system tissues and the authors' personal data on the problem have been presented. The experiments were conducted on ten rabbits and five dogs. The animals were subjected to implantation of granules $Co^{60}$ (activities of 15 and 30 $\mu c$.) into the cerebral matter. To screen $\beta$-irradiation the granules were coated with a paraffin layer one mm. thick. Within 258-430 days cerebral neoformations were developed in five rabbits. Histologically they were tumors of the meningo-vascular type (four animals and complex bidermal-type tumor with derivates of mesenchyme and neuroectoderm (one animal). In two dogs, besides radionecrosis zones, there were revealed focal polyfractional porliferates of the microblastoma type, resembling in their strue a stage of neoplasma formation. On the 815th day one dog exhibited an extensive tumor of the nondifferentiated malignant glioma type. Detailed morphological and biological characteristics of the induced neoformations are also presented.

**A67-80734**

**MARROW DEVASTATION AS A QUANTITATIVE CRITERION OF RADIATION DAMAGE. I. ON THE CHOICE OF THE PERIOD FOR PLOTTING THE DOSE RESPONSE CURVES [OPUSTOSHENIE KOSTNOGO MOZGA KAK KOLICHESTVENNYI KRITERII LUCHEVOGO PORAZHENIIA. I. VYBOR SROKA DLIA POSTROENIIA KRIVYKH DOZA-EFFEKT].**

E. N. Kabakov, N. N. Perestoronina, V. G. Gorbunova (USSR, Acad. of Med. Sci., Inst. of Med. Radiol., Obinsk).

*Radiobiologiia*, vol. 6, no. 6, 1966, p. 779-782. 10 refs. In Russian.

The results of the exposure of mice and rats to gamma radiation from $Co^{60}$ suggested that this effect can be used in estimating the degree of radiation damage to the animal organism. The initial suppression of mature cell count in the peripheral blood and the marrow of long bones can be used only after four days in order to get a characteristic dose-effect curve. In peripheral blood leucopenia and the process of regeneration depended on the dose used. The findings of the number of karyocytes in the blood analysis and the bone marrow showed a close correlation in the graphic form; and the number of myelokaryocytes appeared to be a linear function of the dose used.

**A67-80735**

**A BLOCKINGMETER FOR FLIGHT APTITUDE TEST.** Haruo Ikegami.

*Japanese Journal of Aerospace Medicine and Psychology*, vol. 4, Dec. 1966, p. 1-4. In Japanese.

A blockingmeter was devised in order to detect involuntary short intermission of the mental activity during the simple calculation test for the evaluation of flying fitness. The instrument is composed of two indicators, an integrator, two hand switches and a recorder. The indicators indicated two numerals in random arrangement by means of two electromagnetic rotary switches. The integrator integrated a steady input. The recorder recorded the output of the integrator with a slow paper speed. The subjects added the two numerals shown in the indicators, and pushed the hand switches

when answered orally. One hand switch acted as a trigger of the rotary switches to indicate new numerals in the indicators to which the subjects answer again. The other hand switch discharged the condenser in the integrator to nullify the output. The recorded graphs showed the length of each internal between the indication of the question and the answer. With this method mental performance of the subject was measured frequently, once every second or so, and any short intermission of the mental activity could be detected.

**A67-80736**
**AN EXACT TEST OF THE SIZE-DISTANCE INVARIANCE HYPOTHESIS.**

M. L. Cook (Australian Natl. U., Canberra).

*American Journal of Psychology,* vol. 79, Dec. 1966, p. 568–575. 13 refs.

It has often been suggested that visual space is so structured, that the ratio of perceived size to perceived distance is proportional to the corresponding ratio of physical size to distance. A common method of testing this hypothesis employs size and distance matching techniques. The validity of this procedure as an exact test of the hypothesis, is dependent upon certain assumptions which are not empirically justified. A modification of the usual technique is suggested which enables the hypothesis to be tested without making these assumptions. An experiment employing this procedure, under monocular viewing conditions, failed to confirm the hypothesis.

**A67-80737**
**SERIAL REACTION-TIME AND THE TEMPORAL PATTERN OF PRIOR SIGNALS.**

William Bevan, Lloyd L. Avant, and H. G. Lankford (Kan. State U., Manhattan).

*American Journal of Psychology,* vol. 79, Dec. 1966, p. 551–559. 23 refs.
Contract Nonr-3634(01).

This experiment examined the relationship between response-latency to serially-presented simple visual signals and the frequency-distribution of presentation-intervals within the stimulus-series, when mean duration, range of duration, and the number of different sized intervals was held constant. A total of 200 men were tested with the following types of distributions: constant interval; normal variable interval; skewed variable interval; bimodel variable interval, and rectangular interval. No differences among the series means were obtained for any of the distributions. Response-times were shortest, however, for the mean as compared to the other intervals used in the adaptation-series. The subjects also were given one additional test-trial. Response-latencies were shortest when this test-interval corresponded to the mean of the series, and was longer as the test-interval deviated from the mean. Again, the statistical structure had no relationship to response on the test-trial. Variability of response differed among the several types of distribution, but the significance of this variability is obscure. These results emphasize the role of the mean interval—in contrast to the statistical shape of the interval program—as a determinant of the occurrence of signals on successive trials.

**A67-80738**
**EFFERENT INHIBITION OF AUDITORY-NERVE RESPONSES: DEPENDENCE ON ACOUSTIC-STIMULUS PARAMETERS.**

Michael L. Wiederhold and William T. Peake (Mass. Inst. of Technol., Res. Lab. of Electron. and Dept. of Elec. Eng., Cambridge and Mass. Eye and Ear Infirmary, Eaton–Peabody Lab., Boston).

*Journal of the Acoustical Society of America,* vol. 40, Dec. 1966, p. 1427–1430. 21 refs.
NASA, NSF, PHS, and Joint Serv. Electron. Program supported research.

Electrical stimulation of the crossed olivocochlear bundle in anesthetized cats reduces auditory-nerve responses ($N_1$) if the acoustic stimuli are at low sound-pressure levels but does not produce detectable changes in neural responses for click stimuli of more than 60 to 70 db. above visual-detection level for $N_1$. When the sound-pressure levels of high-frequency (10,000 Hz) and low-frequency (400 Hz) transient acoustic stimuli were matched according to a physiological criterion, the neural response to the high-frequency stimulus was reduced more by olivocochlear-bundle stimulation than the response to the low-frequency stimulus. These results suggest certain characteristics for the mechanisms which influence the activity of single auditory-nerve fibers.

**A67-80739**
**CHARACTERISTICS OF LACTIC ACID PRODUCTION IN SUBMAXIMAL EXERCISE.**

Hisashi Saiki, Rodolfo Margaria, and Franco Cuttica (Milan U., Ist. di Fisiol. Humana, Italy).

*Japanese Journal of Aerospace Medicine and Psychology,* vol. 4, Dec. 1966, p. 5–13. 13 refs. In Japanese.

Lactic acid, (LA) was measured in the blood of subjects performing an exercise (running on a treadmill) involving from 70% to about 100% of their maximum $O_2$ consumption. The results were as follows: (1) The fact that L.A. was produced only at the onset of the sub-maximal level exercise, was clarified. (2) The fact that increasing of L.A. did not take place after 3–4 min. of exercise, was shown. (3) Such behavior of L.A. in the blood is a substantially different one compared with the case of super-maximal exercise. (4) L.A. increasing rate ($\Delta$ mg.%) is only 10–20 mg. for 100 cc. of blood at the onset of the exercise, 70–80% of maximal aerobic exercise. And this L.A. is finally reduced to zero. (5) Evidence is therefore given that when the exercise is submaximal no L.A. formation takes place at the the steady state. It may be built only at the onset of this exercise, during the transitory anaerobic phase met before a steady level of $O_2$ consumption is reached.

**A67-80740**
**THE FUNCTIONAL RELATION OF VISUAL EVOKED RESPONSE AND REACTION TIME TO STIMULUS INTENSITY.**

H. G. Vaughan, Jr., L. D. Costa, and L. Gilden (Albert Einstein Coll. of Med., New York, N. Y.).

*(Am. Physiol. Assn., 72nd Ann. Meeting, Sep. 1964).*
*Vision Research,* vol. 6, Dec. 1966, p. 645–656. 29 refs.
Grants PHS NB-03356, MH-06723, and MH-6418.

Latency of the average visual evoked response (VER) and motor reaction time (RT) were studied as a function of stimulus intensity for brief photic stimuli subtending 4° and 1.5° of visual angle in two subjects. Both VER latency and RT showed an accelerating increase for each tenfold diminution in intensity down to the region of foveal threshold. Below foveal threshold no responses were obtained for the 1.5° stimuli; there was an inflexion in the VER latency and RT curve of responses to the 4° stimuli. Over the photopic range of intensities, VER latency and RT were closely described by power

functions varying in exponent from −0.29 to −0.44. The values for VER were −0.36 for the 4° stimuli and −0.40 for the 1.5° stimuli, which were significantly different ($p < 0.01$). Although latency of VER was the same for both subjects for each stimulus condition, RT showed a consistent difference between subjects of about 25 msec. RT is considered to be determined by at least two independent mechanisms. The first, retinal in location, follows a power function of intensity; the second is related to variability in efferent processes.

**A67-80741**
**INTENSITY AND THE EVOKED OCCIPITOGRAM IN MAN.**

T. Shipley, R. Wayne Jones, and Amelia Fry (Miami U., School of Med., Bascom Palmer Eye Inst., Dept. of Ophthalmol., Fla.).

*Vision Research,* vol. 6, Dec. 1966, p. 657–667. 11 refs.

Individual differences in the waveforms of the visually evoked occipitograms in three trained observers have been shown to persist over 4–5 log units of stimulus intensity. In addition, some differences in the waveforms evoked by different monochromatic lights are reported for color-normal observers. The waveforms for one deuteranomalous observer are indistinguishable despite changes in both wavelength and intensity. In the normal observers, however, the waveforms do change as a function of intensity. For some colors these changes are such as to transform the responses for one wavelength into those for another. For some other colors, waveform differences persist despite intensity changes.

**A67-80742**
**BRIGHTNESS ENHANCEMENT AND OPPONENT-COLORS THEORY.**

Gerald S. Wasserman (Mass. Inst. of Technol., Dept. of Psychol., Cambridge).

*Vision Research,* vol. 6, Dec. 1966, p. 689–699. 42 refs.
NASA Grant NsG 496 and Grant NIMH F1 MH-22,408-02.

An opponent-colors analysis of brightness enhancement is presented which postulates that enhancement is a manifestation of wavelength-dependent transient retinal activity in the two chromatic systems of opponent-colors theory. This transient activity occurs at those wavelengths which are perceived as unique hues. Brightness enhancement was measured as a function of wavelength, and the location of the unique hues in the spectrum was also determined. Enhancement was found to be maximal for wavelengths that were perceived as unique hues, and minimal or absent for other wavelengths.

**A67-80743**
**DEPENDENCE OF VISUAL TRACKING CAPABILITY UPON STIMULUS PREDICTABILITY.**

Joel A. Michael and Geoffrey Melvill Jones (McGill U., Aviation Med. Res. Unit., Montreal, Quebec, Canada).

*Vision Research,* vol. 6, Dec. 1966, p. 707–716. 15 refs.
Grant DRB, Canada 9310-92.

A technique for generating tracking stimuli of various degrees of predictability was developed in order to examine the relationship between stimulus predictability and the responses of the visual tracking system. The stimuli consisted of narrow but variable bandwidths of Gaussian random noise centered about the desired test frequency. The stimuli were presented to ten subjects and their tracking eye movements were recorded electro-oculographically onto magnetic tape. Also recorded were the stimuli and their quadrature components. These signals permitted the phase shift between the stimulus and the response to be determined. The results indicate that the functional effectiveness of the response, measured by the phase shift between stimulus and response, is systematically dependent on the predictability of the stimulus. This is shown by the statistically significant ($p < 0.001$) increase in phase shift with increasing unpredictability (i.e. increasing bandwidth) of the stimulus. The possible significance of the predictive capabilities of the visual tracking system is that it may contribute to the maintenance of visual acuity under normally encountered patterns of head and target movement.

**A67-80744**
**INFLUENCE OF A CHANGE IN SYSTEM CRITERIA ON TEAM PERFORMANCE.**

George E. Briggs and William A. Johnston (Ohio State U., Columbus).

*Journal of Applied Psychology,* vol. 50, Dec. 1966, p. 467–472.
Contract Navy N61339-1327.

In a simulated ground-controlled aerial intercept task, two-man teams of radar controllers transferred to either simple or complex criterion conditions following training under simple criteria. Upon transfer to simple criterion conditions, teams adapted performance rapidly to the new criterion; however, upon transfer to complex criteria, teams continued to emphasize that aspect of performance appropriate during the previous simple criterion conditions.

**A67-80745**
**ROLE OF VERBAL COMMUNICATION IN TEAMWORK.**

Robert C. Williges, William A. Johnston, and George E. Briggs (Ohio State U., Columbus).

*Journal of Applied Psychology,* vol. 50, Dec. 1966, p. 473–478. 10 refs.
Contract Navy N61339-1327.

A simulated radar-controlled aerial intercept task was used to examine verbal communication between teammates under verbal (communication necessary) and verbal–visual (communication unnecessary) conditions. Communication facilitated team performance only in the verbal condition. Team performance, however, was best in the verbal–visual condition. A transfer-of-training paradigm was employed to determine if verbal skills developed in one condition would transfer to the other condition. Differential transfer occurred neither in communication behavior nor in team performance. It was concluded that verbal communication, when not required by the task, plays an insignificant role in team work, and that this role apparently is not enhanced by verbal training.

**A67-80746**
**THE PHASIC RELATION OF A COMPONENT OF ALPHA RHYTHM TO FIXATION SACCADIC EYE MOVEMENTS.**

Kenneth Gaardner, Richard Koresko, and Walter Kropfl (Walter Reed Army Inst. of Res., Dept. of Sensory Psychol. and Natl. Inst. of Mental Health, Saint Elizabeth's Hosp., Clin. Nueropharmacol. Res. Center, Washington, D. C.).

*Electroencephalography and Clinical Neurophysiology,* vol. 21, Dec. 1966, p. 544–551. 11 refs.

The two experimental variables, fixation saccadic (jumping) eye movements and occipital alpha rhythm, were studied by simultaneous recording. Noting the quadrant of alpha

cycle during which a saccade occurs establishes a reliable concrete relationship between the occurrence of a saccade and a particular quadrant in some subjects. Use of saccades to trigger a Mnemotron Computer of Averaged Transients establishes that alpha-like activity in the evoked response is phase-locked to saccades both before and after the saccade. This was found in all 12 subjects studied when alpha activity was present. Since the alpha-like component is phase-locked before as well as after a saccade, this argues against the saccade as stimulus linearly causing the locking and points to the component pacing saccades or to both saccades and the component being paced by something else. The results are interpreted in the light of a model of visual information processing in which saccades generate discontinuous packets of edge information which are cycled as short term templates at a rate reflected by the alpha component frequency.

**A67-80747**

**CORRELATION BETWEEN THE TRACE ELEMENTS AND THE ACTIVITY OF RESPIRATORY ENZYMES IN ACUTE HYPOXIC HYPOXIA [SOOTNOSHENIE MIKROELEMENTOV I AKTIVNOSTI DYKHATEL'NYKH FERMENTOV PRI OSTROI GIPOKSICHESKOI GIPOKSII].**

I. P. Popov (Donets Med. Inst., Dept. of Pathol. Physiol., USSR).

*Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* vol. 10, Nov.–Dec. 1966, p. 38–42. 19 refs. In Russian.

Experiments were made on 40 rabbits and 67 rats. The following was studied: (a) changes of the activities of respiratory enzymes cytochromoxidase, succine–dehydrogenase, catalase, carbohydrase, copper oxydase, (b) content of trace elements (copper, zinc, cobalt and iron) in the blood, brain, heart, liver, kidneys, and muscles in hypoxic hypoxia ( a rise to the "height" of 8,000 and 9,000 m. for two hours). In the rise to the "height" of 8,000 m. the activity of respiratory enzymes and trace element concentration increased in the majority of the tissues investigated. It may be supposed that trace elements and respiratory enzymes played a definite role in the pathogenesis of acute hypoxic hypoxia.

**A67-80748**

**THROMBOELASTOGRAPHIC STUDY IN RAT EXPOSED TO CHEST TO BACK ACCELERATION OF REMARKABLE INTENSITY AND VERY SHORT DURATION [DATI TROMBOELASTOGRAFICI NEL RATTO SOTTOPOSTO A DECELERAZIONI PETTO-SCHIENA DI NOTEVOLE ENTITA' E DI BREVISSIMA DURATA].**

G. Lalli and L. Cascino (Centro di Studi e Ric. de Med. Aeron. e Spaziale, Ispettorato di Sanita' Aeron., Rome, Italy).

*Rivista di Medicina Aeronautica e Spaziale,* vol. 29, Apr.–Jun. 1966, p. 181–192. 22 refs. In Italian.

A thromboelastographic research was carried out in oxalated plasmas of rats submitted to chest-to-back acceleration of about 700g, lasting a few thousandth of second. Serious pathological damages were observed, chiefly of the liver, up to a complete mash, and, consequently tissue penetrated circulation (as shown by the very remarkable increase of serum enzymes, reported in other studies). Small changes (compared to control animals) were observed in plasmas with platelets of decelerated animals, after impact; reaction time (r), clotting time (k), maximum amplitude (m.a.), and elasticity coefficient ($\epsilon$), consequently, showed a mild decrease, whereas thromboelastographic index did not show any significant changes. In the same animals the plasmas without platelets, obtained in standard conditions with siliconed glassware, showed a clearer decrease of r and k, and consequently the thromboelastographic index increased noticeably. After the impact (16–18 hr.) different results were reported: in plasmas with platelets r and k increased considerably, and consequently the thromboelastographic index decreased. In plasmas without platelets r was reported to increase clearly.

**A67-80749**

**ON THE INCREASE OF BIOLOGICAL ACTIVITY OF EXTRACTS OF THE HYPOTHALAMUS IN EARLY STAGES AFTER IONIZING RADIATION [OB UVELICHENII BIOLOGICHESKOI AKTIVNOSTI EKSTRAKTOV GIPOTALAMUSA V RANNIE SROKI POSLE VOZDEISTIIA IONIZIRUIUSHCHEI RADIATSII].**

N. P. Smirnova and L. A. Andrianova.

*Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 63, Feb. 1967, p. 25–28. 13 refs. In Russian.

Experiments on rabbits and rats showed an increase of biological activity of extracts of the hypothalamus three hr. after gamma-irradiation. In the period immediately following the exposure the extract showed an increase in antidiuretic, vassopressin and oxytocic activity. These findings show correlation with the increase in the neurosecretory function of the hypothalamus nuclei.

**A67-80750**

**THE DYNAMICS OF ALTERATION IN THE QUINONE LEVEL IN THE ORGANS AND TISSUES OF RATS EXPOSED TO HIGH ENERGY PROTONS, GAMMA-RAYS, AND FISSION NEUTRONS [DINAMIKA IZMENENIIA UROVNIA KHINONOV V ORGANAKH I TKANIAKH KRYS, OBLUCHENNYKH PROTONAMI VYSOKIKH ENERGII, GAMMA-LUCHAMI NEITRONAMI DELENIIA].**

IU. B. Kudriashov, Z. IA. Baltbarzdys, S. G. Bilushi, IU. E. Goncharenko, and P. A. Sharkovskii.

*Vestnik Moskovskogo Universiteta,* no. 6, Nov.–Dec. 1966, p. 23–26. In Russian.

High energy protons, neutrons and gamma rays produced periodic changes in the quinone concentrations in tissues of rats. A dose of 700 biological equivalent roentgen caused an increase in the liver and kidney tissues quinones, with normalization two days after the exposure. However, a second high level was observed during the second week. In the tests the effect was delayed by two days. No changes were noted in the digestive tract tissues or muscles. It was observed that different doses of each of the three types of radiation produced the same changes in the quinone concentration, which depended also on the type of tissue affected.

**A67-80751**

**PROTEIN FROM POISONOUS PRIMORDIAL SOUP.**

Graham Chedd.

*New Scientist,* vol. 32, Dec. 1, 1966, p. 505.

Current theories on the origin of life envisage amino-acids being formed before proteins. Recent experiments by C. Mathews and R. Moser show the formation of polypeptides from hydrogen cyanide. The following mechanism involved in polypeptide formation is proposed: first, the ammonia acted as a catalyst for the formation of a diradical of hydrogen cyanide, which then polymerized, forming a so-called protopolycyanide. On settling into water a number of chemical changes occurred, eventually leading to peptide, consisting of a linked chain of glycines. The other, more complex, amino acids were formed by reaction of hydrogen cyanide with the side-chains of the protopolycyanide. Most of the 20 amino

acids found in proteins could have arisen this way; the others, containing aromatic rings or sulphur atoms, would have formed through further interactions with acetylene and hydrogen sulphide, two expected components of the primitive atmosphere. It was postulated that this overall sequence proceeded in the primitive Earth's atmosphere and led to the formation of a protein-dominated layer that concentrated in the oceans of the then sterile planet. It was suggested that synthetic proteins for food may be produced from such a simple compound as hydrogen cyanide.

**A67-80752**
**LACTIC DEHYDROGENASE ACTIVITIES OF RAT HEART AND SKELETAL MUSCLE AFTER EXERCISE AND TRAINING.**

Philip D. Gollnick, Phyllis J. Struck, and Thomas P. Bogyo (Wash. State U., Dept. of Phys. Educ. for Men, Exercise Physiol. Lab. and Statist. Serv., Pullman).

*Journal of Applied Physiology*, vol. 22, Apr. 1967, p. 623–627. 24 refs.
Grant NHI HE 08262-02.

Forty-eight male albino rats were used in an investigation of the immediate and chronic effects of exercise on the lactic dehydrogenase activity of heart and skeletal muscle. The animals were allocated into two equal groups; one group was trained for five weeks and the remaining rats served as untrained controls. The training program consisted of an initial 30-min. swim which was extended to 60 min. by increasing the swim time five min. each day. Water temperature in the exercise tank was maintained at 35°C. Half of the trained and untrained animals were sacrificed 24 hr. after the last training session. The remaining rats were exercised for 30 min. immediately prior to sacrifice. On an absolute weight basis, the trained animals had heavier adrenals than the untrained controls but lighter spleens and heart ventricles. Analysis of regressed organ weights adjusted for differences in final body weights revealed that the trained animals had heavier adrenals than the controls and that the rats which were exercised prior to sacrifice had lighter spleens. Training produced a significant increase in lactic dehydrogenase (LDH) activity of the heart ventricles whereas skeletal muscle activity decreased. Exercise did not produce any change in LDH activity of either heart or skeletal muscle.

**A67-80753**
**METABOLIC RESPONSES TO SUBMAXIMAL EXERCISE IN THREE WATER TEMPERATURES.**

David L. Costill, Peter J. Cahill, and Duane Eddy (State U. Coll., Human Performance Lab., Cortland, N. Y.).

*Journal of Applied Physiology*, vol. 22, Apr. 1967, p. 628–632. 13 refs.
N. Y. State Res. Found. supported research.

Eight subjects were studied during 20 min. of submaximal swimming in three different water temperatures (17.4, 26.8, and 33.1°C.). During exercise and recovery various body temperatures, heart rates, and respiratory values were recorded. The energy requirements for the performance of exercise were not significantly affected by the water temperatures. Heart rates during recovery were found to be lowest following the exercise in 17.4°C. water and highest after the swim in water at 33.1°C. The core temperature increase during exercise was positively related to water temperature.

**A67-80754**
**PLASMA CONCENTRATION AND URINARY EXCRETION OF CERTAIN ELECTROLYTES DURING SUPINE WORK.**

M. Aurell, Mona Carlsson, G. Grimby, and B. Hood (Göteborg U., Sahlgren's Hosp., First Med. Serv., Dept. of Clin. Physiol., Sweden).

*Journal of Applied Physiology*, vol. 22, Apr. 1967, p. 633–638. 22 refs.
Swed. Life Insurance Co., Med. Res. Council supported research.

The arterial plasma concentrations of sodium, potassium, and phosphate, and the urinary excretion of these ions were studied during supine exercise of varying intensity on a bicycle ergometer in 17 healthy male volunteers. The plasma concentration of sodium remained constant during exercise while potassium and phosphate concentrations were found to increase significantly. The sodium excretion was found to decrease during severe exercise while the excretion varied in milder exercise. The potassium excretion increased in most subjects during milder exercise but showed a tendency to decrease during severe exercise. The phosphate excretion was found to increase markedly during exercise. It is suggested that the decreased sodium excretion during exercise is influenced not only by changes in glomerular filtration rate but also by changes in the tubular reabsorption of sodium, that potassium excretion is increased as long as the renal blood flow is not decreased below a critical level, and that the increased phosphate excretion is due to decreased relative reabsorption of phosphate.

**A67-80755**
**TYPE, EXTENT AND CODING OF UPDATED SYMBOLIC INFORMATION.**

Frank L. Vicino, Robert S. Andrews, and Seymour Ringel (U.S. Army Personnel Res. Office, Washington, D. C.).

*Human Factors*, vol. 8, Oct. 1966, p. 407–416.

This study concerned how information extraction and assimilation from dynamic visual displays are affected by three amounts of information presented (12, 18, or 24 units), three types of updating changes ("Adding", "Moving," or "Removing" units), three ways of indicating updates (double-cue coding, single-cue coding and history hard copy.). Subjects were presented successive pairs of slides with the second slide containing the updates. Speed and accuracy of extracting and assimilating the updated information were recorded. It was found that: (1) Double-cue improved extraction 97%; assimilation 57%. (2) Single-cue coding improved extraction 68%, assimilation 47%. (3) Hard copy history did not aid extraction; improved assimilation only slightly. (4) Increasing the amount of information and extent of change degraded extraction and assimilation. (5) For assimilation, double-cue coding nullified the degrading effects of increasing amount of information. (6) In both tasks, the "Removed" condition was easiest, "Added" next, and the "Moved" condition most difficult. Results indicate that major performance improvement can be achieved through coding without use of relatively costly color technique.

**A67-80756**
**SPEECH INTELLIGIBILITY FOR SPACE VEHICLES, USING NITROGEN OR HELIUM AS THE INERT GAS.**

Julian P. Cooke and Sarah E. Beard (School of Aerospace Med., Aerospace Med. Div., Brooks AFB, Tex.).

*Journal of the Acoustical Society of America*, vol. 40, Dec. 1966, p. 1450–1453. 16 refs.
AFSC supported research.

A laboratory investigation was carried out to help evaluate verbal-communication intelligibility in a man-rated altitude simulator when either helium or nitrogen was added to the oxygen atmosphere. Some eight operators and 37 male subjects were tested with a total of 16,500 random word events at pressures of five p.s.i.a. using 70:30 mixture of $O_2$:He or $O_2$:$N_2$ mixtures and also 100% oxygen at 3.5 p.s.i.a. An increased lack of intelligibility has been known to occur as gas densities have been reduced. Differences in test scores following the substitution of helium in place of nitrogen at the pressures and mixtures employed resulted in no increased loss of intelligibility other than that associated with the reduced gas density, although some modification of speech can be detected by listeners.

**A67-80757**
**MEASUREMENT OF SPECIFIC ACOUSTIC IMPEDANCE.**
Joseph Wood Rogers (Bucknell U., Lewisburg, Pa.).
*Journal of the Acoustical Society of America*, vol. 40, Dec. 1966, p. 1431–1432.

The theory of an experimental procedure that can be used to measure specific acoustic impedance is presented. No moving parts are required. Only two measurements need be made. A sequence of simple calculations is presented for reduction of these data.

**A67-80758**
**MEMBRANE RESISTANCE IN ENDOLYMPHATIC WALLS OF THE FIRST TURN OF THE GUINEA-PIG COCHLEA.**
B. M. Johnstone, J. R. Johnstone (Western Australia U., Dept. of Physiol., Nedlands), and I. D. Pugsley (Melbourne U., Dept. of Physiol., Parkville, Australia).
*Journal of the Acoustical Society of America*, vol. 40, Dec. 1966, p. 1398–1404. 14 refs.
NSF; Natl. Health and Med. Res. Council and Natl. Heart Found., Australia supported research.

Microelectrodes were inserted into the three scalae of the first turn, and resistance measurements were fitted to a model having six pathways. The six pathways with average resistance values are: (1) blood vessels inside the cochlea to the outside of the bulla—1.6κΩ, (2) blood vessels inside the cochlea to scala tympani—0.6κΩ, (3) blood vessels inside the cochlea to scala vestibuli—0.8κΩ, (4) blood vessels inside the cochlea via the stria vascularis to scala media—13κΩ, (5) scala media direct to scala tympani (organ of Corti)—24κΩ, (6) scala media direct to scala vestibuli (Reissner's membrane)—46κΩ. There was no indication of a need to include a direct pathway from scala tympani to scala vestibuli. The "length constant" of scala media in the first turn is about 2.0 mm. The resistance changes due to moderate sound were found to be small, but measurable. Changes of resistance with anoxia showed first a decrease and then an increase in the resistance from scala media to ground.

**A67-80759**
**THE INFLUENCE OF STIMULUS-MODALITY AND DURATION ON CHANGES IN TEMPORAL JUDGMENTS OVER TRIALS.**
Joel S. Warm, Emerson Foulke (Louisville U., Ky.), and Michel Loeb (U.S. Army Med. Res. Lab., Fort Knox, Ky.).
*American Journal of Psychology*, vol. 79, Dec. 1966, p. 628–631. 8 refs.
NASA and U.S. Army supported research.

The present study assessed the effects of variations in sensory content and nominal durations of intervals delimited by subjects on the tendency for these intervals to increase in magnitude over trials. The intervals to be produced were 0.5 sec., 3.0 sec., 7.0 sec., and 15.0 sec. The pressing of the response-key resulted in the following sensory inputs: (a) auditory and tactual-kinesthetic, (b) electrocutaneous and tactual-kinesthetic, and (c) tactual-kinesthetic alone. A significant linear increase over trials was noted at 15.0 sec., and an increase with significant linear and quadratic components was observed at 7.0 sec.; at 0.5 and 3.0 sec. No significant trend over trials was apparent. The shape and slope constants of the gradient as well as absolute response magnitude showed no relation to the sensory stimulation employed.

**A67-80760**
**DELAYED FORCE FEEDBACK.**
William R. Ferrell (Mass. Inst. of Technol., Cambridge).
*(Human Factors Soc., Metropol. Chapter, Ann. Meeting, New York, Jun. 12, 1965).*
*Human Factors*, vol. 8, Oct. 1966, p. 449–455.
NASA Grant NsG-107-61.

In master-slave manipulators, forces encountered by the remote hand are transmitted back to the operator. At very great distances there will be a transmission delay between an operator's movement and a resulting force. Investigation was made of the effect of long delays and differences in strategy on positioning time with force feedback alone. Positioning could be accomplished, but delay coupled with high loop gain creates serious instability. Experimental results suggest that alternative displays of the feedback force can overcome the stability problem.

**A67-80761**
**CUTANEOUS DIFFUSION OF ATMOSPHERIC $N_2$ DURING $N_2$ WASHOUT IN THE DOG.**
A. C. Groom and L. E. Farhi (N. Y. State U., Dept. of Physiol., Buffalo).
*Journal of Applied Physiology*, vol. 22, Apr. 1967, p. 740–745. 13 refs.
Contract AF 33(657)10082.

$N_2$ washout from the body of the dog during $O_2$ breathing was studied by following the level of $N_2$ in mixed venous blood. The data suggested that atmospheric $N_2$ diffuses across the skin into the blood and this effect was measured quantitatively by experiments in which the gaseous environment was controlled. The mean rate of cutaneous transfer of $N_2$ was $30.1 \pm 3.5$ ml. STPD $hr.^{-1}$ $atmosphere^{-1}$ $m.^{-2}$, equivalent to the equilibration with the gaseous environment of $1.26 \pm 0.15\%$ of the cardiac output, and corresponding to the replacement of the entire body $N_2$ store every 24 hr. The apparent mean half-time of the slowest washout compartment of dogs surrounded by air was 332 min., compared with 117 min. for dogs placed in $O_2$. The cutaneous transfer rate of $N_2$ can exceed the washout rate from the tissues after five hr. of $O_2$ breathing. To obtain an accurate description of inert gas washout from the body stores, the gaseous environment must be of the same composition as the inspired gas.

**A67-80762**
**EFFECT OF POLYCYTHEMIA AND CHRONIC HYPOXIA ON HEART MASS IN THE CHICKEN.**
Russell R. Burton and A. H. Smith (Calif. U., Dept. of Animal Physiol., Davis).
*Journal of Applied Physiology*, vol. 22, Apr. 1967, p. 782–785. 17 refs.
Grant PHS HE 01920.

Polycythemia was induced in the domestic fowl by (a) chronic hypoxia and (b) androgen injections. In both groups a cardiac hypertrophy resulted which involved both ventricles and was correlated with the hematocrit. The hypertrophy of the right ventricle of the chronic hypoxia group was a result of somewhat different kinetics than that found in the androgen-treated brids. This indicated that in the chronic hypoxic state, although a significant hematocrit-heart hypertrophy effect was present, an environmental influence may also be a factor. The cardiac hypertrophy resulting from chronic hypoxia is reversible upon return of the birds to sea level.

**A67-80763**

**SIMULATED DIVING IN MAN: COMPARISON OF FACIAL STIMULI AND RESPONSE IN ARRHYTHMIA.**

Thomas F. Whayne, Jr. and Thomas Killip III (Cornell U., Med. Coll., Dept. of Med., New York City, N. Y.).

*Journal of Applied Physiology*, vol. 22, Apr. 1967, p. 800–807. 23 refs.

Grant NIH H 07044.

The effect of breathholding and four facial stimuli, application of a wet cloth at 25°C. and 0°C., facial immersion in 25°C. and 0°C. water, on heart rate and rhythm were compared in 20 physically untrained subjects. During all five maneuvers heart rate was significantly slower than resting control. Of the ten comparisons among the different stimuli only breathholding compared to a wet cloth at 25°C. and face immersion at 25°C. compared to a wet cloth at 0°C. were not significantly different. The colder stimuli caused greater slowing and pacemaker depression. Bradycardia developed from a decrease in the sinus rate, nodal escape, and subsequent slowing of the atrioventricular nodal rate. Results in ten physically trained athletes were similar although heart rates recorded at rest and during the experimental maneuvers were lower, and the incidence of nodal rhythm was higher than in the untrained subjects. Cardiac slowing occurred during nonapneic facial immersion, but the effect was less marked than during apneic immersion. A variety of responses were observed in patients with arrhythmia. In one patient, facial immersion abolished apparent ventricular premature beats. In another, ventricular tachycardia developed. Heart rate and rhythm response to the diving reflex may be elicited in man without facial immersion. Colder stimuli have a greater effect. Facial stimuli may be a significant factor in the evocation of arrhythmia in patients with heart disease.

**A67-80764**

**AN IMPLANTABLE TELEMETER FOR DETERMINING BODY TEMPERATURE AND HEART RATE.**

C. Leon Harris and P. B. Siegel (Va. Polytech. Inst., Blacksburg).

*Journal of Applied Physiology*, vol. 22, Apr. 1967, p. 846–849.

Grant NSF G-8081.

A radio telemetry system was described and utilized for measurements of heart rate and body temperature of chicken during certain behavioral situations. Recording of these physiological parameters during aggressive behavior demonstrated the practicality of this implantable system in measuring changes during such experimentation.

**A67-80765**

**ENERGY METABOLISM OF THE CHIMPANZEE: A COMPARISON OF DIRECT AND INDIRECT CALORIMETRY.**

H. E. Dale, M. D. Shanklin, H. D. Johnson, and W. H. Brown (Mo. U., Columbia).

*Journal of Applied Physiology*, vol. 22, Apr. 1967, p. 850–853. 12 refs.

Contract AF 29(600)-4126.

Energy metabolism of the chimpanzee was studied using simultaneously direct and indirect calorimetry. A total of 827 determinations were made on 14 chimpanzees, seven males and seven females. The animals were housed and measurements were made at 75°F. From each 40-min. test period a ten-min. low period was delineated as an estimate of the basal metabolic rate (BMR). BMR for all subjects averaged 2.222± 0.593 kcal. kg. body weight per hr.; that for males was higher than that for females. Heat production during the test period was significantly higher than during the basal period, averaging 2.528 kcal./kg. per hr.; a similar sex difference was apparent. Heat production was well correlated with heat loss, but not as well for the chimpanzee as for alcohol burning in the chamber; the difference apparently related to change in heat content of the body. Heat production was significantly higher than heat loss. The mean difference, 0.110 kcal./kg. per hr., was consistent with expected rise in body temperature. Approximately equal quantities of heat were lost by radiation, convection, and vaporization, with the loss by radiation somewhat smaller and less variable than loss by the other two processes.

**A67-80766**

**EFFECT OF TEMPERATURE ON OXIDATIVE PHOSPHORYLATION IN HIBERNATORS AND NONHIBERNATORS.**

Barbara A. Horwitz, Leonard Nelson, and Vojin P. Popovic (Emory U., Dept. of Physiol., Atlanta, Ga.).

*Journal of Applied Physiology*, vol. 22, Apr. 1967, p. 639–644. 21 refs.

NASA Grant NGR-11-001-009, Contract DA-49-193-MD-2432, Grants PHS 5T1-GM-206, GM-06815, GM-09652, and NIGMS 2K3-GM-15,193-06.

The efficiencies of oxidative phosphorylation (P/O ratios) of isolated liver mitochondria from control and cold-adapted albino rats as well as aroused and torpid southeastern brown bats were compared at five incubation temperatures (37, 29, 21, 13, and 5°C.). At 37 and 20°C., the P/O ratios of all preparations were normal but appeared uncoupled at 21 and 13°C. with succinate as the exogenous substrate. These depressed P/O values seem to reflect a differential temperature sensitivity of the enzymes involved in succinate respiration and oxidative phosphorylation. The observation that the rat micochondrial P/O ratios were normal at the lower incubation temperatures when $\beta$-hydroxybutyrate was substituted for succinate suggests that the differential temperature sensitivity may be substrate specific. The similarities of the temperature-response patterns of the mitochondria from the aroused bats, torpid bats, and cold-acclimated rats indicate that the ability of the animal to hibernate is not reflected in a differential effect of cold exposure on the coupling of liver mitchondrial oxidative phosphorylation and succinate respiration.

**A67-80767**

**INFLUENCE OF RADIOPROTECTORS ON RESPIRATION OF LIVER AND BRAIN MITOCHONDRIA IN RABBITS [VLIIANIE RADIOZASHCHITNYKH PREPARATOV NA DYKHANIE MITOKHONDRII PECHENI I GOLOVNOGO MOZGA KROLIKOV].**

N. I. Bicheikina and E. F. Romantsev.
*Radiobiologiia*, vol. 6, no. 6, 1966, p 880–882. 5 refs. In Russian.

Intravenous injections of rabbits with beta-mercapto propylamine (MPA), paraamino propiophenone (PAPP), and sodium nitrite (SN), in doses which produced protective effects during gamma-irradiation of animals from a $CO^{60}$ source, did not affect the oxidative processes in the liver and brain mitochondria. However, when these chemicals were added directly to mitochondrial suspensions, MPA decreased the oxygen consumption by mitochondria for a longer period than after other aminothiols. The difference in the effect may be due to the accumulation of the radioprotectors in the hyaloplasm of the cell and their mechanical removal during the extraction of mitochondria from the tissues. No relationship was noted between the degree of protection by each compound and the change in the optical density of the mitochondria suspension due to swelling of the cells.

**A67-80768**
**CARDIAC RATE CHANGES IN HUMANS AFTER ABRUPT DECELERATION.**
Jerry D. Rothstein and Peter G. Hanson (Aeromed. Res. Lab., Holloman AFB, N. Mex.).
*Journal of Applied Physiology*, vol. 22, Apr. 1967, p. 645–647. 11 refs.

Transient slowing of the cardiac rate was observed after experimental abrupt deceleration (impact) when the deceleration inertial vector is directed craniad ($-g_z$). Clarification of the incidence and conditions of this response is attempted. Eighteen healthy male subjects (21–41 yr.) were exposed to $-g_z$ and $+g_z$ impact profiles of 10 g peak deceleration in paired experiments. Cardiac rate was monitored prior to and after impact. An insignificant increase in cardiac rate occurred after $+g_z$ impact. It is suggested that the observed changes in cardiac rate are mediated through the pressoreceptors of the carotid sinus and aortic arch.

**A67-80769**
**VARIATION IN ALVEOLAR-ARTERIAL $O_2$ TENSION DIFFERENCE AT HIGH LEVELS OF ALVEOLAR $O_2$ TENSION.**
R. B. Cole and J. M. Bishop (Birmingham U., Queen Elizabeth Hosp., Dept. of Med., Great Britain).
*Journal of Applied Physiology*, vol. 22, Apr. 1967, p. 685–693. 20 refs.
United Birmingham Hosp. supported research.

Alveolar-arterial oxygen tension difference (A-a)D was measured in 12 normal men, equally divided into the age groups 20–29 and 50–59 years at six levels of alveolar oxygen tension obtained by breathing oxygen mixtures ranging from air to pure oxygen. The (A-a)D increased significantly when mean alveolar oxygen tension increased from 100 to 174 mm. Hg, but did not thereafter alter significantly up to a mean alveolar oxygen tension of 526 mm. Hg. When alveolar oxygen tension was further increased to 651 mm Hg by breathing pure oxygen, a significant fall in (A-a)D was observed. Calculations of the effect which a small compartment of open but unventilated alveoli (i.e., $\dot{V}/\dot{Q}=o$) would have on the (A-a)D at different levels of inspired $O_2$ tension suggested that the observed variation in (A-a)D might be partly explained on this basis. The possibility was also considered that the anatomical shunt effectively diminishes when pure $O_2$ is breathed.

**A67-80770**
**ON LIVER INCLUSION INTO IMMUNOGENESIS IN ACUTE RADIATION SYNDROME [O VKLIUCHENII PECHENI V IMMUNOGENEZ PRI OSTROI LUCHEVOI BOLEZNI].**
M. I. Ravich-Shcherbo and L. G. Prokopenko (Kursk State Med. Inst., USSR).
*Radiobiologiia*, vol. 6, no. 6, 1966, p. 921–922. In Russian.

The involvement of liver tissues in the immunogenesis during the period of radiation sickness was tested in rabbits. The local irradiation of the liver region followed by bacterial inoculation of the animals produced no antibody formation in the liver tissues. However, a great amount of the injected antigen was accumulated in the liver tissues. In a second series of experiments the injection of purified spleen and lymphatic nodes homogenates from the immunized animals caused formation of antibodies in the liver tissue of a recipient. These findings indicated the presence of a substance formed by the disintegration of lymphoid tissue by the ionizing radiation.

**A67-80771**
**EXPOSURE OF MICE TO A HELIUM–OXYGEN ATMOSPHERE AT PRESSURE TO 122 ATMOSPHERES.**
J. MacInnis, J. G. Dickson, and C. J. Lambertsen (Pa. U., School of Med., Lab. of Pharmacol., Philadelphia).
*Journal of Applied Physiology*, vol. 22, Apr. 1967, p. 694–698. 27 refs.
Grants Nonr 551(14) and PHS HE-08184-01.

Forty-eight mice were subjected to saturation exposures in a helium–oxygen environment at pressures from 92 to 122 atm. Oxygen partial pressure was controlled between 160 and 380 mm. Hg; carbon dioxide was absorbed by granular soda lime. All mice remained conscious and active throughout the exposure. It became possible to decompress an entire group of mice safely even from the highest pressures employed, although in several instances early in the study technical difficulties resulted in death on decompression. Mice surviving decompression from the highest pressure lived until sacrificed several months later. Effects observed during the compression and exposure to maximum pressure phases were an altered pattern of respiration and coarse tremors. It appears that exposure of the central nervous system of mice to a pressure equivalent to 4,000 ft. of sea water is not lethal and that any narcotic effects of helium are not incapacitating. It is therefore probable that the central nervous system of man can tolerate the same helium pressure. However, this study in mice offers no information useful in predicting adverse effects of such pressures upon the pulmonary gas exchange of larger animals, including man.

**A67-80772**
**THE ROLE OF GROWING CONDITIONS IN THE RADIORESISTANCE OF PLANTS [ZNACHENIE USLOVII PROIZRASTANIIA V RADIOUSTOICHIVOSTI RASTENII].**
N. N. Nazirov.
*Radiobiologiia*, vol. 6, no. 6, 1966, p. 904–907. 7 refs. In Russian.

The air-dried seeds of wild plants of the family *Gramineae* and seeds of cotton plants were exposed to various doses from 3 kr. to 100 kr. of gamma-radiation from a $CO^{60}$ source, two-three days before planting. The difference in the percentage of germination, growth and the height of plants produced from seeds of the same species, but grown in different areas indicated that climate and soil affected the resistance of plants to radiation; and as a rule, plants grown at higher altitudes exhibited greater resistance to radiation.

**A67-80773**
**ON THE PROBLEM OF DURATION OF MOTOR RESPONSES [K VOPROSU O DLITEL'NOSTI DVIGATEL'NYKH REAKTSII].**
R. I. Kruglikov.
*Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 16, Nov.–Dec. 1966, p. 1121–1122. 6 refs. In Russian.

Observations of human subjects and animal experiments disclosed no relationship between the duration of the motor response and the reorganization of conditioned reflexes. This fact indicated the difference in rate of action in various nervous processes. However, there was a correlation between the motor activity responses and the number of changes in the conditioned reflexes. No mechanism of this reaction has been proposed.

**A67-80774**
**THE EFFECT OF TIME-FACTOR AND THE OBJECT-SIZE ON THE STEREOSCOPIC THRESHOLD [DER EINFLUSS DES ZEITFAKTORS UND DER BILDGROSSE AUF DIE STEREOSCHWELLE].**
G. Schubert and F. X. Wohlzogen (U. Wien, Physiol. Inst., Austria).
*Vision Research,* vol. 6, Dec. 1966, p. 725–728. 9 refs. In German.

Analysis of stereoscopic threshold determinations showed that an increase of either the size of the test object or the viewing time exert a comparable effect on stereoacuity, viz. a lowering of the stereoscopic threshold. This can be explained by spatial and temporal summation, and may be considered as a further proof of binocular vision to be a purely cortical function.

**A67-80775**
**EFFECT OF DIFFERENT AMBIENT PRESSURES ON AIRWAY RESISTANCE.**
Pierre Varene, Jean Timbal, and Charles Jacquemin (Centre d'Essais en Vol, Lab. de Méd. Aérospatiale, Brétigny-sur-Orge, Essonnes, France).
*Journal of Applied Physiology,* vol. 22, Apr. 1967, p. 699–706. 27 refs.

Airway resistance in simulated dives and altitude (from 0.5 to 5 atm.) was measured on five subjects (4 males, 1 female) with a plethysmographic method. The use of this method in such conditions is discussed theoretically. The equations $R_x/R_1 = 0.57 + 0.44\ P$ or $R_x/R_1 = p0.59$ are proposed to represent the results obtained (P in absolute atmosphere; $R_x$ resistance at pressure P; $R_1$ resistance at ground level). They are compared to the data of others and discussed in relation to the airway resistance measured as function of flow or physical properties of ventilated gaseous mixtures. It also appears that inertance of breathed gases interferes in the shape of experimental plethysmorgraphic recordings and that this parameter may be estimated through this technic.

**A67-80776**
**EFFECT OF IONIZING RADIATION ON OXIDATIVE PHOSPHORYLATION IN MITOCHONDRIA [UPLYU IANIZUIUCHAI RADYIATSIYI NA PRATSESY AKISLIALNAHA FASFARYLIAVANNIA U MITAKHONDRYIAKH TKANAK].**
C. I. Mokharava.
*Vestsi Akademii Navuk BSSR, Seryia Biialahichnykh Navuk,* no. 1, 1967, p. 27–33. 10 refs. In Belorussian.

Histochemical studies of normal liver, kidney, and heart sections were performed in rats after irradiation by 40 r. of X-rays, and by neutrons of moderate hardness (30 rad). The neutron radiation caused an increase in phosphorylation and respiration in liver mitochondria, but a decrease in the esterification of the inorganic phosphate and oxygen consumption in kidneys, when succinic acid was employed. Different results occurred when other amino acids were used as a substrate. After the X-ray exposure the changes in the mitochondria biochemistry were similar to the neutron effect, but the degree of change was more pronounced. No normalization of this disturbance was noted 30 days after the exposure.

**A67-80777**
**PARADOXICAL SLEEP [PARADOKSAL'NYI SON].**
Z. A. Kostandov.
*Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 16, Nov.–Dec. 1966, p. 1098–1109. 59 refs. In Russian.

A survey is made of the results of research and observation of the rapid eye movement phase of sleep (REM). It stresses: (1) the peculiar electrical activity of brain, muscle tone and the organism's behavior during this phase; (2) the changes in the nervous system functions, and in the secretion mechanisms, and (3) the biological importance of paradoxical type of sleep.

**A67-80778**
**INFLUENCE OF GLUTAMIC ACID ON RESPIRATION AND OXIDATIVE PHOSPHORYLATION IN LIVER MITOCHONDRIA UNDER NORMAL CONDITIONS AND IN HYPOXIA [VLIIANIE GLIUTAMINOVOI KISLOTY NA DYKHANIE I OKISLITEL'NOE FOSFORILIROVANIE V MITOKHONDRIIAKH PECHENI V NORME I PRI GIPOKSII].**
A. M. Genkin and N. A. Glotov (Sverdlovsk Med. Inst., Dept. of Biol. Chem., USSR).
*Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 63, Feb. 1967, p. 50–52. 12 refs. In Russian.

Influence of glutamic acid on respiration and oxidative phosphorylation in liver mitochondria of white rats was studied under normal conditions and in hypoxia (pressure chamber equivalent to 8,000 m. altitude). Glutamic acid administered to an animal in the dose of one mgm. per one gm. body weight did not influence the respiration or oxidative phosphorylation under normal conditions. The same dose of glutamic acid in hypoxia raised the utilization of oxygen in mitochondria by 19.6% (p-0.01) without affecting the character of phosphorylation.

**A67-80779**
**CHANGES OF CONDITIONED REFLEX ACTIVITY AND STOMACH SECRETION IN RADIATION SYNDROME [IZMENENIIA USLOVNOREFLEKTORNOI DEIATEL'NOSTI I ZHELUDOCHNOI SEKRETSII PRI LUCHEVOI BOLEZNI].**
S. R. Perepelkin (I. M. Sechenov First Moscow Med. Inst., USSR).
*Radiobiologiia,* vol. 6, no. 6, 1966, p. 851–859. 9 refs. In Russian.

During the course of acute or even subacute radiation sickness in dogs, kept on a meat diet, the gastric secretion had a periodic character. The secretion curve was monitored in dogs and the activity of the nervous system in the conditioned reflex mechanism was studied. The positive stimuli used were a bell and flashes of light. The negative stimulus was a buzzer. The indicator of response was the amount of gastric juice secreted in one hr. and six hr. Diets were either of a solid

meat type, or a chemically defined one. There was a general indication that the ionizing radiation combined with a meat diet affected the gastric secretion mechanism more than the cerebral cortex. The increase of the gastric activity was primarily due to an increase in the amount of enzymes rather than the amount of elaborated juice. The chemically defined diet produced a rather feeble effect on the enzymatic activity.

**A67-80780**
**THE FEASIBILITY OF A HELMET-MOUNTED SIGHT AS A CONTROL DEVICE.**
Robert M. Nicholson (Honeywell, Inc., Systems and Res. Div., Minneapolis, Minn.).
*Human Factors*, vol. 8, Oct. 1966, p. 417–425.

The purpose of this research was to investigate the practicality of a helmet-mounted sight as an operational element in a quick-reaction bore-sighting system. A three-phase experimental program was conducted to determine the human capabilities with the helmet-mounted sight. In a laboratory environment sighting accuracies were obtained on both static and moving targets. Field test data were obtained during high-speed, low-altitude flights. The series of tests indicated that the accuracy of the sighting process can be expected to vary between a fraction of a degree and four degrees depending on target angular rate and the target sighting angle.

**A67-80781**
**EFFECTS OF DISPLAY MAGNIFICATION, PROPRIOCEPTIVE CUES, CONTROL DYNAMICS AND TRAJECTORY CHARACTERISTICS ON COMPENSATORY TRACKING PERFORMANCE.**
Russell L. Smith, David R. Garfinkle, Hilde Groth, and John Lyman (Calif. U., Los Angeles).
*Human Factors*, vol. 8, Oct. 1966, p. 427–434. 17 refs.
Contract N123(60530)23558A.

An experiment was performed on the NOTS–UCLA heavy inertia tracking simulator to assess effects of display magnification, proprioceptive cues, displacement aiding, trajectory characteristics and trajectory direction on tracking performance. Particular attention was paid to interactions among these variables. The results showed that: (1) 5X magnification significantly decreased tracking error compared to tracking without magnification; (2) proprioceptive cues related to both azimuth and elevation significantly improved performance; (3) velocity plus displacement-aiding control dynamics (time constant = 0.1 sec.) produced significantly lower error scores than unaided velocity control dynamics (time constant = 0.0 sec.); and (4) since no crossover tendencies were found, the effects of the variables appear to be independent.

**A67-80782**
**APPARENT SIZE AND HUE VARIATIONS OF A LASER LIGHT SPOT.**
H. John Caulfield (Tex. Instr. Inc., Dallas).
*Human Factors*, vol. 8, Oct. 1966, p. 435–440. 9 refs.

Both the apparent size and the apparent hue of a single spot of 6328 Å laser light vary with varying conditions, and with the particular observer. The apparent radius of a spot can vary from zero to several times the objectively-determined radius as the background lighting conditions are changed. The general features of this variation are predictable theoretically. The apparent hue of the center of a laser spot can shift as much as 340 Å. Previous theory for the hue shift is shown to be inadequate, but no fully adequate theory is suggested.

**A67-80783**
**BAYESIAN ASPECTS OF TROUBLE SHOOTING BEHAVIOR.**
Nicholas A. Bond, Jr. (Sacramento State Coll., Calif.) and Joseph W. Rigney (Southern Calif. U., Electron. Personnel Res. Group, Los Angeles).
*Human Factors*, vol. 8, Oct. 1966, p. 377–383.
Contract Nonr-228(22).

Thirty-nine Navy technician trainees filled out a symptom-malfunction matrix on a blocking oscillator circuit. The technicians then attempted to solve six troubleshooting problems in the same oscillator circuit. The particular sequence of checks used by each man on each problem was combined with his symptom-malfunction matrix, via a Bayesian algorithm, to yield computer estimates of failure likelihoods for each component. The computer program predicted actual parts-replacement behaviors in about one-half of the cases. Those technicians who start out with valid symptom-malfunction matrices were more likely to resemble the Bayesian processor.

**A67-80784**
**CHOICE REACTION-TIME AND SIZE OF STIMULUS-SET WHEN TRANSMITTED INFORMATION IS HELD CONSTANT.**
I. M. Schlesinger and Rachel Melkman (Hebrew U., Jerusalem, Israel).
*American Journal of Psychology*, vol. 79, Dec. 1966, p. 596–601. 13 refs.

The hypothesis is presented that reaction-times are dependent also on the amount of stimulus-information when the latter is varied independently of transmitted information. Stimulus-information was varied by varying the number of alternative stimuli. In doing this it was necessary to keep stimulus-information and similarity unconfounded. This was done by letting the subjects discriminate between a set of familiar and a (subjectively) indefinitely larger set of unfamiliar stimuli. In such a two-choice task, responses of 20 subjects to familiar patterns required significantly less time than responses to the unfamiliar patterns. Thus, the hypothesis was corroborated. A "matching model" which was advanced to account for the effect of stimulus-information was tested by comparing response-times in two experimental conditions; (a) when there were four alternative familiar patterns; and (b) when the number of these patterns was only two. Contrary to predictions derived from the model, the smaller number of alternatives was effective in reducing response-time only to familiar patterns.

**A67-80785**
**PERCEPTION OF THE VISUAL HORIZONTAL IN NORMAL AND LABYRINTHINE DEFECTIVE OBSERVERS DURING PROLONGED ROTATION.**
Brant Clark (San Jose State Coll., Calif.) and Ashton Graybiel (U.S. Naval School of Aviation Med., Pensacola, Fla.).
*American Journal of Psychology*, vol. 79, Dec. 1966, p. 608–612. 17 refs.
NASA Grant R-93.

Five normal and nine labyrinthine defective men were studied in a slow rotation room which produced a change in resultant force of 20° on them. The men faced in the direction of rotation and at one-min. intervals set a luminous line to the perceived horizontal in darkness for one hr. The results for the normal men confirmed an earlier study showing no systematic change in the perception of the visual horizontal after an initial lag. In contrast the labyrinthine defective men showed

a smaller, rapid, and then gradual change in the perception of the visual horizontal throughout the one hr. of constant rotation. At the end of that period there was no significant difference between the two groups. These results are discussed in terms of a differential weighting of the synergistic information available to the two groups.

**A67-80786**
**FACILITATION OF MEMORY BY EXPERIMENTAL RESTRICTION AFTER LEARNING.**
Robert J. Grissom (Princeton U., N. J.).
*American Journal of Psychology,* vol. 79, Dec. 1966, p. 613–617. 9 refs.
Contracts DA-49-007-MO-671 and NSF G-21762, Grant NIH MPM-16,010.

It was predicted that a period of quiescence interpolated between learning and a retention test would facilitate memory. Subjects who were confined to a bed within a soundproof and dark chamber for varying intervals after hearing a prose passage retained the material significantly better than did control subjects, who went about their daily affairs during the retention intervals. The differences were not readily attributable to rehearsal, so that an interpretation in terms of interference is favored. It is argued, however, that decay as a process influencing retention cannot be ruled out by the results. The treatment of the experimental and control subjects differed in no other respect than in experience during the retention interval. Steps taken to avoid stressing the restricted subjects were successful.

**A67-80787**
**A COMPARISON OF HAPTIC AND VISUAL JUDGMENTS OF SOME ILLUSIONS.**
Ray Over (Otago U., Dunedin, New Zealand).
*American Journal of Psychology,* vol. 79, Dec. 1966, p. 590–595. 11 refs.
U. Grants Comm. supported research.

In the present experiments, it has been asked whether variables which have been shown to influence the magnitude of visual illusions similarly influence haptic (tactile-kinesthetic) illusions. Both visual and haptic judgments made of the Müller–Lyer figure were found to be a function of the angle of the arrowheads. For both modes of judgment, a larger illusion was found for the bisection (inverted T) than the horizontal–vertical figure. The results suggest that theories which attempt to explain illusions in terms of processes which are specific to vision are invalid.

**A67-80788**
**METHOD, STANDARD DURATION, AND INTER-STIMULUS DELAY AS INFLUENCES UPON JUDGMENT OF TIME.**
W. J. Richards and P. V. Livingston (Ark. U., Fayetteville).
*American Journal of Psychology,* vol. 79, Dec. 1966, p. 560–567. 13 refs.

Effects of method, standard duration, and delay interval upon time-estimation were measured by PSE, DL, and SIQ. The methods of limits and reproduction were employed. Thirty-two subjects volunteered from undergraduate classes in psychology. Each subject participated in one method, all standard durations, and one delay-interval at each standard duration. Standard durations of 2, 8, and 16 sec., and delay-intervals of 2, 8, 16, and 25 sec. were used. Major findings were: (1) Variance of the PSE for the method of reproduction was significantly greater than for the method of limits; (2) Standard stimulus duration affected judgments significantly for all measures except SIQ; (3) As length of standard duration increased, CE for the method of reproduction changed from positive to negative; for the method of limits, the trend was reversed; (4) Accuracy of discrimination as measured by DL and SIQ increased as standard duration increased.

**A67-80789**
**MAIN PHYSIOLOGICAL PHENOMENA RELATED TO SPACE FLIGHT [I PRINCIPALI FENOMENI FISIOPATOLOGICI CONNESSI CON IL VOLO SPAZIALE].**
A. Scano (Centro di Studi e Ric. di Med. Aeron. e Spaziale, Ispettorato di Sanita' Aeron., Rome, Italy).
*Rivista di Medicina Aeronautica e Spaziale,* vol. 29, Apr.–Jun. 1966, p. 269–303. In Italian.

After a premise on present limitations of manned space flight, as well as on the outstanding contributions of aeromedical research to space science, that made space flight possible and safe, the effects of weightlessness are discussed. Pioneer research is surveyed that was carried out with aircraft, missile parabolic flight, and with the subgravity tower, designed by Lomonaco and collaborators. Results are presented, from actual space flights, on vestibular and visual function, as well as on cardiovascular apparatus, energy consumption, metabolism and trophicity of body frame, urinary function, and locomotion, etc. Some considerations are also presented on convective, diffusive and thermal phenomena, in the space vehicle. The second part of this paper pertains to microclimate regulation of the space cabin, emergency pressure equipment, meteorite-impact phenomena, and astronaut nutrition. Information is added to the study of the biological cycle proposed to regenerate the atmosphere and to produce food in long flights. The effects of solar and cosmic radiations were also reported.

**A67-80790**
**UNSYMMETRICAL DIMETHYLHYDRAZINE TOXICITY [SULLA TOSSICITA' DELLA DIMETILIDRAZINA ASIMMETRICA].**
Gualtiero Paolucci (Centro di Studi e Ric. di Med. Aeron. e Spaziale, Ispettorato di Sanita' Aeron., Rome, Italy).
*Rivista di Medicina Aeronautica e Spaziale,* vol. 29, Apr.–Jun. 1966, p. 305–328. 9 refs. In Italian.

Unsymmetrical dimethylhydrazine (UDMH) doesn't cause, at low dosage (10 mg./kg. body weight) any troubles or anatomo-pathological changes, because the substance doesn't accumulate in the body. On the contrary larger dosages (50 to 100 mg./kg. body weight) cause convulsion and death due to respiratory paralysis; at these dosages fatty degeneration was reported, chiefly in liver and kidney. In regard to metabolism, UDMH increases blood sugar level, and produces moderate changes of hematocrit, and some increase of glutamic oxalecetic transaminase. Pyridoxine was shown (with a few other compounds) to protect, at the dose of 50 mg./kg. body weight, against the toxic effects of this substance.

**A67-80791**
**EXPERIMENTAL RESEARCH ON FAR POINT OF SCOTOPIC VISION [RICERCHE SPERIMENTALI SUL PUNTO REMOTO NELLA VISIONE SCOTOPICA].**
R. Neuschüler and C. Terrana (Rome U., Eye Clin. and Aldo di Loreto Inst. of Legal Med., Italy).
*Rivista di Medicina Aeronautica e Spaziale,* vol. 29, Apr.–Jun. 1966, p. 167–180. 8 refs. In Italian.

Using the subjective optometer of Cialdea and Bagolini persons between 18–40 years of age were exposed to a visual perception experiment at various light intensities. The subjects did not know the given distance of the object seen and could not distinguish changes in the object unless it was shifted to a near or distant point. Polychromatic light (white) or monochromatic light (obtained by filters of red, green or blue) were used. Using an artificial pupil system to estimate pupillary diameter changes revealed no changes in the luminosity of retinal images. Luminosity of retinal images were variable for levels obtained by apposition of filters of various optic densities, giving a minimum value corresponding to 0 density to a maximum value corresponding to 2.9 density. By introducing the artificial pupil system the spherical aberrations were eliminated since the most peripheral part of the crystalline lens was not used. Using monochromatic light resulted in the elimination of the Purkinje effect. The results did not provide univocal responses, indicating two groups of data; some for which the distance point was far (hypermetropia), others in which it was near (myopia). Atropinized subjects were exposed to the artificial pupil and monochromatic light with unsatisfactory results, sometimes hypermetropic and other times myopic. Aphakic subjects showed results similar to those atropinized and those with normal pupil. Possibly the changes found were due to interpretive factors rather than to optic or physiological factors. It was postualted that nocturnal myopia may be an optic phenomenon.

**A67-80792**

**EXPERIMENTAL THERAPY AND PROPHYLAXIS OF ACUTE HYPOXIA WITH THE AID OF GUTIMIN [EKSPERIMENTAL'NAIA TERAPHIIA I PROFILAKTIKA OSTROI GIPOKSII S POMOSHCH'IU GUTIMINA].**

L. V. Pastushenkov and V. M. Vinogradov (S. M. Kirov Mil.-Med. Acad., Dept. of Pharmacol., Leningrad, USSR).

*Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* vol. 10, Nov.–Dec. 1966, p. 81–82. In Russian.

The use of gutimin (guanil-thiourea) for therapy and prophylaxis in cases of hypoxia was tested in various experimental animals. Hypoxia was created in a pressure chamber simulating altitude of 5 km. and higher. In dog injections of gutimin (25–50 mg./kg. of body wt.) deterred the hypoxia effect on respiration. Asphyxia occurred 12.9 min. after the beginning of experiment instead of 1.7 min. as observed in control. The animals given the compound showed less disturbance in the electroencephalogram than the controls. The mechanism of gutimin action of the oxidative processes studied in other experimental animals was discussed.

**A67-80793**

**DIFFERENTIAL EFFECTS OF CENTRAL AND LATERAL FIXATION ON AFTER-EFFECTS OF EXPANSION AND CONTRACTION.**

Herman H. Spitz.

*American Journal of Psychology,* vol. 79, Dec. 1966, p. 618–622. 9 refs.

After-effects of expansion of a centrally fixated spinning spiral are known to persist longer than after-effects of contraction. It was hypothesized that this difference results from adaptation to the frequent natural occurrence of small, perhaps subliminal, after-effects of contraction. The finding that the after-effects of expansion and contraction do not differ under lateral fixation is congruent with this hypothesis.

**A67-80794**

**A PHYSIOLOGICAL COMPARISON OF STATIC AND PHASIC EXERCISE.**

Brian J. Sharkey (Mount. U., Missoula).

*Research Quarterly,* vol. 37, Dec. 1966, p. 520–531. 36 refs.

Five subjects were tested three times in each of three static and three phasic work tests involving leg extensions in the semireclining position. Oxygen uptake, net oxygen consumption, ventilation rate, pulse rate, and systolic and diastolic blood pressures were consistently higher in phasic work than in static effort with a comparable resistance. The patterns of systolic and diastolic blood pressure and pulse rate response and recovery did not seem to differ in the two modes of work. While the ventilation rate–oxygen uptake relationship was similar in both forms of effort, the pulse rate–oxygen uptake relationship differed in that the static pulse exceeded the phasic rate at a comparable level of oxygen uptake.

**A67-80795**

**SUPPRESSION IN BINOCULAR VISION.**

James Roland Law (Duke U., Durham, N. C.) and Herbert F. Crovits (VA Hosp., Durham, N. C.).

*American Journal of Psychology,* vol. 79, Dec. 1966, p. 623–627. 12 refs.

Subjects viewed Helmoholz's crossed-bar stereogram and monocular–binocular variants of it. Duration of suppression in the horizontal bar was measured in 30-sec. observational periods. Suppression-time was significantly reduced when a binocular superposable contour was available and it was not significantly changed when the superposable contours differed in color as compared to when they were identical in color; so long as the color seen was the color of the superposable vertical bar in the half-view not containing the horizontal bar. When that vertical bar was suppressed, little suppression of the horizontal bar occurred. The results imply a method for detecting suppression in those parts of the visual field containing identical contours.

**A67-80796**

**SOME CHARACTERISTICS OF STIMULUS-PROVOKED ALPHA ACTIVITY.**

Lenore K. Morrell (Stanford U., School of Med., Div. of Neurol., Palo Alto, Calif.).

*(Am. EEG Soc., San Francisco, Oct. 7, 1963).*

*Electroencephalography and Clinical Neurophysiology,* vol. 21, Dec. 1966, p. 552–561. 55 refs.

NASA Grant NsG 215-62.

Two groups of subjects, pre-selected for prominent resting alpha, were studied to assess the habituation of electroencephalogram (EEG) reactivity to repeated photic stimuli. In one group, the subjects passively received the signals; in the other they were instructed to respond manually as soon as the signal was detected, and the reaction times were measured. It was found that the EEG background of alpha activity tended to alternate with a lower voltage, more random pattern sometimes including slow waves in both groups. The EEG reactivity against the latter background was that of provocation of alpha activity, whereas against the background alpha rhythm, the reactivity was that of blocking or arrest of alpha. From the point in each record in which these patterns began to alternate, it was found that the alpha provocation response had a higher incidence than the desynchronization response, significantly so only for the group not required to respond. The blocking response was relatively habituated for both groups.

The requirement of a motor response to the photic signal was associated with an increase incidence of the alpha blocking response. Reaction times tended to be higher when alpha provocation occurred.

**A67-80797**
**MEASUREMENT OF SUBJECTIVE SYMPTOMATOLOGY OF ACUTE HIGH ALTITUDE SICKNESS.**
Wayne O. Evans (Fitzsimmons Gen. Hosp., U.S. Army Med. Res. and Nutr. Lab., Denver, Colo.).
*Psychological Reports,* vol. 19, Dec. 1966, p. 815–820. 9 refs.

The development and testing of a questionnaire to quantify the severity of the subjective symptomatology of acute high altitude sickness is described. Using procedures developed to test the effects of psychotropic drugs, a 26-item questionnaire was produced which was shown to be reliable and to reflect both symptom severity as a function of different simulated altitudes and the length of time of exposure to those altitudes. Development of such a scale will allow comparison of ameliorative measures for acute high altitude sickness and correlation of symptoms of the disorder with physiological changes induced by high altitude.

**A67-80798**
**ORIGIN OF SUMMATING POTENTIAL.**
J. R. Johnstone and B. M. Johnstone (Western Australia U., Dept. of Physiol., Nedlands).
*Journal of the Acoustical Society of America,* vol. 40, Dec. 1966, p. 1405–1413. 18 refs.
NSF; Western Australia U. and Natl. Health and Med. Res. Council supported research.

The relationship between sound and cochlear potentials is considered in the light of von Békésy's observations of movement of the cochlear partition and Davis' variable-resistance theory of hair-cell function. An equation is derived relating hair angle to basilar-membrane movement. The equation is $\phi = \text{arcot}\ (Y\alpha + \cot\phi_0)$, where $\phi$ is the hair angle and $\alpha$ is proportional to basilar-membrane and hair-cell apex to the distance between tectorial membrane and hair-cell apex. It is shown that the sigmoidal shape of this function leads to a linear dependence of microphonics on sound intensity, generation of harmonics, and production of positive and negative summating potentials by inner and outer hair cells, respectively. The behavior of the cochlear potentials, including the effect of sound pressure in reversing summating potential polarity, effect of cochlear pressure changes, and reversal of summating potential polarity with anoxia, is also accounted for. A mechanical model of the organ of Corti, used to illustrate our theory, is described, together with results obtained from the model.

**A67-80799**
**MASKING-LEVEL DIFFERENCES WITH CONTINUOUS AND WITH BURST MASKING NOISE.**
Dennis McFadden (Ind. U., Hearing and Commun. Lab., Bloomington).
*(Acoust. Soc. of Am., 71st Meeting, Boston, Mass., Jun. 1–4, 1966).*
*Journal of the Acoustical Society of America,* vol. 40, Dec. 1966, p. 1414–1419. 6 refs.
AFOSR and NSF supported research.

Psychometric functions were obtained for several interaural phase combinations with both continuous and burst masking noise. In the burst conditions, the signal (400 c.p.s., 125 msec.) and the wide-band masker (45 dB./cycle) were gated simultaneously; in the continuous conditions, only the signal was gated. Performance on burst NO–SO was only about 0.5 dB. worse than that on continuous NO–SO, but the masking-level differences (MLD's) for NO–S$\pi$, N$\pi$–SO, NO–Sm, and N$\pi$–Sm were 4–6 dB. smaller with burst than with continuous noise. In an additional experiment, the noise burst (NO) was gated 0, 75, 150, 250, 400, 600, and 1000 msec. before the onset of the signal (S$\pi$). These MLD's increased gradually between 0 and 600 msec. and then leveled off at approximately the value obtained with a continuous masker. A single-interval yes–no procedure was used in these experiments. When two-alternative forced choice was used, the difference between continuous and burst noise was considerably diminished.

**A67-80800**
**MEASUREMENT OF STAPEDIAL-FOOTPLATE DISPLACEMENTS DURING TRANSMISSION OF SOUND THROUGH THE MIDDLE EAR.**
M. Rubinstein (Govt. Hosp., Otolaryngol. Dept., Tel Hashomer, Israel), B. Feldman, H. Fischler, E. H. Frei, and D. Spira (Weizmann Inst. of Sci., Rehovoth, Israel).
*Journal of the Acoustical Society of America,* vol. 40, Dec. 1966, p. 1420–1426. 10 refs.
Ford Found. supported research.

The frequency response of stapedial-footplate vibration during sound conduction was measured on fresh cadaver specimens. Specially designed and adapted instruments made these measurements possible at sound levels lower than those causing discomfort to living subjects (86–114 dB.) and with a continuous frequency sweep between 100 c.p.s. and 10 k.c.p.s. The results show a similarity with the curves of subjective ear sensitivity, suggesting a dependence of the over-all sensitivity of the ear on the middle-ear frequency response. Linear increase of vibration amplitude with sound level was found to exist up to around 104 dB.; above this sound level, there is a gradual limiting of the stapedial excursions. Speculations on energy transfer from the middle to the inner ear showed nearly optimal matching between them. The influence of the aging process of the specimens is discussed.

**A67-80801**
**EFFECTS OF HELIUM AND OXYGEN MIXTURES ON PULMONARY MECHANICS DURING AIRWAY CONSTRICTION.**
Thomas B. Barnett (N. C. U., School of Med., Dept. of Med., Chapel Hill).
*Journal of Applied Physiology,* vol. 22, Apr. 1967, p. 707–713. 14 refs.
Grant PHS H-1257

Patients with obstructive airway diseases differ with respect to the effects of low-density gases on pulmonary mechanics. Theoretically, this could result from differences in the anatomic locus of the obstruction. The effects of breathing He–$O_2$ mixtures upon pulmonary mechanics were studied in dogs with the airway constricted by various methods. When dogs breathed air, histamine injection, which constricts distal airways, was associated with increased nonelastic work of breathing and decreased pulmonary compliance. Similar changes occurred when histamine was injected while the dogs breathed 22% oxygen, 78% helium (hleium–air). With air breathing, mechanical obstruction of the lower trachea and vagal stimulation were both accompanied by increased non-elastic work. This effect was minimal or absent when the dogs breathed helium–air. It is concluded that helium–air reverses the effects on

airway resistance of proximal airway construction but has little influence upon that resulting from distal airway constriction. This conclusion is consistent with the laws governing gas flow in branching tubes.

A67-80802
**NITROGEN TISSUE TENSIONS FOLLOWING REPEATED BREATH-HOLD DIVES.**
Poul-Erik Paulev (Aarhus U., Inst. of Physiol. and Copenhagen U., Inst. of Med. Physiol B, Denmark).
*Journal of Applied Physiology,* vol. 22, Apr. 1967, p. 714–718. 12 refs.

Results from electronic computer calculations of nitrogen tissue tensions following repetitive breath-hold dives are reported. They are based on alveolar nitrogen percentages measured during actual diving up to 62 ft. in fresh water. These calculations predict that after repeated skin dives to depths of 62–115 ft. it is possible to obtain tissue nitrogen tensions exceeding the maximum allowable tensions of conventional air-supplied diving. Thus decompression sickness from breath-hold diving is a likely possibility when a series of deep dives is performed. Repeated breath-hold dives to such depths should only be performed with long surface intervals to avoid the risk of decompression sickness. Prenitrogenation by breathing compressed air beforehand has been shown to diminish the number of dives necessary to reach a given tissue tension, and thereby increase the risk of decompression sickness. Breath-hold dives to 62 ft. or more should be discouraged if the diver, by simulated or real air-supplied diving, has been breathing compressed air immediately before.

A67-80803
**EFFECTS OF TRANSVERSE ACCELERATION ON BLOOD OXYGEN SATURATION.**
Natalio Banchero, Lucille Cronin, Wilhelm J. Rutishauser, Anastasios G. Tsakiris, and Earl H. Wood (Mayo Clin. and Mayo Found. and Minn. U., Graduate School of Med., Mayo Sect. of Physiol., Rochester).
*Journal of Applied Physiology,* vol. 22, Apr. 1967, p. 731–739. 27 refs.
NASA Grant NsG-317, Grants AF 33(657)-8899, NIH H-3532, and AHA CI 10.

The oxygen saturations of blood being withdrawn continuously from the femoral and pulmonary arteries were recorded by cuvette oximeters before and during one-min. exposures of seven dogs to forward ($+g_x$), backward ($-g_x$), right lateral ($+g_y$), and left lateral ($-g_y$) acceleration while they were breathing air. During exposures to 2.1 g, no systematic changes in arterial oxygen saturation occurred in the four different body positions. At two higher levels of acceleration (4.4 and 6.7 g), decreases in arterial blood oxygen saturation occurred and were related to the level of acceleration. Lesser changes were observed in the oxygen saturation of mixed venous blood. Estimated pulmonary arterial–venous shunting increased progressively with acceleration. Breathing 99.6% oxygen did not prevent arterial desaturation, and estimated pulmonary arterial–venous shunts were similar to those when the animals breathed air. Blood oxygen changes appear to be related to severe disturbances of $\dot{V}/\dot{Q}$ ratios within the lungs, resulting from magnification of the pressure imbalances in the thorax by the increased inertial forces associated with acceleration.

A67-80804
**CUTANEOUS SENSITIVITY COMMUNICATIONS.**
John R. Hennessy (U.S. Army Electron. Command, Avionics Lab., Fort Monmouth, N.J.).
*(Human Factors Soc., Metropol. Chapter, Ann. Meeting, New York, Jun. 12, 1965).*
*Human Factors,* vol. 8, Oct. 1966, p. 463–469. 11 refs.

The general and specific problems facing emergence of cutaneous sensitivity devices into a useful sub-system of communications system are discussed. The cutaneous sensory channel is emerging as a contender for application in communications systems in pace with the solution of corollary problems of psychology, neurology and bio-electronics. Transduction of electrical energy into living systems is only beginning to be understood. When suitable hardware is designed to match the nerve impulse and neuronal channels, the safety and user acceptability of cutaneous sub-systems will enhance the reliability of modern communications under extremes of environment, as well as provide an independent channel for the sensorially deprived.

A67-80805
**REGULARITIES OF DEATH OF DIFFERENTIATING NERVE CELLS INDUCED BY IRRADIATION. II. INVESTIGATION IN NEW BORN WHITE RATS [ZAKONOMERNOSTI POSTRADIATSIONNOI GIBELI DIFFERENTSIRUIUSHCHIKHSIA NERVNYKH KLETOK. 2. ISSLEDOVANIIA NA NOVOROZHDENNYKH BELYKH KRYSAKH].**
IU. V. Korogodina and V. M. Dubrovina (USSR, Acad. of Med. Sci., Inst. of Med. Radiol., Obninsk).
*Radiobiologiia,* vol. 6, no. 6, 1966, p. 875–879. 10 refs. In Russian.

Young rats received various doses (200 r.–1,200 r.) of gamma radiation from $CO_{60}$. After sacrificing the animals at various periods (10 min.–24 hrs.) after the exposure their brains were removed. Sections of cerebellar cortex were examined for cell pyknosis which indicated cell damage and death. The examination revealed heterogeneity of the cells with different degrees of radiosensitivity: in the outer layer 90–93% of cells exhibited sensitivity; in the inner layer 6–9% were radiosensitive. All Purkinje cells showed radio resistance. The resistance of cells seemed to be greater in the mature cells. The postirradiation destruction of young cells showed no relationship to the phase of mitosis but took place during the interphase. The plotted curves of survival numbers had an exponential character, and the $LD_{50}$ was close to 100 r.

A67-80806
**SOME DATA OF DEPENDENCE OF HEMORRHAGIC SYNDROME IN DOGS IN ACUTE RADIATION SICKNESS ON TOPOGRAPHY OF PERIPHERAL NERVOUS SYSTEM DAMAGE [NEKOTORYE DANNYE O ZAVISIMOSTI OSOBENNOSTEI PROIAVLENIIA GEMORRAGICHESKOGO SINDROMA U SOBAK PRI OSTROI LUCHEVOI BOLEZNI OT TOPOGRAFII PORAZHENIIA PERIFERICHESKOI NERVNOI SISTEMY].**
V. I. Lebedev.
*Radiobiologiia,* vol. 6, no. 6, 1966, p. 848–850. 11 refs. In Russian.

In dogs exposed to X-rays and gamma-irradiation the most damage was noted in the sympathetic nervous system, while the majority of cells in the spinal ganglia remained normal or slightly changed. In general, the results showed a definite relationship between the location of the hemorrhages and the damage of the corresponding neurons. However, the entire peripheral nervous system was affected, characteristic of acute radiation sickness.

**A67-80807**
**ON THE PROBLEM OF INTENSIFYING RADIORESISTANCE OF RABBITS BY MEANS OF IMMUNIZATION WITH SMALLPOX VIRUS VACCINE [K VOPROSU O POVYSHENII RADIOREZISTENTNOSTI KROLIKOV PUTEM IKH IMMUNIZATSII VERUSOM OSPOVAKTSINY].**

L. A. Kamalian (USSR, Acad. of Med. Sci., Radiobiol. Sect., Erevan).

*Radiobiologiia*, vol. 6, no. 6, 1966, p. 860–862. 10 refs. In Russian.

Rabbits immunized against smallpox, either by the egg-grown vaccine or vaccine from the animal skin exudates, (0.1 ml. containing $10^4$ $CPD_{50}$) were challenged by virulent pox virus to determine the degree of immunity by the number of plasma cells present in the blood. The parallel test was run for antibody titre. These animals served as a comparison group for the effect of radiation in normal and vacinated organisms. The vaccinated rabbits had a better tolerance to radiation of 700–1000 r. than the non-vaccinated ones. The greatest degree of resistance was noted during the highest stage of immunity.

**A67-80808**
**ON THE INITIAL RADIATION DAMAGES OF NUCLEUS STRUCTURES [O NACHAL'NYKH POVREZHDENIIAKH IADERNYKH STRUKTUR IONIZIRUIUSHCHEI RADIATSIEI].**

N. B. Strazhevskaia, V. A. Struchkov, and G. S. Kalendo (USSR, Acad. of Sci., Inst. of Biol. Phys., Moscow).

*Radiobiologiia*, vol. 6, no. 6, 1966, p. 783–789. 15 refs. In Russian.

The whole-body irradiation (without thymus) of white rats with gamma-rays from $Cs^{137}$ (1000 r.) and the local X-ray exposure of the thymus was performed for the study of the effect of ionizing radiation on the nucleic acid, DNA, of the tissue cells. The effect of epinephrine injections was also tested. The results showed that irradiation changed the viscosity of DNA-complexes which correlated with changes in mitosis, but did not affect the general structure of the cell. Pyknosis took place after the viscosity changes. Irradiation of the entire body changed the physical properties of DNA-complexes only 24 hr. after the exposure. The changes in viscosity remained at the same level for 1–2 hr. indicating that the enzyme systems did not participate in this change. The early effect of this action was the irreversible changes in physical and chemical properties of the chromatin nucleoproteins, which may have resulted in pyknosis.

**A67-80809**
**PROLONGED RESIDENCE OF HUMAN SUBJECTS IN GASEOUS ENVIRONMENT WITH HIGH $CO_2$ CONTENT [O DLITEL'NOM PREBYVANII CHELOVEKA V GAZOVOI SREDE, SODERZHASHCHEI POVYSHENNOE KOLICHESTVO $CO_2$].**

A. G. Kuznetsov and I. R. Kalinichenko.

*Fiziologicheskii Zhurnal SSSR*, vol. 52, Dec. 1966, p. 1460–1462. 8 refs. In Russian.

Young, male adults were subjected to breathing air containing carbon dioxide under partial pressure of 7.5–14.7 mm. Hg (at sea level). The subjects were placed in a pressure chamber where the altitude was simulated at 7,000 m., where $PCO_2$ was 7.9–15.8 mm. Hg, and $PO_2$ was 148.174 mm. Hg which was within safe limits of hypoxia. The respiration rate showed an increase shortly after the beginning of the experiment. As the experiment progressed and after its termination after 30 days, respiration rate, changes in pulmonary ventilation, chemical composition of inhaled and exhaled air, and alveolar air were recorded. The results showed that the prolonged inhalation of air containing an increased amount of $CO_2$ led to the increased alveolar $PCO_2$, and an increase in pulmonary ventilation rate. However, the pulmonary ventilation rate reached its upper limit at the beginning of the experiment, while alveolar $PCO_2$ proceeded to increase. The increase in the alveolar $PCO_2$ even after the return to normal atmosphere breathing suggested a decrease in the respiratory centers' sensitivity, as a factor of the organism's adaptation to $CO_2$.

**A67-80810**
**CYSTAMINE INFLUENCE ON CHANGES IN WHITE BLOOD OF DOGS AFTER SUBLETHAL IRRADIATION [VLIIANIE TSISTAMINA NA IZMENENIIA V BELOI KROVI U SOBAK POSLE RENTGENOVSKOGO OBLUCHENIIA V SUBLETAL'NOI DOZE].**

O. K. Makhalova, A. S. Mozzhukhin, and V. I. Bertash (S. M. Kirov Mil.-Med. Acad., Leningrad, USSR).

*Radiobiologiia*, vol. 6, no. 6, 1966, p. 883–885. 11 refs. In Russian.

The general effect of ionizing radiation is due primarily to the damage to the sensitive tissues of the organism. However, even after the lethal doses of radiation the use of radioprotectors lead not only to an increase in the percentage of survival but also in diminishing the destructive effect on the white blood cells in the peripheral blood and bone marrow during the early period of irradiation. Faster recovery is also seen in the hemopoietic system. The intravenous injections of cystamine hydrochloride (60 m.g./kg. body weight) in dogs before the irradiation moderated the clinical symptoms of the acute radiation sickness, and the damage to the white cells in the circulating blood. It was also noted that normalization in leucopoiesis took place faster than in animals who did not receive the drug.

**A67-80811**
**CYSTEAMINE RADIOPROTECTIVE EFFECT IN IRRADIATION OF LOACH SPERM [PROTIVOLUCHEVOI EFFEKT TSISTEAMINA PRI DEISTVII IONIZIRUIUSHCHEI RADIATSII NA SPERMII V'IUNA].**

E. IA. Graevskii, Z. N. Faleeva, and N. K. Flerova (USSR, Acad. of Sci., A. N. Severtsov Inst. of Animal Morphol., Moscow).

*Radiobiologiia*, vol. 6, no. 6, 1966, p. 886 890. 14 refs In Russian.

Viability of sperm in the loach, *Misqurnus fossilis*, after the exposure to the 1,000–1,500 r. doses of X-rays was tested by fertilization of mature fish eggs. Only 36–54% of such eggs produced fry. Cysteamine (0.75 mg./md.) was used to counteract the radiation effect. The aminothiol added to the physiological solution containing sperms immediately before or after the irradiation completely presented damage of sperm cells. The prophylactic effect may have been due to the action of sulfhydryl groups which were found in greater concentration within the tissue cells after the introduction of the radiation protector.

**A67-80812**
**ON THE POSSIBLE WAY OF REALIZATION OF RADIOPROTECTIVE ACTION OF RADIOPROTECTORS [O VOZMOZHNOM PUTI REALIZATSII ZASHCHITNOGO DEISTVIIA RADIOPROTEKTOROV].**

I. G. Akoev, M. A. Lagun, B. I. Ognev, and O. F. Ziadinova. *Radiobiologiia,* vol. 6, no. 6, 1966, p. 891–897. 33 refs. In Russian.

The mechanism of action of radioprotectors was studied by employing cydoxin (cystamine and pyridoxine) in mice and rats exposed to cobalt radiation. The relative size of the spleen in normal and irradiated animals acted as an indicator of the damage. Although there may exist a certain chemical action of each compound, the results of present studies strongly suggested the existence of a common mechanism of the radioprotector action. It consisted of the ability of the chemical to hasten the reparative process of the affected tissue which seemed to begin even during the action of the radiation on the cellular constituents. The effectiveness of a radioprotector, therefore, is essentially the degree of enhancing such repair during the exposure. If this is the case, then the value of radioprotection should decrease with the duration of exposure. The experimental results indicated the validity of the above hypothesis.

**A67-80813**

**SUMMARY BIOELECTRICAL RESPONSES OF MUSCLE MECHANOCEPTORS UNDER VARIOUS PARAMETERS OF VIBRATION [SYMMARNYE BIOELEKTRICHESKIE OTVETY MYSHECHNYKH MEKHANOTSEPTOROV PRI VOZDEISTVII VIBRATSII RAZLICHNYKH PARAMETROV].**

V. D. Shubchinskii (Donetsk Inst. of Ind. Hyg. and Occupational Diseases, UkrSSR).

*Biulletin' Eksperimental'noi Biologii i Meditsiny,* vol. 63, Feb. 1967, p. 3–7. 8 refs. In Russian.

Investigations were carried out in acute experiments on cats under nembutal anesthesia. One of the heads of *m. gastrocnemius* was subjected to vibration, potentials being recorded from the corresponding gastrocnemius nerve. It was found the mechanoceptors of a physiologically released muscle responded to vibration with the frequency varying from 1 to 150–200 cycles. With increase of frequency the response to vibration was facilitated, which was especially demonstrable in the low frequency range. In contracted muscle mechanoceptors ceased to respond to vibratory stimulation regardless of its frequency.

**A67-80814**

**EFFECT OF ACOUSTIC SIGNAL DURATION ON THE LATENCY OF A VOLUNTARY MOTOR RESPONSE [ISSLEDOVANIE SKRYTOGO PERIODA PROIZVOL'NOI DVIGATEL'NOI REAKTSII PRI ZVUKOVYKH SIGNALAKH RAZNYKH DLITEL'NOSTEI I UROVNEI INTENSIVNOSTI].**

R. V. Avakian, G. A. Vardapetian, and G. V. Gershuni (USSR, Acad. of Sci., I. P. Pavlov Inst. of Physiol., Lab. of Physiol. of Acoust. Analyzer, Leningrad).

*Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 16, Nov.–Dec. 1966, p. 1037–1045. 15 refs. In Russian.

Simple reaction time (RT) was investigated as a function of duration, intensity and energy of the acoustic signal (white noise). It has been shown that RT decreases with the increase of the signal duration. The critical time of this effect at sound intensity levels of 20, 30 and 50 db. was 110, 46 and 8 msec. respectively. When intensity alone was increased, a minimum value of RT was observed already within the range of intensities from 20 to 30 db. The results of this and related studies are taken to mean, that the effect of stimulus duration and intensity (i.e.—stimulus energy) in the case of simple reaction time measurement is different from that observed in the case of threshold and loudness measurements.

**A67-80815**

**INTERPRETATION OF FRACTURE MECHANISM IN PILOTS EJECTED, MAINLY IN REGARD TO F-104G AIRCRAFT [INTERPRETAZIONE SUI MECCANISMI DI FRATTURA IN PILOTI DI AVIOGETTI, EJETTATI CON IL SEGGIOLINO, CON PARTICOLARE RIGUARDO AGLI F. 104 G].**

P. Italiano.

*Rivista di Medicina Aeronautica e Spaziale,* vol. 29, Apr.–Jun. 1966, p. 193–228. 11 refs. In Italian.

Traumatic lesions are described, due to pilot ejection, including a fracture of the lower limbs, typical of bail out. The cases, large in number, are concerned in particular, with vertebral fractures from F-104G ejection, this lesion being reported in five pilots out of six ejected. This lesion is mainly located in the 12th dorsal vertebra, and is defined as typical spine fracture from bail out. The ejection seats equipping the AF jet planes are examined and through this examination the vertebral lesion is connected partly with ejection impact acceleration, and partly with spine position when pilot holds the "D" handle of F-104G. It is suggested, based on some pilots' observations, to move the ejection system to a different position.

**A67-80816**

**OCULAR SIDE-EFFECTS OF DRUGS.**

Hugh Green.

*Ophthalmic Optician,* vol. 6, Oct. 15, 1966, p. 1009–1010. 6 refs.

Side-effects from the use of Imipramine (psychomotor stimulant) and the phenothiazines (central nervous system depressant) are discussed. Imipramine causes blurred vision and disturbance of accommodation and has an atropine-like effect. The phenothiazines including Chlorpromazine cause lenticular and corneal opacities which may not be reversible. In connection with these eye conditions a skin reaction may be present. A warning is given against the improper medical supervision of these drugs.

**A67-80817**

**MUSCULAR FATIGUE AND RECOVERY CURVE PARAMETERS AT VARIOUS TEMPERATURES.**

David H. Clarke (Md. U., College Park) and George E. Stelmach (Calif. U., Berkeley).

*Research Quarterly,* vol. 37, Dec. 1966, p. 468–479. 15 refs.

Thirty-six college males immersed their arms in water of 46°C and 10°C for 10 min. before and after separate hand-gripping exercise bouts consisting of static contractions held maxiamally for two min. A third period was designated control, in which no temperature change was induced. Following the exercise, the recovery was examined by testing for maximal strength every 60 sec. Heat caused a decrease in initial strength, final strength, and total work, but fatigable work remained unchanged; cold decreased initial strength and fatigable work, increased final strength, while the total work done was the same as control. Recovery of strength was more rapid for heat, but cold had a retarding influence. The curves of exercise and recovery were described mathematically.

**A67-80818**

**SPIROKINESIS.**

Bryant J. Cratty and Jack N. Sage (Calif. U., Los Angeles).

*Research Quarterly,* vol. 37, Dec. 1966, p. 480–490. 5 refs.

Grant NINDB NB 05577-02S1.

University males and females (N = 105) were deprived of auditory and visual cues and asked to walk a straight line on an athletic field 110 yd. by 120 yd., upon which a grid 10 yd. by 10 yd. had been laid out. The pathway they inscribed (based upon the mean amount of angular rotation per 100 ft. of progress was 33.87°, .83° per 30-inch stride. No relationships were found between reported hand and leg dominance, sex, and the direction and amount of rotation in the spiral shaped pathways. No significant differences were found when comparing the degrees of rotation per 100 ft. between groups classified according to sex and hand dominance. Further, no significant differences in the number of individuals spiraling to the right and those spiraling to the left were observed. Fifty-five (52.2 percent) of the subjects veered in the same direction on two trials (28.6 percent to the right and 23.6 percent to the left). Of the remaining subjects, 30 (28.6 percent) veered in opposite directions on each of two trials, while the remaining 20 subjects walked patterns which were difficult to classify.

**A67-80819**
**EFFECTS OF BREATHING HIGH CONCENTRATIONS OF OXYGEN ON TREADMILL PERFORMANCE.**
David A. Cunningham (Alberta U., Edmonton, Canada).
*Research Quarterly*, vol. 37, Dec. 1966, p. 491-494. 14 refs.

The effects of breathing high concentrations of oxygen on treadmill performance time, the exercise and postexercise pulse, and the relationship between excess lactic acid and oxygen debt were studied. The breathing of oxygen during the maximal performance test improved the performance time of each test. Oxygen debt was significantly reduced for the first minute of recovery after breathing oxygen during the test. The excess lactic acid was reduced after the first minute of recovery and was found to peak during the third minute of recovery. A linear relationship was observed between excess lactic acid and oxygen debt while breathing air or oxygen during the test.

**A67-80820**
**A FACTORIAL INVESTIGATION OF POWER, SPEED, ISOMETRIC STRENGTH, AND ANTHROPOMETRIC MEASURES IN THE LOWER LIMB.**
K. B. Start, R. K. Gray, D. J. Glencross, and A. Walsh (Western Australia U., Perth).
*Research Quarterly*, vol. 39, Dec. 1966, p. 553-559. 20 refs.

Sixty-three men provided 19 measures of the lower limb: seven of isometric strength, four of power, seven anthropometric estimates, and one of speed. Varimax analysis of the data suggested that power was linked with speed rather than strength, and that total leg strength had decreasing loadings on the factors of ankle, knee, and hip strength. This was confirmed by Promax analysis which also enabled two second-order factors to be obtained.

**A67-80821**
**DIURNAL CYCLES AND WORK-REST SCHEDULING IN UNUSUAL ENVIRONMENTS.**
Richard Trumbull.
*Human Factors*, vol. 8, Oct. 1966, p. 385-398. 86 refs.

The extension of man's working environment and its control have led to a new consideration of his "normal" neuro-physiological and psychological rhythms. There are some fifty such patterns of fluctuating functions within man which have various degrees of influence upon his level of performance and ability to maintain performance. Data are provided from physiological and psychological research in an attempt to provide perspective for selection of appropriate personnel and establishment of work/rest or duty cycles in deference to these influences.

**A67-80822**
**THE MOTION OF THE HUMAN CENTER OF MASS AND ITS RELATIONSHIP TO MECHANICAL IMPEDANCE.**
Edmund B. Weis, Jr. (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio) and Frank Primiano, Jr. (Technol. Inc., Dayton, Ohio).
*Human Factors*, vol. 8, Oct. 1966, p. 399-405. 6 refs.

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

**A67-80823**
**PULMONARY EDEMA OF HIGH ALTITUDE: A REVIEW OF CLINICAL AND PATHOLOGICAL CONSIDERATIONS.**
H. L. Colcolough (U. S. Army Res. Inst. of Environ. Med., Pathol. Div., Natick, Mass.).
*Military Medicine*, vol. 131, Dec. 1966, p. 1504-1509. 34 refs.

This review represents the majority of clinical and pathological material published since Hurtado's original description of acute pulmonary edema of altitude in 1937. In the cases from South America the greatest incidence is in persons previously acclimatized to high altitude whereas the data from India is predominantly in acutely exposed young adult males. In most instances there was an initial latent period of 12-72 hr. before the onset of symptoms. Increasing dyspnea, orthopnea and productive cough usually indicated the onset of acute pulmonary edema. Physical examination of this stage often showed scattered bilateral rales. X-rays of the chest usually showed early fluffy bilateral hilar infiltrates. If treatment is initiated in this early stage reversal of the process is usually quite dramatic. Bed rest and nasal $O_2$ (100%) is the treatment of choice. Digitalis, morphine, and diuretics may be necessary in the more refractory cases. There have been approximately 540 cases of acute pulmonary edema attributed to high terrestrial altitude. Of these there were 31 deaths reported and 19 autopsies performed. In addition to congestion and edema which were universally present a significant number of cases showed intraaleveolar fibrin, thrombi, and hyaline membranes. Inhibition of the pulmonary plasminogen activator system has been suggested as the source of the hyaline membranes.

**A67-80824**
**EXPOSURE TO CARBON MONOXIDE: REVIEW OF THE LITERATURE AND 567 AUTOPSIES.**
Pierre A. Finck (Armed Forces Inst. of Pathol., Wound Ballistics Pathol. Branch, Washington, D. C.).
*Military Medicine*, vol. 131, Dec. 1966, p. 1513-1539. 42 refs.

Part of the literature on carbon monoxide (CO) and 567 autopsied cases from the files of the Armed Forces Institute of Pathology were reviewed. In acute fatal CO poisoning, the diagnosis can be made by the analysis of the blood or tissue that contains blood. The tissue from an acute case retains its cherry-red color in

formalin for a few days, in contrast to tissue from a case not exposed to CO, which loses its red color within a few hours. Such a criterion is by itself a useful, practical qualitative test when no other means of analysis are available. In delayed deaths, the proof of exposure to CO depends on the analysis of an air sample taken at the scene. The lesions encountered do not allow a specific diagnosis of CO poisoning.

**A67-80825**
**RECONSIDERATION OF THE CENTRAL NERVOUS SYSTEM PHARMACOLOGY OF AMPHETAMINE. II. INFLUENCE OF PHARMACOLOGIC AGENTS ON CUMULATIVE AND TOTAL LETHALITY IN GROUPED AND ISOLATED MICE.**

Joseph F. Gardocki, Margery E. Schuler, and Leonide Goldstein (McNeil Labs., Inc., Biol. Res. Dept., Fort Washington, Pa. and N. J. Bur. of Res. in Neurol. and Psychiat., Neuropharmacol. Sect., Princeton).

*Toxicology and Applied Pharmacology,* vol. 9, Nov. 1966, p. 536–554. 20 refs.

Doses of amphetamine were selected from the polyphasic mortality response curves for interaction studies with drugs representative of various pharmacologic groups that could be expected to interact with amphetamine. The results of these studies suggested that the interaction of a test drug with amphetamine is more fully described by employing several dosages of amphetamine in both the grouped and isolated situation rather than a single grouped and a single isolated dose. A difference in the amphetamine-drug interaction was found to exist not only in the grouped vs. the isolated situation, but also between different dosages of amphetamine in the same situation. The indices employed for studying the interaction effects were gross behavior and the cumulative and total lethality counts. The results also indicated that one cannot extrapolate from the activity of a given pharmacologic agent against amphetamine lethality to other members of the same class.

**A67-80826**
**THE EFFECT OF CONCEPTUAL COMPLEXITY ON INFORMATION SEARCH IN A COMPLEX PROBLEM-SOLVING TASK.**

Marvin Karlins, Thomas Coffman, Helmut Lamm, and Harold Schroder (Princeton U., N. J.).

*Psychonomic Science,* vol. 7, Feb. 5, 1967, p. 137–138. 10 refs. Contract ONR 1858 (42).

Individuals varying in their level of "integrative complexity" (greater perceptual categories) requested information about a novel environment for use in solving a complex problem. Subjects who are integratively complex are more active in this type of learning task (ask more questions) and request different types of information than their integratively simple counterparts.

**A67-80827**
**SOME PATTERNS OF FIXATION SACCADIC EYE MOVEMENTS.**

Kenneth Gaarder (Natl. Inst. of Mental Health, Saint Elizabeth's Hosp., Clin. Neuropharmacol. Res. Center, Washington, D.C.).

*Psychonomic Science,* vol. 7, Feb. 5, 1967, p. 145–146. 8 refs.

Fixation saccadic eye movements occur at a more rapid rate during non-alpha (aroused) intervals than during alpha (less aroused) intervals. Other specific patterns of eye movement are shown to be typical of individuals or to occur in periods combining visual fixation with auditory task instruction.

**A67-80828**
**SIMULTANEOUS BRIGHTNESS CONTRAST AS A FUNCTION OF PERCEPTUAL SET**

Michael Parrish and Kendon Smith (N.C.U., Greensboro).

*Psychonomic Science,* vol. 7, Feb. 5, 1967, p. 155–156. 7 refs.

Using the method of constant stimuli, the degree of simultaneous brightness contrast was determined for 17 subjects within the context of one of Hering's standard demonstrations. Of these subjects, eight were given a "whole-perceiving" and nine an "analytical" perceptual set. The analytical subjects showed a significantly smaller contrast effect ($p = .02$, two-tailed test).

**A67-80829**
**RESTRAINT STRESS AS IT INFLUENCES THE MYOCARDIUM OF RAT.**

V. N. Sharma and F. S. K. Barar (S.M.S. Med. Coll., Dept. of Pharmacol. and Exptl. Therap., Jaipur, India).

*Indian Journal of Medical Research,* vol. 54, Dec. 1966, p. 1102–1107. 15 refs.

Indian Council of Med. Res. supported research.

Rats of either sex, were divided into six groups. The groups were under restraint for 7 or 18 hr., conditioned to hydrocortisone or in combinations of both factors. The effect of forced-restraint stress on the myocardial glycogen and acetylcholine content was studied. Simultaneous histological studies of the myocardium were carried out in each group. The glycogen content in all the experimental groups was significantly reduced. The acetylcholine content followed no definite pattern. The main histological changes observed were round cell infiltration, edema of the myocardium, focal necrosis and fragmentation of fibers.

**A67-80830**
**THE PATTERN OF RENAL CHANGES FOLLOWING STRESS: AN EXPERIMENTAL STUDY IN RATS.**

V. N. Sharma, D. P. Gupta, F. S. K. Barar, and J. L. Godhwani (S.M.S. Med. Coll., Depts. of Pharmacol. and Pathol., Jaipur, India).

*Indian Journal of Medical Research,* vol. 54, Dec. 1966, p. 1108–1114. 9 refs.

Indian Council of Med. Res. supported research.

Rats were subjected to restraint, cold, heat and electric and chemical stress. The results of histological investigation of the kidney pointed to the direct role of stress in the pathogenesis of certain renal lesions in the form of round cell infiltration going on to fibrosis and picture of interstitial nephritis (which is also referred to as pyelonephritis by some). Realization of this mechanism is important in the final evaluation of the interrelationship between stress and the production of lesions in kidneys which may be inducive to idiopathic hypertension.

**A67-80831**
**ASSOCIABILITY OF CVC-WORD PAIRS AND ITS RELATION TO LIST DIFFICULTY.**

Alexander J. Wearing and William E. Montague (Ill. U., Urbana).

*Psychonomic Science,* vol. 7, Feb. 5, 1967, p. 133–134. 12 refs. Contracts DA 28 043 AMC 00073(E), Nonr-3985(09), and OEC-3-6-058375-0612.

Previous data showed that two lists, constructed of seemingly homogeneous materials, were not equivalent. It was hypothesized that the reason for the difference lay in the Associability (AS) of the pairs used in the lists. In this study, AS was determined by the proportion of 50 subjects giving an associative aid to link a pair within 15 sec. The two lists differed significantly in mean AS value and the correlation between AS and errors in learning (previous data) was −.64, confirming the hypothesis.

A67-80832
**THE FUNCTION OF PHASIC AND TONIC SYSTEMS ON THE OCULOMOTOR APPARATUS IN POST-ROTARY AND OPTOKINETIC NYSTAGMUS [RABOTA FAZNOI I TONICHESKOI SISTEM GALZODVIGATEL'NOGO APPARATA PRI POSLEVRASHCHATEL'NOM I OPTOKINETICHESKOM NISTAGMAKH].**

D. P. Matiushkin (Pediat. Med. Inst., Dept. of Normal Physiol., Leningrad, USSR).

*Biulleten Eksperimental'noi Biologii i Meditsiny*, vol. 63, Feb. 1967, p. 12–15. 10 refs.

The function of phasic and tonic systems of the oculomotor apparatus may be assessed by characteristic electrical manifestations of excitation of the corresponding muscular fibers. Analysis of electromyograms of the ocular muscle in post-rotatory and optokinetic nystagmus shows that fast phases of nystagmus are conditioned by bursts of activity of the phasic system of corresponding muscles, strengthened by excitation of the tonic system of these muscles, while the slow phases are conditioned mainly by action of the tonic system of antagonist muscles. The duration of the rapid phases of nystagmus (bursts of activity of the phase system) is always short, varies but feebly and is practically not related to the duration period and force of nystagmus. The latter apparently points to the existence of mechanisms limiting the duration of rapid ocular movements.

A67-80833
**INHALATION OF OXYGEN AS AN AID TO RECOVERY AFTER EXERTION.**

Richard K. Bjorgum and Brian J. Sharkey (Mont. U., Missoula).

*Research Quarterly*, vol. 37, Dec. 1966, p. 462–467. 15 refs.

Twelve young men including six trained endurance runners and six non-runners, were tested once in each of three treatment situations to determine the effectiveness of oxygen inhalation as an aid to recovery. The exercise test involved two runs of five min. each on a motor-driven treadmill. The treadmill was set at level grade and a speed of eight m.p.h. After the first run, one of the treatments was administered. The treatments consisted of oxygen, a placebo tank of compressed atmospheric air, and ordinary atmospheric air. Immediately after a one-min. inhalation period, the second five-min. run followed. Heart rates were monitored throughout the testing period, and recovery, oxygen consumption, and ventilation rate were measured after the second run. The inhalation of oxygen did not appear to be of any physiological aid to recovery. Although not of statistical significance, larger pulse decreases were recorded on the non-runners during the inhalation of oxygen. Exercise pulse rates indicated that the exercise test elicited near maximal exertion from the non-runners.

A67-80834
**MOUNTAIN SICKNESS.**

James S. Milledge (Christian Med. Coll. and Hosp., Vellore, South India).

*Lancet*, vol. 2, Nov. 12, 1966, p. 1082.

A discussion is presented of the role of respiratory alkalosis in initiating mountain sickness. Twenty-two men were transported within three hr. from sea level to 12,000 ft. altitude. Various symptoms of sickness were recorded, and the partial pressure of carbon dioxide ($P_{CO_2}$) was measured. Reduction in the $P_{CO_2}$ was mostly finished by 20 hr. of arrival at altitude. Symptoms of the disease reached a maximum at 36–48 hr. The results suggested that acid-base adjustment is completed before the symptoms reached their greatest intensity, and is not the direct cause of acute mountain sickness.

A67-80835
**MONOCULAR AND BINOCULAR PERCEPTION OF VERTICALITY AND THE RELATIONSHIP OF OCULAR DOMINANCE.**

Carl W. Schneider (Mich. State U., East Lansing).

*American Journal of Psychology*, vol. 79, Dec. 1966, p. 632–636. Grant NIMH 5-F1-MH-17, 006-02.

The perception of verticality was determined for 12 right-eyed and 12 left-eyed observers using the right eye, the left eye, and binocular vision. The apparent vertical was displaced to the right of true vertical when the right eye was used and to the left of true vertical when the left eye was used by all observers. Under the binocular viewing condition, the apparent vertical was displaced clockwise of true vertical by the right-eye dominant observers and counterclockwise of true vertical by the left-eye dominant observers.

A67-80836
**THE COMPLEXITY OF NATURAL LANGUAGE MEDIATORS AND ITS RELATION TO PAIRED-ASSOCIATE LEARNING.**

William E. Montague and Alexander J. Wearing (Ill. U., Urbana).

*Psychonomic Science*, vol. 7, Feb. 5, 1967, p. 135–136. 14 refs.

Contracts DA 28 043 AMC 00073 (E) and Nonr-3985(08).

Natural language mediators (NLMs) are widely used by subjects in paired-associate learning. Experiments which have documented their effect on learning have largely ignored qualitative differences between them. Two large groups learned different CVC-word lists after which they reported any NLMs they had used. Judges rated the complexity of NLMs using a scale developed by Martin, Boersma, and Cox (1965) with different materials. The results agree with theirs in that complex NLMs produced fewer errors in learning. However, some categories on the scale were used infrequently which may indicate that, at least with highly meaningful material, a simpler dichotomous categorization (NLM or Rote) may be preferable.

A67-80837
**INFLUENCE OF DIETARY FAT AND PROTEIN ON METABOLIC AND ENZYMATIC ACTIVITIES IN ADIPOSE TISSUE OF MEAL-FED RATS.**

Gilbert A. Leveille (Fitzsimons Gen. Hosp., U.S. Army Med. Res. and Nutr. Lab., Denver, Colo.).

*Journal of Nutrition*, vol. 91, Jan. 1967, p. 25–34. 36 refs.

The influence of dietary protein and fat on the response of adipose tissue to meal-feeding (a single, daily two-hour meal) was investigated in the rat. Meal-feeding stimulated the incorporation of pyruvate carbon into fatty acids and the oxidation of pyruvate by isolated adipose tissue. This response to meal-feeding was completely abolished by feeding a high fat diet. The activities of glucose 6-phosphate dehydrogenase and malic enzyme were higher in adipose tissue and liver of meal-fed rats consuming a high carbohydrate diet, but were unchanged in tissue of rats meal-fed a high fat diet. The activities of glucose 6-phosphate dehydrogenase and malic enzyme were depressed in adipose tissue of rats fed the high fat diet, whereas only glucose 6-phosphate dehydrogenase activity was depressed in liver of nibbling rats consuming the high fat diet. Adipose tissue from rats fed the high fat diet was able to convert significantly more pyruvate-$2^{14}C$ to glyceride-glycerol than tissue from rats fed the high carbohydrate diet. The possible significance of this observation is discussed. Dietary protein did not influence the response of adipose tissue to meal-feeding. Increasing the dietary protein level did increase hepatic glutamic-oxaloacetic (GOT) and glutamic-pyruvic (GPT)

**A67-80838**
**HUMAN STRESS IN SPACE.**
Robert Dean (Boeing Co., Multiple Stress Res. Group, Seattle, Wash.).
*Science Journal*, vol. 2, Dec. 1966, p. 71–75. 8 refs.

During space flight, man is subjected to stresses resulting from several maneuvers, the most important being boost and re-entry, and interplanetary transfer and orbital parking. Recent research indicates that environmental stresses in space (heat, humidity, noise, vibration, acceleration, zero gravity, and reduced pressure) are not necessarily harmful. Some results indicate that certain parameters, normally classified as stresses, may in fact be beneficial and improve performance by making subjects more alert. Interaction effects, occurring when human beings are exposed to several environmental stresses simultaneously, represent a promising new research area that offers the possibility of alleviating the effects of one stress with the effects of another.

**A67-80839**
**CHARACTERISTICS OF LIQUID OXYGEN OF ON-BOARD INHALATORS [LE CARATTERISTICHE DELL'OSSIGENO LIQUIDO PER RESPIRATORI DI BORDO].**
C. Marangoni and E. Rossi.
*Rivista di Medicina Aeronautica e Spaziale*, vol. 29, Apr.–Jun. 1966, p. 229–256. 28 refs. In Italian.

The impurities found in liquid oxygen used in breathing aboard aircraft were studied. The following impurities were considered in terms of their physico-chemical characteristics, dosage, and hazards when present in levels higher than those designated as within normal limits: acetylene, water, butane, carbon dioxide, ethane, ethylene, freon 12, methane, carbon monoxide, ozone, pentane, propane, propylene, nitrous oxide, carbon tetrachloride, and trichloroethylene. These impurities were found during evaporation which took place during the period of storage and utilization of liquid oxygen. The hazards presented by the impurities include (1) poisoning (carbon monoxide, carbon tetrachloride, and trichloroethylene); (2) fire (various hydrocarbons and carbon dioxide); (3) explosion (acetylene, ethylene, propylene and butane); (4) asphyxia (carbon dioxide, methane); and (5) malfunction of breathing apparatus (water and carbon dioxide).

**A67-80840**
**PARADOXICAL SLEEP AND NEURO-MENTAL DISORDERS [PARADOKSAL'NYI SON I NERVNO-PSIKHICHESKIE ZABOLEVANIIA].**
E. A. Kostandov, B. A. Lebedev, and K. K. Monakhov.
*Zhurnal Nevropatologii i Psikhiatrii*, vol. 67, no. 1, 1966, p. 144–149. 36 refs. In Russian.

A review is presented of current studies of the relationship of paradoxical phase of sleep to the neuro-psychosis. The important points are: (1) the necessity of this type of sleep in maintaining the normal mental state, and (2) the role of some drugs and alcohol on the duration of the paradoxical phase.

# Subject Index

AEROSPACE MEDICINE AND BIOLOGY / *a continuing bibliography* JUNE 1967

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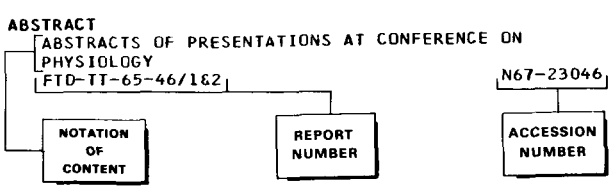


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# Corporate Source Index



## Typical Corporate Source Index Listing

AEROSPACE MEDICAL DIV. AEROSPACE MEDICAL RESEARCH LABS. /6570TH/, WRIGHT-PATTERSON AFB, OHIO.
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AMRL-TR-65-149 N67-21110


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## A

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A GARD ACTIVITIES IN AEROSPACE MEDICINE, AVIONICS, FLIGHT MECHANICS, FLUID DYNAMICS, GUIDANCE AND CONTROL, PROPULSION AND ENERGETICS, STRUCTURES AND MATERIALS, AND TECHNICAL INFORMATION N67-19910

AEROJET-GENERAL CORP., AZUSA, CALIF.
CONVERSION OF PLANETARY ENVIRONMENT BY EARTH MICROORGANISMS TO SUPPORT HUMAN LIFE N67-20420

AEROSPACE MEDICAL DIV. AEROMEDICAL RESEARCH LAB. /6571ST/, HOLLOMAN AFB, N. MEX.
VISUAL STIMULUS REDINTEGRATION IN CHIMPANZEE
ARL-TR-66-19 N67-19693

AEROSPACE MEDICAL DIV. AEROSPACE MEDICAL RESEARCH LABS. /6570TH/, WRIGHT-PATTERSON AFB, OHIO.
HUMAN CUTANEOUS SENSES AS RELATED TO MAINTENANCE, TROUBLESHOOTING, AND MAN-MACHINE COMMUNICATION, INCLUDING BIBLIOGRAPHY
AMRL-TR-66-108 N67-19812

EFFECTS OF CONFINEMENT ON NUTRITIONAL, BIOCHEMICAL, AND PHYSIOLOGICAL STATUS OF HUMAN SUBJECTS IN LIFE SUPPORT SYSTEMS EVALUATOR
AMRL-TR-66-2 N67-19813

STANDARDIZATION OF SYMBOLS AND UNITS FOR BIOLOGICAL VARIABLES USED IN ENVIRONMENTAL RESEARCH
AMRL-TR-66-115 N67-20650

AEROSPACE MEDICAL LAB. /CLINICAL/, LACKLAND AFB, TEX.
CONSTRUCTION AND USE OF INEXPENSIVE SMALL ANIMAL TREADMILL
AMLC-TR-66-4 N67-19703

AIR FORCE SYSTEMS COMMAND, WRIGHT-PATTERSON AFB, OHIO.
BIOENERGETICS RESEARCH ON BIOLOGICAL ENERGY CHANGES, THERMODYNAMICS AND LIFE, ENTROPY AND INFORMATION IN BIOLOGICAL BODIES, AND ENERGY BARRIERS AND ENTROPY BARRIERS
FTD-TT-65-1495 N67-19776

PHYSICAL LIMITATIONS OF SUPERSONIC AIRCRAFT
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PHYSICAL AND PSYCHOPHYSIOLOGICAL EFFECTS OF SPACEFLIGHT ON PILOT TRACKING PERFORMANCE UNDER SIMULATED VOSKHOD II CONDITIONS N67-20395

ENDOGENIC FORMATION OF CARBON MONOXIDE AND IMPORTANCE IN CLOSED ECOLOGICAL SYSTEMS - LITERATURE SURVEY N67-20396

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FTD-TT-65-1922 N67-20658

AMERICAN INST. FOR RESEARCH, WASHINGTON, D. C.
EFFECTS OF DAILY GOAL SETTING ON CODE RECEIVING PERFORMANCE AND ATTITUDES OF RADIOMAN
AD-642784 N67-19790

ARGENTINA. COMISION NACIONAL DE ENERGIA ATOMICA, BUENOS AIRES.
BLOOD CIRCULATION AND IODINE 131 TISSUE DEPURATION STUDIES
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ARMY EDGEWOOD ARSENAL, MD.
EQUATION OF ALTERNATE FORMS BY HUMAN SUBJECTS IN NUMBER FACILITY AND SPEED OF CLOSURE SUBTESTS - REPETITIVE PSYCHOMETRIC MEASURES
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PROTECTIVE CLOTHING FOR COOLING AND VENTILATION FOR MILITARY APPLICATION
TR-66-07 N67-21712

ARMY MEDICAL RESEARCH LAB., FORT KNOX, KY.
VISUAL-AROUSAL INTERACTION AND SPECIFICITY OF MYSTAGMIC HABITUATION IN HUMAN MALES UNDER ANGULAR ACCELERATION

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# Personal Author Index



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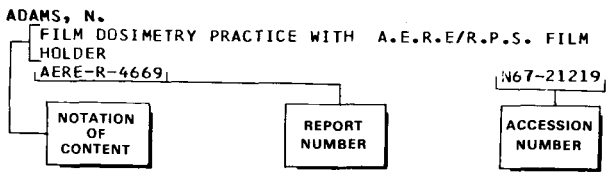


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