AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

NASA SP-7011 (08)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during January, 1965.

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. **FEBRUARY 1965**

INTRODUCTION

SP-7011 (08) is the eighth issue of *Aerospace Medicine and Biology*, NASA's continuing bibliography for the abstracting and announcement of current references on this subject. The publication is compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project (AMBBP) of the Library of Congress (LC), the American Institute of Aeronautics and Astronautics, 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, SP-7011.

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 in SP-7011 (08) 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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(continued)

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

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STAR ENTRIES

N65-10012# University Coll., Cork (Ireland)
STUDIES OF THE PROPERTIES AND STRUCTURE OF PURIFIED MAMMALIAN ADENOSINE DEAMINASE ISOLATED FROM CALF INTESTINE Third Annual Technical Status Report, 1 Jul. 1963–1 Jul. 1964
Thomas G. Brady [1964] 26 p refs
(Contract DA-91-591-EUC-2901)
(AD-444390)

Various modifications of the purification procedure have been investigated in an effort to eliminate bacterial contamination, reduce inactivation, and give stable concentrates. By means of Sephadex columns it has been found that purified preparations of adenosine deaminase usually contain a quantity of inactive material of approximately twice the molecular weight of the active enzyme. Treatment of the enzyme with 2-mercapto-ethanol converts it into lower molecular enzymically active fragments. Bovine lung and spleen have high deaminase activity. High activity is uniformly distributed in cat lung. Dog bone marrow is low active. The levels of deaminase found in some tissues of rat, rabbit, and cat were compared with previously published data. Considerable agreement has been found. The pH optima and isoelectric points of the deaminases isolated from different species have been compared. Further investigations on the separation of the isozymes of calf mucosa are described. By using the zymogram technique, it has been possible to show that mouse duodenum contains three isozymes. Author

N65-10014# Boeing Co., Seattle, Wash.
EFFECTS OF MISCELLANEOUS WASTES ON MESOPHILIC ACTIVATED SLUDGE: SOAPS, DETERGENTS, AND VOMITUS
R. W. Okey, R. L. Cohen, and D. D. Chapman Brooks AFB, Tex., School of Aerospace Med., Aug. 1964 13 p refs
(Contract AF 41(657)-387)
(SAM-TDR-64-41; AD-449425)

Effects of soap, synthetic detergents, and vomitus on the performance of high solids, mesophilic-activated-sludge, biologic-type waste reactors designed for extended manned space flight are reported. System performance was determined by oxygen uptake measured by microrespirometer and degree of side effects. Castile soap and the detergent sodium dodecyl sulfate were metabolized rapidly, and no deleterious side effects were exhibited. Eight other cleansing agents had serious disadvantages due to slow biodegradability or extreme foaming, or both. The relationship between biodegradability and chemical structure of the nonionic and anionic synthetic detergents is discussed. Human stomach content of nonpathologic origin was found to be rapidly metabolized, and pH depression that results from the discharge of vomitus through a waste treatment system had only slight observable metabolic effect through pH 4. The disposal of selected cleansing agents, vomitus, and pH depressant substances posed no apparent problems. Author

N65-10034# Joint Publications Research Service, Washington, D.C.
STUDIES OF INDUSTRIAL TOXICOLOGY
9 Nov. 1964 34 p refs Transl. into ENGLISH from Gigiena Truda i Prof. Zabolevaniya (Moscow), v. 8, no. 9, Sep. 1964 p 3-10, 25-28, 42-45, 62-63
(JPRS-27282; TT-64-51538) OTS: $2.00

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N65-10035# Joint Publications Research Service, Washington, D.C.
SIMULATED SPACE FLIGHT EXPERIMENTS
9 Nov. 1964 12 p Transl. into ENGLISH from Med. Gazeta (Moscow), no. 75, 18 Sep. 1964 p 3; no. 80, 6 Oct. 1964
(JPRS-27286; TT-64-51542) OTS: $1.00

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2. IN AN ARTIFICIAL ATMOSPHERE A. Kuznetsov, N. Agadzhanyan, and S. Zharov p 6-9

N65-10036 Joint Publications Research Service, Washington, D.C.

STATISTICAL ELECTROENCEPHALOGRAPH MODEL

M. I. Venslauskas et al 12 Nov. 1964 15 p refs Transl. into ENGLISH from Zh. Vysshei Nervnoi Deyatel'Nosti (Moscow), v. 14, no. 4, Jul.-Aug. 1964 p 726-731
(JPRS-27324; TT-64-51580) OTS: $1.00

This is a description of a statistical EEG model to be used for the explanation of the quantitative characteristics of the EEG as a function of the physiological load. It was assumed that the EEG represents a sum of the random electric activity of neurons correlated to a concrete physiological mechanism in which the singled-out rhythms of the alpha-rhythm type are absent from the EEG. The mechanism of the formation and development of the wave impulses was established by equations. It was found that the proposed statistical model of excitation waves in a mass of neurons is in agreement with the basic experimental facts that are characteristic in EEG dynamics. G.G.

N65-10037# Joint Publications Research Service, Washington, D.C.

STUDIES IN NEUROPATHOLOGY AND PSYCHIATRY

12 Nov. 1964 47 p refs Transl. into ENGLISH from Zh. Nevropatol. i Psikhiatr. (Moscow), v. 64, no. 5, 1964 p 680-685, 690-693, 723-728, 730-734, 768-770
(JPRS-27337; TT-64-51593) OTS: $2.00

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3. ON CLINICAL DYNAMICS OF NEURASTHENIA V. V. Korolev p 23-32 refs

4. ON THE CLINICAL DYNAMICS OF SO-CALLED ORGANIC PSYCHOPATHIES I. L. Kulev p 33-40 refs

5. ON THE PROBLEMS OF ADMINISTRATION OF INDOPAN IN A PSYCHIATRIC CLINIC V. G. Levit, T. N. Morozova, and A. N. Popova p 41-44

N65-10039# Joint Publications Research Service, Washington, D.C.

CHEMICAL PROPHYLAXIS OF RADIATION INJURIES

A. S. Mozzhukhin and F. Y. Rachinskiy 4 Nov. 1964 287 p refs Transl. into ENGLISH of the book "Khimicheskaya Profilaktika Radiatsionnykh Porazheniy" Moscow, Atomizdat, 1964 p 1-244
(JPRS-27227; TT-64-51482) OTS: $6.00

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7. EFFECT OF RADIOPROTECTIVE PREPARATIONS ON FUNCTIONAL STATE OF THE ORGANISM OF HIGHER ANIMALS AND MAN p 212-253 refs

8. POSSIBLE MECHANISMS OF PROTECTIVE ACTION OF AGENTS OF CHEMICAL PROPHYLAXIS OF RADIATION INJURIES p 254-280 refs

N65-10045*# Naval School of Aviation Medicine, Pensacola, Fla.

BIOLOGICAL CONSIDERATIONS OF MANNED SPACE FLIGHT

Ashton Graybiel [1964] 11 p refs
(NASA Order R-93)
(NASA-CR-59405) OTS Prices: HC $1.00/MF $0.50

This paper covers the stresses and hazards in manned space flight that are originated by the great distances to be transversed, the lack of any known destinations having a favorable environment, the exposure to a near vacuum, and the changes in the gravitoinertial force of the environment. The application of hyoscine or a combination of hyoscine and d-amphetamine was found to give the best protection against motion sickness induced by prolonged rotation. G.G.

N65-10065# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

EFFECTIVENESS OF PHARMACOCHEMICAL PROTECTION IN GAMMA IRRADIATION AND IRRADIATION BY PROTONS WITH ENERGIES OF 660 AND 120 Mev

V. S. Shashkov, P. P. Saksonov, V. V. Antipov, V. S. Morozov, G. F. Murin et al *In its* Cosmic Res., Vol. 2, No. 4, 1964 11 Sep. 1964 p 217-231 refs (See N65-10051 01-30)

The effects of gamma rays from Co^{60} and of 660- and 120-MeV protons were compared in experiments on 1360 white mice. At a γ-ray dose rate of 364 R/min, the $DL_{100/30}$ came to 850 R (720 rad). On irradiation in a pulsed beam of 660-MeV protons (dose rate 600 to 700 rad/min), the $DL_{100/30}$ amounted to ~ 1178 rad. Cystamine (150 mg/kg), aminoethylisothiuronium (150 mg/kg), serotonin (50 mg/kg), and 5-methoxytryptamine (75 mg/kg), injected intra-abdominally 10 to 15 min before γ or proton irradiation, protected 50% to 80% of the animals from death. The protective effects of tryptamine and 5-hydroxytryptophane came to 20% to 25%. The relative biological effectiveness of 660-MeV protons as compared to Co^{60} γ-rays is 0.75 with respect to the DL_{50} for mice, and 0.73 with respect to the DL_{100}. Author

N65-10066# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

OCCURRENCE OF CROSSING OVER IN *DROSOPHILA* MALES UNDER THE INFLUENCE OF VIBRATION, ACCELERATION AND γ-IRRADIATION

G. P. Parfenov *In its* Cosmic Res., Vol. 2, No. 4, 1964 11 Sep. 1964 p 232-241 refs (See N65-10051 01-30)

The influence of vibration, acceleration, and γ-irradiation on the incidence of crossing over in *Drosophila* males is examined. It is customary to assume that this class of hereditary changes is governed by rebuilding of homologous chromosomes in the meiotic stages. This test was also used aboard artificial earth satellites to indicate the biological effect of cosmic radiation, and spotty results were obtained. To analyze the differences that arose, experiments were run with *Drosophila* specimens subjected to acceleration, vibrations, and γ-irradiation, and combinations of these factors. The data obtained are discussed. Author

N65-10112*# Pennsylvania State U., University Park
[CELLULAR BIOPHYSICS: A STUDY OF THE STRUCTURE AND FUNCTION OF LIVING CELLS] Progress Report, Period Ending Jul. 1, 1964
[1964] 46 p refs
(Grant NsG-324)
(NASA-CR-59196) OTS Prices: HC $2.00/MF $0.50

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1. THE EFFECT OF IONIZING RADIATION ON GENETIC TRANSCRIPTION 14 p refs (See N65-10113 01-04)

2. RATE OF MUTATION TO PHAGE RESISTANCE IN D_2O MEDIUM Ernest Pollard and Martha Lemke 6 p refs (See N65-10114 01-04)

3. THE NATURE OF BACTERIAL REVERTANTS PRODUCED BY THE DECAY OF INCORPORATED TRITIATED COMPOUNDS R. Bockrath and S. Person 22 p refs (See N65-10115 01-04)

N65-10113*# Pennsylvania State U., University Park
THE EFFECT OF IONIZING RADIATION ON GENETIC TRANSCRIPTION
In its [Cellular Biophysics: A Study of the Structure and Function of Living Cells] [1964] 14 p refs (See N65-10112 01-04) OTS Prices: HC $2.00/MF $0.50

Cells of *E. coli* grown on maltose can be induced to produce betagalactosidase by the addition of thiomethyl galactoside (TMG). If cells are irradiated shortly after induction, the transcription of the DNA ceases and the enzyme produced by the messenger RNA is observed to reach a maximum. This enables the calculation of the half-life of unstable messenger RNA. The half-life for this decay is readily measurable, and values are given over a temperature range from 17° C (5.2 min) to 45° C (0.56 min). Author

N65-10114*# Pennsylvania State U., University Park
RATE OF MUTATION TO PHAGE RESISTANCE IN D_2O MEDIUM
Ernest Pollard and Martha Lemke *In its* [Cellular Biophysics: A Study of the Structure and Function of Living Cells] [1964] 6 p refs (See N65-10112 01-04) OTS Prices: HC $2.00/MF $0.50

It has been suggested that a change in a base pair in nucleic acid, between an adenine-thymine pair and a guanine-cytosine pair, constitutes a process of mutation. A further suggestion has been made that this change could be mediated by the tunneling of a proton from one base to another. The process of proton tunneling involves the passage through a potential barrier, and an expression is derived for the probability of such a passage. Cells of *Escherichia coli* were grown in ordinary nutrient broth and in a similar broth made with D_2O. It was concluded from this preliminary experiment that it is not safe to assume that the only basis for the formation of mutants is the process of proton tunneling, in other words, other mechanisms of mutation exist. D.E.W.

N65-10115*# Pennsylvania State U., University Park
THE NATURE OF BACTERIAL REVERTANTS PRODUCED BY THE DECAY OF INCORPORATED TRITIATED COMPOUNDS
R. Bockrath and S. Person *In its* [Cellular Biophysics: A Study of the Structure and Function of Living Cells] [1964] 22 p refs (See N64-10112 01-04) OTS Prices: HC $2.00/MF $0.50

It has been shown that tritiated thymidine decay in bacteria produces mutations as well as lethal events. Uracil, thymidine, histidine, and proline have been investigated as tritium-labeled precursors for RNA, DNA, and protein, and their relative efficiencies for reversion production are given. Since the revertants produced by the decay of different tritium compounds might be different, revertant production was examined in detail as a function of the growth conditions following the accumulation of tritium decays. Results are reported of experimentation for the dependent and independent subclasses in revertant population and for independent revertants as a function of accumulated ^3H decays. Results show two types of revertants produced by ^3H decay. The majority are dependent revertants that give rise to revertant colonies in the presence of nutrient fortification. The relative mutagenic efficiencies are given for the three tritium compounds used. D.E.W.

N65-10119*# Ohio State U., Columbus
THE EFFECTS OF ISOMETRIC WORK ON HEART RATE, BLOOD PRESSURE, AND NET OXYGEN COST
Robert L. Bartels, Richard W. Bowers, Edward L. Fox, Edwin P. Hiatt, and Frank L. Martin [1962] 20 p refs
(Grant NsG-295-62)
(NASA-CR-59419) OTS Prices: HC $1.00/MF $0.50

Six subjects, all athletes or former athletes in good physical condition, exercised in a semireclining, fixed position against a Medart spring dynomometer. Each subject pulled to 60% of his previously determined maximum effect. The heart rate showed a slight increase during exercise followed by a sharp rise in the few seconds following exercise. This was followed by a drop almost to the resting level within 20 to 30 seconds following exercise. Systolic pressure rose following exercise and was highest in the period immediately following exercise. It then dropped slowly to resting levels but had done so in most cases within two and a half minutes. Dystolic pressure fell slightly in the first 30 sec following exercise, and returned to the resting level within a minute and a half. Oxygen consumption varied widely both between subjects and between experiments in the same subject. Author

N65-10120# Joint Publications Research Service, Washington, D.C.
VESTNIK OF THE ACADEMY OF MEDICAL SCIENCES USSR, VOLUME XIX, NO. 7, 1964
22 Oct. 1964 140 p refs Transl. into ENGLISH of Vestn. Akad. Med. Nauk SSSR (Moscow), v. 19, no. 7, 1964 p 3-95 (JPRS-27032, TT-64-51288) OTS: $4.00

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7. PATHOLOGY OF SILICATOSES P. P. Dvizhkov p 51-60 refs

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11. SOME MEANS TO RAISE THE RADIORESISTANCE OF THE BODY S. P. Yarmonenko p 97-113 refs (See N65-10125 01-04)

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N65-10121# Joint Publications Research Service, Washington, D.C.

PROBLEMS OF OCCUPATIONAL HYGIENE IN OPERATING MECHANIZED TOOLS

N. N. Malinskaya, A. P. Filin, and L. N. Shkarinov *In its* Vestn. of the Acad. of Med. Sci. USSR, Vol. 19, No. 7, 1964 22 Oct. 1964 p 41-50 refs (See N65-10120 01-04) OTS: $4.00

As a result of hygienic and physiological examinations of subjects belonging to different occupational groups in machine building, timber, and mining industries, who are exposed to diverse types of vibrations originating from mechanized tools, data were collected on the effect produced by vibration on the organism and by additional adverse factors. Medical examination of 591 persons revealed the proportional incidence of vibration disease and hearing disorders in each occupational group. From this information, concrete measures to combat the adverse effects of vibration and noise are suggested. Author

N65-10122# Joint Publications Research Service, Washington, D.C.

PROBLEMS OF INDUSTRIAL HYGIENE AND OF THE BIOLOGICAL EFFECT PRODUCED BY RADIO-WAVES OF DIFFERENT BANDS

Z. V. Gordon *In its* Vestn. of the Acad. of Med. Sci. USSR, Vol. 19, No. 7, 1964 22 Oct. 1964 p 61-71 refs (See N65-10120 01-04) OTS: $4.00

Processes involved in the creation and employment of the sources producing electromagnetic waves of the radio-frequency range may be linked with adverse conditions of work. Depending upon the latter, as well as upon technical parameters and the way in which the energy of electromagnetic waves is actually utilized, various principles of protection against the action of radio waves can be adopted. Biological reactions arising as a result of radio-wave action and, especially, of microwaves are primarily characterized by shifts occurring in the level of the central nervous system (cerebral biopotentials, conditioned reflex activity, response of rats to a sound stimulus, morphological and histochemical changes). Depending upon the waveband certain peculiarities in the body responses can be noted. Author

N65-10123# Joint Publications Research Service, Washington, D.C.

PROBLEMS OF RADIATION SAFETY IN WORKING WITH RAW MATERIALS OF LOW NATURAL ACTIVITY

L. T. Yelovskaya *In its* Vestn. of the Acad. of Med. Sci. USSR, Vol. 19, No. 7, 1964 22 Oct. 1964 p 72-85 refs (See N65-10120 01-04) OTS: $4.00

Material is presented characterizing the magnitude of the radiation factor in different branches of industry. The extent of the radiation hazards that may attend handling crude stocks and raw materials containing natural radioactive substances in incidental amounts is assessed. Attention is directed to the necessity of elucidating the biological significance of all constituents of the radiation factor, with particular reference to its thorium component. Author

N65-10124# Joint Publications Research Service, Washington, D.C.

SOME POINTS OF PRINCIPLE CONCERNING STANDARDIZATION OF RADIOACTIVE SUBSTANCES

Ye. B. Kurlyandskaya *In its* Vestn. of the Acad. of Med. Sci. USSR, Vol. 19, No. 7, 1964 22 Oct. 1964 p 86-96 refs (See N65-10120 01-04) OTS: $4.00

The main attention is focused on the interaction between the organism and the external environment— the protective and adaptive reflexes and responses of the body to the influence of various environmental factors, including ionizing radiation. The definition of maximum permissible concentrations of chemical and radioactive substances and levels of ionizing radiation effects accepted in Soviet hygienic practice and abroad is given. The thresholds of physiological and pathological reactions arising under the influence of environmental factors are considered. Author

N65-10125# Joint Publications Research Service, Washington, D.C.

SOME MEANS TO RAISE THE RADIORESISTANCE OF THE BODY

S. P. Yarmonenko *In its* Vestn. of the Acad. of Med. Sci. USSR, Vol. 19, No. 7, 1964 22 Oct. 1964 p 97 113 refs (See N65-10120 01-04) OTS: $4.00

Under discussion are the mechanism governing the action of certain means of chemical antiradiation protection, and its relation to postradiation restoration under diverse conditions (acute, fractionate, and chronic) and types (roentgen, gamma rays, and high-energy protons) of radiation effect. The chromosome system of somatic animal cells is demonstrated to be capable of repair following irradiation with a low dose. Attention is directed toward the necessity of investigating factors modifying different manifestations of the radiobiological effect in order to arrive at a scientifically formulated hygienic standardization of ionizing radiations. Author

N65-10212# Joint Publications Research Service, Washington, D.C.

VESTNIK OF USSR ACADEMY OF MEDICAL SCIENCES, VOLUME XIX, NUMBER 6, 1964

2 Nov. 1964 132 p refs Transl. into ENGLISH from Vestn. Akad. Med. Nauk SSSR (Moscow), v. 19, no. 6, 1964 p 3-88 (JPRS-27178; TT-64-51434) OTS: $4.00

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6. CLINICAL ASPECTS AND ETIOLOGY OF POLYSEASONAL MENINGOENCEPHALITIDES O. A. Khondkarian, M. D. Skobel'skiy, L. M. Khvan, and A. I. Burak p 49-60 refs

7. MORPHOLOGICAL CHANGES IN THE CENTRAL AND PERIPHERAL NERVOUS SYSTEMS IN EXPERIMENTAL INFLUENZA Yu. S. Martynov p 61-67 refs

8. NEPHROPATHY IN MULTIPLE MYELOMA (PARAPROTEINEMIC NEPHROSIS) N. Ye. Andreyeva and V. V. Serov p 68-80 refs

9. ANALYSIS OF THE NEUROHUMORAL-HORMONAL CHANGES IN SOME VIGILANCE DISORDERS N. I. Grashchenkov, G. N. Kassil', I. L. Vaysfel'd, A. M. Veyn, E. Sh. Matlina et al p 81-93 refs

10. NEUROPSYCHIC DISORDERS IN HYPOXIC STATES IN CONNECTION WITH SURGICAL TREATMENT OF CARDIAC DEFECTS L. O. Badalyan and V. V. Kovalev p 94-104 refs

11. MYASTHENIA-LIKE SYNDROME AND THYMOMAS IN EXPERIMENTS G. Ya. Svet-Moldavskiy, N. M. Spektor, and L. I. Ravkina p 105-109 refs

12. PREVENTION OF TUMORS IN HAMSTERS INFECTED WITH THE SV-40 VIRUS G. I. Deychman and T. Ye. Klyuchareva p 110-115 refs

13. RADIOTELEMETRIC INVESTIGATION OF THE TEMPERATURE IN THE HUMAN STOMACH AND INTESTINE IN NORMAL AND PATHOLOGICAL CONDITIONS B. Ye. Votchal, A. S. Belousov, L. N. Zvyagina, and N. N. Braytseva p 116-124 ref

14. CLINICO-ANATOMICAL CHARACTERISTICS OF INTERAURICULAR AND INTERVENTRICULAR SEPTA DEFECTS IN CONGENITAL HEART FAULTS L. D. Krymskiy p 125-138 refs

N65-10218# Naval School of Aviation Medicine, Pensacola, Fla.
AN INSTRUMENT FOR ELECTROCARDIOGRAPHIC AREA MEASUREMENTS
Thomas G. Arnold, Jr. (Vanderbilt U.) and Raphael F. Smith 26 May 1964 15 p refs
(Rept.-1; AD-253064)

The report describes an instrument that has been developed to measure the area of electrocardiographic deflections. Basically, the instrument is a special purpose analog computer that performs the mathematical operation of integration on three input signals. Synchronizing circuits have been added to start the period of integration at a predetermined time in the cardiac cycle. The instrument is an essential component in a system used to quantitate the ECG changes that occur after excercise. Author

N65-10228* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY. A CONTINUING BIBLIOGRAPHY
Nov. 1964 130 p refs
(NASA-SP-7011(04)) OTS Price: $1.00

The subjects covered are the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the atmosphere or space. Also included are effects on biological organisms of lower order, and such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life-support systems, exobiology, and personnel factors. Three organizations contribute to the publication—NASA, the American Institute of Aeronautics and Astronautics, and the Library of Congress. R.L.K.

N65-10230# American Inst. for Research, Pittsburgh, Pa.
THE INVESTIGATION OF STEP SIZE AND ERROR RATE IN PROGRAMMED INSTRUCTION
David J. Klaus Jul. 1964 108 p refs
(Contract N61339-1208)
(NAVTRADEVCEN-1208-1; AD-607782)

An investigation was undertaken to determine whether step size in linear programs could be defined, measured, and manipulated, and to determine the effects of various sizes of step on error rate and achievement for learners at three levels of ability. Response, cue, context, and enrichment components of a frame were used to define both intraframe and interframe step size. Numerical scales then were developed to measure step size, and a set of manipulations was devised for use in modifying the step size of existing programs. Normative step-size values were determined from a survey of 10 published programs. Author

N65-10255# New Hampshire U., Durham
VARIATIONS OF HUMORAL AND CELLULAR ELEMENTS OF THE BLOOD OF ALASKAN GROUND SQUIRRELS DURING HIBERNATION AND INDUCED HYPOTHERMIA
J. P. Schmidt and T. G. Metcalf Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Dec. 1963 14 p refs
(Contract AF 41(609)-1856)
(AAL-TDR-63-21; AD-605253)

Alaskan ground squirrels exhibited a profound leucopenia during hibernation and hypothermia. The total number of erythrocytes declined slightly also, but the differences could not be established as statistically significant. The packed cell volume values were significantly different from normal animals only during hibernation. Hemoglobin measurements revealed a slight, though not significant, drop during hibernation. Measurements of complement titers in the serum withdrawn from active, hibernating, and hypothermic animals suggested that significant differences in complement activity did not accompany changes in body temperature during either hibernation or hypothermia. Electrophoretic patterns of sera from hibernating ground squirrels revealed the presence of a new peak in the vicinity of the beta-globulin component. Author

N65-10260# Naval Training Device Center, Port Washington, N.Y. Human Factors Lab.
THE EFFECTS OF STIMULUS AND FIELD SIZE ON THE ACCURACY OF ORIENTATION IN THE HOMOGENEOUS ENVIRONMENT
Milton S. Katz, William Metlay, and Paul A. Cirincione Jul. 1964 31 p refs
(NAVTRADEVCEN-IH-13; AD-607739)

The effects of various size targets and the extent of the visual field on the accuracy of orientation in the homogeneous environment were investigated by requiring S's to reposition, to geometric center, four different targets starting from 11 locations, in a 270° homogeneous field. Among the results are the following: (1) Each S positioned all four targets into a preferred field. (2) Small error scores and consistency in positioning around perceived centers were found with only three of the four targets. (3) In all cases, the largest error and greatest variability was in centering the smallest target. (4) Absolute errors were not related in any systematic fashion to the initial starting points. Author

N65-10267# Amoco Chemicals Corp., Seymour, Ind.
A SOLID CHEMICAL AIR GENERATOR Final Report, Apr. 1963–Mar. 1964
Gavin H. Peters, James E. Aker, and E. F. Morello Wright-Patterson AFB, Ohio, AMRL, Sep. 1964 57 p
(Contract AF 33(657)-11120)
(AG-1; AMRL-TDR-64-71; AD-607480)

The development of a solid chemical air generator capable of producing a breathable, oxygen-enriched atmosphere for possible space applications was investigated. Various catalyst systems for decomposition of nitrous oxide were investigated, since the reaction products contained about 40% of this gas and results indicated this gas could be controlled. Screening of various catalyst systems produced nickel oxide, 0.5% rhodium on alumina, 0.6% platinum on alumina, and cobalt oxide catalysts, all capable of completely decomposing nitrous oxide at high flow rates. The level of nitrous oxide in the reaction products could not be increased sufficiently to provide the desired oxygen level, and it was necessary to decompose the nitrogen dioxide present in the reaction gases. Author

N65-10268# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio
THE EFFECT OF DECABORANE INJECTION ON MACACA MULATTA AND MACACA IRUS OPERANT BEHAVIOR
Herbert H. Reynolds, Henry W. Brunson (Holloman AFB, N. Mex.), Kenneth C. Back, and Anthony A. Thomas Aug. 1964 44 p refs
(AMRL-TDR-64-74; AD-607532)

Ten adult monkeys, eight on negatively, and two on positively reinforced tasks, were injected with either 2 mg, 4 mg, or 1 mg followed by 2 mg decaborane per kg body weight. Their performance on various operant tasks was compared with baseline performance. All animals exhibited a performance decrement on at least one task; 75% of the subjects exhibited a decrement on the remaining tasks. In over half the cases, performance changes preceded clinical symptoms. There was no significant difference between the 2- and 4-mg exposures when a subject showed a decrement on negatively reinforced tasks. Those subjects that received 1 mg, followed the next day by 2 mg (positively reinforced animals), did not noticeably improve or return to baseline for a much longer period than the 2-mg and 4-mg groups (negatively reinforced). Subjects exposed to these levels of decaborane may be expected to exhibit a performance decrement or clinical symptoms during the first 50 hours, since one or the other will probably occur during that time period. At lower exposure levels, tasks of a discrete nature may reflect no decrement and clinical symptoms may be absent. When performance decrements do occur, one may expect a return to baseline between 3 and 10 days. Author

N65-10269# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio
A FURTHER STUDY OF THE INFLUENCE OF A RELEVANT BUT "UNUSED" CUE IN TRAINING UPON TRANSFER IN A POSITIVE TRANSFER SITUATION
Gordon A. Eckstrand, Alan D. Neiberg, and Ross L. Morgan Sep. 1964 13 p refs
(AMRL-TDR-64-81; AD-607472)

This study was an attempt to assess the utility of a cue that was relevant to, but not used in, the solution of a first task in the learning of a second task. The relationship was such that if something were learned about the relevant but "unused" cue, positive transfer would be expected to occur. In an earlier experiment, no positive transfer was found in this type of situation. The present study essentially duplicated the first but involved an important procedural modification. This modification was intended to rule out the possibility that subjects in the first study had been trained to disregard this relevant but unused cue. The findings of the present study support those of the earlier one. Even with the revised procedure, no transfer was shown from the learning of the first task to the learning of the second task, on the basis of the cue that was originally relevant but unused. Author

N65-10284# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
ELECTRICAL MEASUREMENT OF MECHANICAL QUANTITIES IN PHYSIOLOGICAL INVESTIGATIONS
Ye. B. Babskiy and Ya. S. Yakobson 23 Mar. 1964 17 p Transl. into ENGLISH from the book "Elektronika v Meditsine" Moscow, Gosenergoizdat, 1960 p 79-90
(FTD-TT-63-1192/1+4; AD-600613)

Considered is the application of transducers that convert mechanical quantities directly into electrical signals. Energetic or generator transducers include the piezoelectric transducer used for recording rapid dynamic processes, and the magnetoelectric transducer used with the direct ballistocardiograph. Parametric transducers are characterized by the fact that one of the transducer's inherent electrical properties is altered by the influence of various mechanical quantities. The uses of capacitance, inductance, resistance, semiconductor, and resistance wire transducers, some in technically new physiological procedures, are described. The application of these methods affords the possibility, by using an oscilloscope as a recording device, of carrying out vector analysis of various motor phenomena. Also, using electronic differentiating and integrating circuits, it is possible to synchronously record the first and second derivatives, as well as the integral, of the functions expressing any curve. This permits simultaneous recording, using one transducer, of displacements, speeds, and accelerations characterizing some processes. R.L.K.

N65-10285# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
THE EFFECT OF IONIZING RADIATION OF HEPATIC REGENERATION IN WHITE MICE AFTER BRIEF AND CHRONIC IRRADIATION
G. S. Strelin and I. V. Shiffer 7 Apr. 1964 10 p refs Transl. into ENGLISH from Eksptl. Biol. i Med. (Moscow), v. 56, no. 7, 1963 p 87-91
(FTD-TT-64-230/1+2+4; AD-600606)

This study pertains to the level of physiological regeneration of white-mice livers after partial hepatectomy, and also after the exposure to long-term and short-term radiation of Co^{60} gamma rays. It was found that a physiological regeneration occurs normally in the liver of nonirradiated adult white mice through the replacement of the cell composition by mitotic division, but that the same regeneration is strongly suppressed after irradiation. G.G.

N65-10288# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
SPACE BIOLOGY—A NEW SCIENCE
H. Hurduc 1 Oct. 1964 19 p Transl. into ENGLISH from Nat., Seria Biol. (Rumania), v. 15, no. 2, 1963 p 3-12
(FTD-TT-64-664/1+3+4; AD-607307)

Progress in space biology in the Soviet Union is described. The composition of primary cosmic radiation and its intensity variation are discussed. The need for further study of the biological action of heavy nuclei is emphasized. The solution of the food and oxygen problems of manned space flight by a closed ecological system is treated. A Soviet analysis of astronomical observations indicates the existence of life on Mars. The probability of some advanced civilizations in the cosmos is noted. R.L.K.

N65-10303*# National Aeronautics and Space Administration, Washington, D.C.
REACTIVITY IN SPACE MEDICINE [K PROBLEME REAKTIVNOSTI V KOSMICHESKOY MEDITSINE]
V. V. Parin, P. V. Vasil'yev, and V. Ye. Belay Nov. 1964 17 p refs Transl. into ENGLISH of a paper Presented at the 15th Intern. Astronautical Congr., Warsaw, 7-12 Sep. 1964
(NASA-TT-F-277) OTS Prices: HC $0.50/MF $0.50

This is a study of the influence of the environment on the organism with emphasis on acceleration. It was found that acceleration changes the reactivity of several animals to various groups of drugs—anesthetics, cardiac glucosides, vasodilators, and vasoconstrictors. G.G.

N65-10306# Joint Publications Research Service, Washington, D.C.
ACUTE BLOODLETTING DURING RADIATION SICKNESS
A. A. Beysebayev 9 Nov. 1964 10 p refs Transl. into ENGLISH from Vestn. Akad. Nauk Kaz. SSR (Alma-Ata), v. 20, no. 5, 1964 p 48–53
(JPRS-27293; TT-64-51549) OTS: $1.00

Bloodletting of healthy rabbits had a stimulating effect on their hemopoietic system, and the same bloodletting performed two hours after irradiation eliminated the leukocytosis phase and did not aggrevate the leukopenia. However, when bloodletting was performed on the third and ninth postirradiation days, the course of the radiation sickness was aggravated, and there was a rise in the mortality rate and a shortening of the average survival time of the animals. G.G.

N65-10313# California U., Los Angeles School of Medicine
DESCRIPTION OF A STUDY OF ECOLOGICAL EFFECTS ON A DESERT AREA FROM CHRONIC EXPOSURE TO LOW LEVEL IONIZING RADIATION
Norman R. French Oct. 1964 59 p refs
(Contract AT(04-1)-GEN-12)
(UCLA-12-532)

A circular 20-acre study area is fenced to confine the rodent population. The area is irradiated by a Cs-137 source that is partially shielded to reduce the dose rate at ground level close to the source. Small mammals are expected to receive about 1 R/day. Radiation dose to the kangaroo rats and pocket mice is being measured by small thermoluminescent dosimeters attached externally to the animals. Animals are individually marked. The populations of irradiated and control plots are censused at monthly intervals by live trapping. Mortality rates and production of young will be compared. Investigations of the vegetation, reptiles, and arthropods are also being conducted. Author

N65-10315*# National Aeronautics and Space Administration, Washington, D.C.
PHYSIOLOGICAL REACTIONS OF THE HUMAN ORGANISM TO TRANSVERSE ACCELERATIONS AND MEANS OF RAISING THE RESISTANCE TO SUCH FORCES [FIZIOLOGICHESKIYE REAKTSII ORGANIZMA CHELOVEKA NA POPERECHNO NAPRAVLENNYYE USKORENIYA I NEKOTORYYE PUTIPOVYSHENIYA USTOYCHIVOSTI K ETIM VOZDEYSTVIYAM]
A. S. Barer et al Nov. 1964 17 p refs Transl. into ENGLISH of a paper presented at the 15th Intern. Astronautical Congr., Warsaw, 7–12 Sep. 1964
(NASA-TT-F-274) OTS Prices: HC $0.50/MF $0.50

Three series of experiments are described. In the first, human-endurance limits to prolonged accelerations acting in the back–chest direction at a 65° angle to the longitudinal body axis were investigated, and the results were interpolated to show that a further increase in the angle (from 65° up) is accompanied by a substantial decrease in the component along the pelvis–head axis (the critical axis for human endurance) and a relatively slight increase in the component along the back–chest axis. The second study evaluated various means of raising human resistance to acceleration along the back–chest axis; the results established that optimum conditions are created when the angle between the total acceleration vector and the longitudinal body axis approaches 80°. The third study evaluated physiological changes associated with 20 to 26.5 g for 50 seconds at the 80° angle with oxygen respiration. Four stages of human response are delineated: increased activation of functional systems accompanied by an impairment of functional coordination, adaptation or resistance, disruption of adaptive reactions, and restoration when the applied force decreases. An analogy is drawn between these processes and adaptive control theory. M.P.G.

N65-10325# Federal Aviation Agency, Oklahoma City, Okla. Aviation Medical Service
EFFECTS OF SOME TRANQUILIZING, ANALEPTIC AND VASODILATING DRUGS ON PHYSICAL WORK CAPACITY AND ORTHOSTATIC TOLERANCE
R. V. Ganslen, B. Balke, F. J. Nagle, and E. E. Phillips Dec. 1963 10 p refs
(CARI-63-34; AD-603930)

A definite increase in work capacity was observed after ingestion of a combined caffeine-metrazol preparation, apparently resulting from an increased capacity for cardiac output and maximum oxygen intake. Recordil, a relatively new Italian drug and a very potent dilator of coronary arteries, also improved work capacity but caused a tendency for orthostatic syncope, probably due to its generally vasodilating effects. The blood pressure depression observed with Equanil (from the meprobamate group) during rest, exercise, and tilting, especially with larger doses, raises the question about the safety of people engaged in the operation of aircraft or motor vehicles when "sedated" by this drug. Author

N65-10337# Joint Publications Research Service, Washington, D.C.
SUPERIOR PERFORMANCE OF AGRICULTURAL AVIATION
A. Anishchenko 30 Oct. 1964 5 p Transl. into ENGLISH from Ekon. Sel'skogo Khoz. (Moscow), no. 8, Aug. 1964 p 110-113
(JPRS-27161; TT-64-51417) OTS: $1.00

The use of aircraft in agriculture in the application of pesticides, fertilizers, and weed killers is discussed. Data are presented that show the superiority of aircraft to ground means of application in terms of productivity per cost of application. P.V.E.

N65-10363*# Biosystems, Inc., Cambridge, Mass.
BIOLOGICAL CONTROL SYSTEMS—A CRITICAL REVIEW AND EVALUATION. VESTIBULAR CONTROL SYSTEM Second Quarterly Progress Report, 28 Aug.–30 Nov. 1963
[1963] 78 p refs
(Contract NAS2-1372)
(NASA-CR-59441; QPR-2) OTS Prices: HC $3.00/MF $0.75

The vestibular system is presented as a biological control system, in which contributions from the fields of psychology, physiology, anatomy, aviation medicine, and engineering are integrated. The discussion is divided into the following areas: the vestibular control system in general, anatomy and physiology of the vestibular system, behavioral experimental results related to the vestibular control system, descriptions of the control system and experiments relating to the vestibular system, and vestibular control system models. Also presented is a bibliography covering most of the literature relevant to the nonclinical aspects of the vestibular system. P.V.E.

N65-10409# Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.
DISPLACEMENT AND DURATIONAL CHARACTERISTICS OF LEVER PRESSING UNDER A VARIABLE RATIO SCHEDULE AND SUBSEQUENT EXTINCTION
Robert M. Herrick and Richard A. Bromberger 17 Sep. 1964 31 p refs
(NADC-ML-6409; AD-450289)

Compared with other schedules, mean lever displacement and variability of rats under a VR schedule was high. Displacement distributions in VR correlated with distributions in extinction. As a function of the ordinal number of the press following a reinforcement, no behavioral pattern emerged. No tendency to repeat a reinforced response existed, but there was, initially, a tendency to repeat a nonreinforced response. Median response durations and interresponse times in extinction remained about the same as in acquisition, but extreme values occurred more frequently. A number of differences between VR and FR behavior were noted; none of these differences were discernible from rate measurements. Author

N65-10466# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
REACTION TIME OF THE PRE-ADOLESCENT CHIMPANZEE (UNDER CONDITIONS OF NEGATIVE REINFORCEMENT)
Herbert H. Reynolds, Donald L. Hay, and Vernon Pegram Sep. 1964 24 p refs
(ARL-TR-64-10; AD-450472)

An "allowable interval" for responding has been arbitrarily used in animal reaction time studies, having no empirical basis in systematic investigations of an animal's optimal response capability. The comparative psychology research program of this laboratory has made great use of such a procedure, employing the preadolescent chimpanzee as a surrogate for man in potentially high risk situations. However, it was felt that a need existed to know more about the optimal discrete response characteristics of the chimpanzee, with regard to both single and multiple stimuli. The results, in which negative reinforcement (low amperage shock) was used, indicate that the reaction time of the preadolescent chimpanzee in an experimental situation approximating that of routine laboratory performance testing is highly similar to that of man. In programing tasks that involve single or multiple stimuli to which a discrete response must be made, suggestions are made concerning the allowable time interval for responding. Author

N65-10467# Chicago Medical School, Ill.
BODY TISSUE CHANGES IN DOGS RESULTING FROM SINUSOIDAL OSCILLATION STRESS Technical Documentary Report, Mar. 1960–Dec. 1962
John L. Nickerson and Anna Paradijeff Wright-Patterson AFB, Ohio, AMRL, Aug. 1964 27 p refs
(Contract AF 33(616)-7053)
(AMRL-TDR-64-58; AD-435550) OTS: $2.00

This is a report on tissue damage resulting from varying frequency, amplitude, and duration of sinusoidal vibration. Gross post mortem and histological observations and, in some cases, routine clinical studies of blood and urine were made. The organs found most liable to damage with vibration at 4 cps as evidenced by hemorrhage observed in histological studies were kidney, midbrain pons, heart, lungs, and liver, with less effect upon the urinary bladder, medulla, rectum, and trachea. At the higher frequencies the pituitary, stomach, duodenum, pancreas, and the midbrain also showed change. The adrenal, spleen, and sections of artery showed no histologic evidence of hemorrhage in the tests performed. Tearing occurred in soft tissues. No ligaments showed damage. Blood cell changes appeared, specifically hyperlobulation in the polynuclear neutrophils, inhomogeneities, and the appearance of intranuclear vacuoles in the nucleus of the lymphocytes. Author

N65-10496# Air Force Office of Scientific Research, Washington, D.C.
THE AIR FORCE-OAR CONTRIBUTION TO PROGRAMMED INSTRUCTION Monographs, No. 1
S. V. Martorana Aug. 1964 15 p refs
(OAR-64-10; AD-607073)

The influence of the new educational method of programed instructions on the instructional and training methods in military fields is discussed. The improvement in the effective utilization of the human capabilities by the use of autoinstructional devices is observed. The human element, as the most important "weapon," develops a higher effectiveness and so enhances the chances of success for the total military organization. G.G.

N65-10497# Naval Research Lab., Washington, D.C. Chemistry Div.
EFFECT OF HIGH MAGNETIC FIELDS ON RESPIRATION AND PHOTOSYNTHESIS IN ALGAE
P. J. Hannan 15 Sep. 1964 11 p refs
(NRL-6153; AD-606952)

An algal culture apparatus was designed to fit inside the 2 1/2-in. bore of a large electromagnet capable of providing fields exceeding 100 000 G. Photosynthesis and respiration rates of *Chlorella pyrenoidosa* (7-11-05) were determined by analyzing the input and effluent gases for oxygen. Two experiments were conducted: (1) the effect of 10 000 G on photosynthesis; and (2) the effect of 100 000 G on respiration. In neither case did the magnetic field have any effect. Author

N65-10509# Naval School of Aviation Medicine, Pensacola, Fla. Naval Aviation Medical Center
THE RELATIONSHIPS AMONG THE NEEDS AND VALUES OF FLIGHT CANDIDATES Research Report
Lawrence K. Waters 16 Apr. 1964 11 p refs
(Rept.-39; AD-604535)

The purpose of this study was to determine for a cadet sample the relationships among the scales of two forced-choice personality instruments and to compare these relationships with those previously reported for college students. Mean scale scores for the flight candidate sample were also compared with college male norms. The scale relationships were very similar to those found for college samples. Several differences between cadet and college male groups were found on mean scale scores. Author

N65-10522# General Dynamics Corp., Groton, Conn. Electric Boat Div.
BEHAVIORAL AND OPERATIONAL ASPECTS OF TACTICAL DECISION MAKING IN AAW AND ASW
Raymond C. Sidorsky, Joan F. Houseman, and David E. Ferguson Port Washington, N.Y., Naval Training Device Center, Aug. 1964 112 p refs
(Contract N61339-1329)
(NAVTRADEVCEN-1329-1; AD-607888)

This report describes a continuing analytical and empirical research program intended to provide data related to those aspects of decision-making behavior that can be trained. The study included the delineation of the organization and responsibilities of AAW and ASW personnel as well as the development of ACADIA—a taxonomy of tactical decision tasks. Purposes to be served by the ACADIA schema include the isolation

and identification of general decision-making skills and the development of training procedures and methods through which general decision-making skills can be developed. Several behavioral traits are discussed in regard to their applicability to the derivation of generalized behavioral criteria. These traits include stereotypy, perseveration, timeliness, completeness, and series consistency. Also discussed is the notion of a Decision Response Evaluation Matrix, a technique that might make it possible to rate or score the adequacy of a decision response in terms of various operational criteria such as spatial relationships, self-concealment, conservation of resources, information generation, and weapon utilization. Author

N65-10623# Massachusetts Inst. of Tech., Cambridge
EFFECT OF STRESS OF NUTRIENT REQUIREMENTS OF MAN Progress Report, Nov. 1, 1962–Oct. 31, 1963
Nevin S. Scrimshaw [1963] 105 p refs
(Contract DA-49-193-MD-2239)
(AD-423385) OTS: $2.50

The major experimental projects completed during the year involved three studies upon the physiological effect of the reversal of night and day, and two studies on the effect of examinations. Subjects were evaluated psychiatrically in all trials: in two of the reversal studies and one of the examination studies psychiatric interviews were performed, in addition to the physiological and biochemical measurements. Weights and pulse rates were examined, and urines and fecal samples were analyzed. Two studies involving two groups of five students showed that when such individuals were subjected to a reversal of night and day, accompanied by an obligation to work during such reversed periods, there was enhanced excretion of nitrogen, inorganic sulfate sulfur, and during the reversal periods these were paralleled by the excretion of 17-hydroxysteroids; very little effect was observed on the excretion of creatinine, sodium, and potassium. A third reversal study involving 10 students for a 21-day period was also completed. Here, the days following a return to a normal day and night pattern were also examined. Author

N65-10641*# National Aeronautics and Space Administration, Washington, D.C.
EFFECTS OF GRAVITY ON BODY FUNCTIONS AND PROBLEMS OF SPACE FLIGHT [GRAVITATSIONNYYE VOZDEYSTVIYA V FORMIROVANII FUNKTSIY ORGANIZMA I PROBLEMY KOSMICHESKIKH POLETOV]
P. K. Isakov, Ye. M. Yuganov, and I. I. Kas'yan Nov. 1964 7 p refs Transl. into ENGLISH of a paper presented at the 15th Intern. Astronautical Congr., Warsaw, 7–12 Sep. 1964
(NASA-TT-F-275) OTS Prices: HC $0.50/MF $0.50

Since no generalized theory exists explaining the action of weightlessness on the human body, some determinations of the effects of acceleration and weightlessness on the body and on the functioning of organs and systems are analyzed in an effort to assemble basic concepts for such a theory. Included are the following: (1) The differential threshold of perception of gravitational force decreases during weightlessness. (2) A change in the weight of the hand during acceleration or weightlessness impairs the coordinated functioning of the epidermal and motor analyzers in estimating the weight of objects. (3) The degree of skeletal muscle tonicity during acceleration and weightlessness differs from normal values. (4) Weightlessness results in a level of otolithic stimulation manifested by a lower excitability of the semicircular canals, as compared with their excitability under terrestrial or acceleration conditions. (5) In all probability, the level of gas metabolism processes will be lower in weightlessness than under terrestrial conditions. M.P.G.

N65-10648# Human Sciences Research, Inc., McLean, Va.
AIRPORT/HELIPORT MARKING AND LIGHTING SYSTEMS: A SUMMARY REPORT ON HUMAN FACTORS RESEARCH Final Report
J. A. Whittenburg, W. S. Vaughan, Jr., M. D. Havron, and C. R. Cavonius Jun. 1964 29 p refs
(Contract FAA/BRD-401)
(RD-64-94; HSR-RR-64/2-Mk-X)

This is a study of human-factors considerations in airport and heliport marking and lighting systems. Surveys of prior operational flight tests, human-factor data, and all marking and lighting components and systems are presented. Studies of the development of the airport and heliport marking and lighting designs, as well as their screening and evaluation, are discussed. The communality of the marking and guidance requirements for fixed- versus rotary-wing aircraft, and the allocation of the research, logistical, and operational resources in regard to future marking and lighting requirements were also observed. G.G.

N65-10653# Joint Publications Research Service, Washington, D.C.
BLASTOMATOGENIC ACTION OF HIGH-ENERGY PROTONS
V. N. Strel'tsova, Yu. I. Moskalev, and I. K. Petrovich 13 Nov. 1964 6 p ref Transl. into ENGLISH from Vopr. Onkol. (Leningrad), v. 10, no. 9, 1964 p 74–76
(JPRS-27343; TT-64-51599) OTS: $1.00

This is a report on the blastomatogenic effects on Wistar rats of high-energy protons, in doses ranging from 25 to 850 rads. The rats were irradiated in a synchrocyclotron. All animals were then dissected, and the nature and type of the tumor process were observed. It was found that benign and malignant tumors developed in a variety of tissues, but were found chiefly in the endocrine glands, the sex organs, and the mammary glands. The total frequency of tumors and the number of cases of polycentric origin of neoplasma were found to be higher in the female than in the male Wistar rats. G.G.

N65-10875# Oak Ridge National Lab., Tenn.
PARTICLE REENTRY INTERACTIONS
Ralph S. Decker, Jr. and Morton I. Goldman (Nuclear Utility Services, Inc. Washington, D.C.) 20 Jan. 1964 30 p refs

A reevaluation of the radiological problems associated with the premature reentry of fragments of a high-power density nuclear-rocket reactor is presented, based on recently acquired data. Interaction probabilities are considered for four types of potential exposures: external whole-body gamma doses, beta skin doses, lung doses, and gastrointestinal-tract doses. M.P.G.

N65-10877# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
MEASURING THE DOSES OF RADIATION RECEIVED BY Yu. A. GAGARIN AND G. S. TITOV AT THE TIME FOR FIRST SPACE FLIGHTS
I. B. Keirim-Markus, Ye. Ye. Kovalev et al 6 Nov. 1963 5 p refs Transl. into ENGLISH from Iskusstv. Sputniki Zemli (Moscow), no. 15, 1963 p 102–103
(FTD-TT-63-1017/1; AD-424605)

Photodosimeters (IFKN) to register neutrons and gamma rays, and luminescent dosimeters (ILK) to register gamma rays and protons were used by the Russian cosmonauts on their space flights. The received dose of radiation consisted basically of primary cosmic radiation amounting to 6 to 10 mrsd/day. The gathered data were compared with each other, and the difference in the indications of the dosimeters with different filters, explained as radiation retardation, incurred by the spaceships passing through the outer radiation belt in the region of the

South Atlantic anomaly. By observation of the data gained by PKI, it was assumed that the radiation of solar flares did not bring any noticeable increase to the accumulated radiation dose, and that the radiation effect on the astronauts did not go over 60 mber, and so was judged negligible. G.G.

N65-10880# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
RESPONSE TO SECONDARY ANTIGENIC STIMULUS AFTER WHOLE BODY X-IRRADIATION IN THE BEAGLE
F. F. Pindak, J. F. Stara (Public Health Service, Cincinnati), and W. E. Clapper Sep. 1964 15 p refs
(Contract AT(29-2)-1013)
(LF-17) OTS: $0.50

The results of the administration to healthy beagles of a secondary antigenic stimulus (booster dose) of *Leptospira canicola* and infectious canine hepatitis virus (ICH) are reported. Twelve previously vaccinated animals were used. Six were exposed to 335 R dose of X-irradiation. Three controls and three irradiated dogs received the booster dose two days after the irradiation, and the remaining six, seven days later. Agglutinin titers for *Leptospira canicola* of 1:32 to 1:256 were observed in the 12 beagles before the booster dose. No increases of significance were found in either the controls or the experimental group after the booster dose. Complement-fixing titers for the ICH virus of 1:16 to 1:64 were seen in all animals before revaccination. There was no significant difference in the titers of the control group and the experimental group that were given the ICH booster seven days after irradiation. However, the response observed in the controls given the booster after two days was absent in the irradiated animals. Author

N65-10964# Boeing Scientific Research Labs., Seattle, Wash. Mathematics Research Lab.
THE RADIATION DOSE ACCUMULATED BY BLOOD DIVERTED THROUGH A SHUNT
George Marsaglia Jul. 1964 12 p refs *Its* Mathematical Note No. 357
(DI-82-0362)

Modern techniques have made it possible to divert a portion of the circulating blood through a shunt outside the body, for example, in heart–lung machines, artificial kidneys, and coiled tubes where the blood may be exposed to radiation without danger to body tissues. There is some probability theory connected with such procedures, for the cells of the blood are thoroughly mixed in the body, and hence the number of times a blood cell passes through the shunt is a random variable. This paper discusses the problem in terms of probability theory, finding the exact distribution of the number of times a blood cell has passed through the shunt and, in addition, a normal approximation that makes calculation of accumulated doses a matter of simple arithmetic. Author

N65-10982# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
AVERAGE DIAMETER OF RED BLOOD CORPUSCLES UNDER THE CHRONIC ACTION ON THE HUMAN ORGANISM OF SMALL DOSES OF IONIZING RADIATION
Ye. D. Gol'dberg 17 Sep. 1963 7 p refs Transl. into ENGLISH from Lab. Delo (Moscow), v. 9, no. 2, 1963 p 9–11
(FTD-TT-63-784/1; AD-422453)

Average diameters and volumes of erythrocytes were determined for blood samples from normal or control subjects and for samples from persons working in environments of 0.02 to 0.04 R per day. It is concluded that the presence of a statistically definite tendency toward the development of macrocytosis in exposed subjects is evidence of stable displacements of erythropoiesis to the side of increase in the specific weight of the macroblastic blood formation. Such a tendency seems to appear in the case of long-term action on the organism of ionizing radiation in doses of the order of 0.02 to 0.04 R per day. D.E.W.

N65-10989# Joint Publications Research Service, Washington, D.C.
MOTOR REACTIONS UNDER CONDITIONS OF WEIGHTLESSNESS
I. I. Kas'yan, V. I. Kopanev, and Ye. M. Yuganov 30 Nov. 1964 18 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 5, Sep.–Oct. 1964 p 677–689.
(JPRS-27591; TT-64-51820)

Experiments with human subjects under conditions of weightlessness are discussed. Conclusions include statements that flights under these conditions lead to insignificant changes in certain indicators of human movements, that the genesis of the disorders observed under conditions of weightlessness is apparently caused by a disturbance in the functional systems at work in the analyzers, and that the influence of prolonged weightlessness on the organisms of animals and man is still incompletely understood. D.E.W.

N65-11016# Lockheed Missiles and Space Co., Sunnyvale, Calif.
PRELIMINARY RENDEZVOUS EXPERIMENTS DEFINITION AND DESIGN
D. W. Eliason, R. S. Lincoln, and T. S. Merriman 1 Sep. 1964 35 p refs
(LMSC-6-62-64-13)

This report describes a man-in-the-loop terminal rendezvous experiment, which is based on the principles of experimental design theory. A detailed discussion of the experimental design, the task description, and pilot instructions are included, as well as a discussion of the experimental equipment and procedure. Author

N65-11019*# Space Technology Labs., Inc., Redondo Beach, Calif.
A STUDY OF MANUAL CONTROL METHODOLOGY WITH ANNOTATED BIBLIOGRAPHY
L. G. Summers and K. Ziedman Washington, NASA, Nov. 1964 205 p refs
(Contract NASw-717)
(NASA-CR-125) OTS Prices: HC $3.50/MF $1.25

Two general classifications of approaches toward describing the human being as a controller are reviewed. The first is the study of perceptual motor behavior, as performed by the general or engineering psychologist. The second is the application of mathematical models, based on control theory to the description of the human operator. Differences and similarities in the two approaches are discussed, and the most useful aspects of each are pointed out. Areas for future study are suggested. R.L.K.

N65-11021*# National Aeronautics and Space Administration, Washington, D.C.
STRUCTURE AND FUNCTION OF THE VESTIBULAR APPARATUS UNDER CONDITIONS OF AN ALTERED GRAVITATIONAL FIELD [STRUKTURA I FUNKSTIYA VESTIBULYARNOGO APPARATA v USLOVIYAKH IZMENENNOGO GRAVITATSIONNOGO POLYA]
Ya. A. Vinnikow Nov. 1964 18 p refs Presented at the 15th Intern. Astronautical Congr., Warsaw, 7–12 Sep. 1964
(NASA-TT-F-278) OTS Prices: HC $0.50/MF $0.50

It is concluded that the shifts observed in the substructural and cytochemical organization of the ciliated cells and synapses of the utricle during acceleration apparently reflect a state of excitation and transmission of impulses. Results obtained from the study reveal, to some extent, the mechanism of the function of the "organ of gravity" on the cellular and subcellular levels of organization and indicate methods and possibilities of controlling its functioning under conditions of acceleration and space flight. However, the processes of specific stimulation of the utricle, as well as the interdependence of its activity with that of other receptor elements of the vertebrate vestibular system, are still unclear. D.E.W.

N65-11043*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FIXED-BASE-SIMULATOR EVALUATION OF A PILOT'S TERRAIN-FOLLOWING DISPLAY WITH VARIOUS MODES OF PRESENTING INFORMATION
Thomas E. Wempe Washington, NASA, Nov. 1964 40 p refs
(NASA-TN-D-1827) OTS Prices: HC $1.00/MF $0.50

An exploratory study was made of human ability to use a visual display to guide a high-speed aircraft in close proximity to the terrain. The control dynamics of a small aircraft flying near sea level at Mach 1.2 were simulated on an analog computer interconnected with a two-axis side-arm controller and a cathode-ray-tube display. The pilot's task was to guide the aircraft as closely as possible to simulated terrain while minimizing a heading error. No motion cues or other environmental stresses were provided. The pilot's performance was markedly influenced by variations in the visual display of the aircraft attitude and position relative to the terrain. A 1 1/2-hour sustained terrain-following task with this fixed-base simulation revealed no major degradation in pilot performance. Author

N65-11045*# National Aeronautics and Space Administration, Washington, D.C.
EFFECT ON THE BODY OF PROLONGED EXPOSURE TO CONDITIONS OF ARTIFICIAL ATMOSPHERE [VLIYANIYE NA ORGANIZM DLITEL'NOGO PREBYVANIYA v USLOVIYAKH ISKUSSTVENNOY ATMOSFERY]
A. G. Kuznetsov et al Nov. 1964 8 p Presented at the 15th Intern. Astronautical Congr., Warsaw, 7–12 Sep. 1964
(NASA-TT-F-9178) OTS Prices: HC $3.00/MF $0.75

The essential medical-biological problems of creating a gas-medium environment for human beings which permits the prolonged exposure in a sealed chamber of limited dimensions, are discussed. The dynamics of gas metabolism, cardiovascular-system functions, and peripheral blood composition were studied in two subjects who were exposed for many days to conditions of partial oxygen pressure of 160- to 170-mm Hg. The subjects developed symptoms of general asthenia, lowered oxygen requirements, deterioration of the isometric tolerance and isotonic strength indices in individual muscle groups, lowered resistance to acceleration, the onset of irritability and fatigue, and deterioration of the ability to perform set tasks at the end of the experiment. G.G.

N65-11057*# National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY A Continuing Bibliography Apr.–Jun. 1964
Aug. 1964 186 p
(NASA-SP-7011(01)) OTS Prices: HC $1.00/MF $1.25 19038

An annotated bibliography is given of unclassified reports and journal articles that were introduced into the NASA information system during this period. The subject matter covers biological, physiological, psychological, and environmental effects to which man is subjected during the following simulated or actual flight in the atmosphere or in space. These areas were announced previously in separate publications by the Library of Congress, the American Institute of Aeronautics and Astronautics, and NASA. The references are indexed by subject, corporate source, and personal author. R.L.K.

N65-11082# Air Force Systems Command, Wright-Patterson AFB, Ohio Behavioral Sciences Lab.
PROGRAMED INSTRUCTION—PAST, PRESENT, FUTURE
John S. Abma Sep. 1964 17 p refs
(AMRL-TR-64-89; AD-607809)

Programed instruction has existed in its present forms for approximately ten years. Three major approaches are adjunct autoinstruction, intrinsic programing, and linear programing. Most current research is centering on linear programing. Results indicate that programed instruction is successful in some applications, but not the answer to all training problems. The future may see an integration of programed instruction and other training techniques within a systems approach to training and education. Author

N65-11096# Naval School of Aviation Medicine, Pensacola, Fla.
THE RELATIONSHIP OF SMALL VISUAL ACUITY DEFECTS TO THE ABILITY TO COMPLETE FLIGHT TRAINING AND PERFORM IN OPERATIONAL FLYING. A Ten-Year Progress Report
Wayne L. Erdbrink and Robert E. Kinneman 9 Apr. 1963 12 p
(Rept.-2; AD-600977)

At the end of a 10-year period, 116 men with small visual acuity errors have had an opportunity to complete flight training as a result of this study. Eighty-four of these actually completed training and have been designated naval aviators. The attrition rate in training and in the fleet compares quite favorably with what is seen overall in visually qualified subjects. There has been no attrition resulting from progressive myopia or other visual defects in any of the student aviators or first tour pilots of this group. Only four aviators from this study (4.9% of those designated) have been grounded as a result of decreased visual acuity, and all of these had completed their obligated service prior to grounding. Author

N65-11098# Chicago U., Ill.
USAF RADIATION LABORATORY QUARTERLY PROGRESS REPORT NO. 53
Kenneth P. Du Bois 15 Oct. 1964 142 p refs
(Contract AF 41(609)-1693)
(AD-607952)

CONTENTS:

3. DEVELOPMENT AND APPLICATION OF A QUANTITATIVE METHOD FOR MEASURING THE INHIBITORY EFFECTS OF X-RAY ON SYNTHESIS OF MICROSOMAL ENZYMES Robert A. Neal, Florence Kinoshita, and Kenneth P. Du Bois p 21-35 refs

PHARMACOLOGICAL AND TOXICOLOGICAL COMPOUNDS AS PROTECTIVE OR THERAPEUTIC AGENTS AGAINST RADIATION INJURY IN EXPERIMENTAL ANIMALS

1. THE INFLUENCE OF VARIOUS CHEMICAL COMPOUNDS ON RADIATION LETHALITY IN MICE V. J. Plzak, M. Root, and J. Doull p 36-64 refs

2. DOSE-MORTALITY RELATIONSHIPS FOR SEVERAL RADIOPROTECTIVE AGENTS J. Doull and V. Plzak p 65-97 refs

3. STUDIES ON THE TOXICITY AND MECHANISM OF ACTION OF MERCAPTOETHYLAMINE (MEA) Kei-Ming Yam, Bernard E. Hietbrink, and Kenneth P. Du Bois p 98-107 refs

4. FURTHER STUDIES ON THE RADIOPROTECTIVE ACTION OF SODIUM NITRITE IN MICE A. T. Hasegawa and H. D. Landahl p 108-115 refs

THE INFLUENCE OF EXPOSURE TO LOW LEVELS OF GAMMA AND FAST NEUTRON IRRADIATION ON THE LIFE SPAN OF ANIMALS

1. SUMMARY OF THE CHRONIC GAMMA AND LOW LEVEL FAST NEUTRON IRRADIATION PROGRAM A. Sandberg and J. Doull p 116-131 refs

2. HISTOLOGICAL FINDINGS IN THE TISSUES OF MICE SERIALLY SACRIFICED AFTER FEEDING A DIET CONTAINING PARA-AMINOPROPIOPHENONE D. Vesselinovitch, A. Sandberg, and J. Doull p 132-139 refs

N65-11099# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

AUTOMATION TODAY AND TOMORROW Collection of Articles

D. M. Berkovich et al 20 Oct. 1964 58 p ref Transl. into ENGLISH from "Avtomatizatsiya Segodnya i Zavtra" Moscow, Izd. Znaniye, 1963, ser. 4 p 1-40
(FTD-MT-64-188; AD-607856)

This is a discussion of the first volume of the encyclopedia "Automation of Production and Industrial Electronics." The development of the cybernetic technology as an important prerequisite of new technical and scientific approaches to liberate mankind from dehumanization by machines is emphasized. The following topics are presented: "Main Trends in the Development of Automation"; "Arming Personnel with Advanced Science"; "Some Problems of Radio Electronics"; "Creative Collaboration of Engineers and Biologists"; "Persistently Develop the Theoretical Bases of Automation"; "Electronic Technology at the Service of Automation"; and "Mathematical Problems of the Organization of Production." G.G.

N65-11100# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

EFFECT OF IONIZING RADIATION ON THE LEVEL OF HISTAMINE IN THE TISSUES AND ITS SIGNIFICANCE IN EARLY RADIATION DAMAGE TO THE HISTOHEMATIC BARRIERS

Ye. I. Krichevskaya and G. V. Kapitonova 15 Oct. 1964 17 p refs Transl. into ENGLISH from Gisto-Gematicheskiye Bar'ery. Trudy Soveshchaniya (USSR), no. 48, 1961 p 48-56
(FTD-TT-64-644/1; AD-607563)

Histamine and its role in the breakdown of the capillary penetrability in radiation-induced pathological conditions of laboratory animals were studied. After a single total radiation of rats with a lethal dose of X-rays, a marked increase in the penetrability of the different histohematic barriers occurred. It was found that the histaminopexic capacity of the blood and the tissues is regulated by the hypophyseal-adrenal system, and changes in the level of histamine by irradiation are not the direct results of the direct action of the X-rays on the tissues. G.G.

N65-11157# Tufts U., Medford, Mass. Neuropsychology Lab.

THE EFFECTS OF DISPLACED EARS ON AUDITORY LOCALIZATION

Sanford J. Freedman and Kenneth Stampfer Aug. 1964 27 p refs
(Contract AF-49(638)-1282; Grant AF-AFOSR-53-63)
(AFOSR-64-0938; AD-604569)

This experiment was an auditory rearrangement. Subjects' judgments of auditory direction were displaced laterally by means of a high-fidelity pseudophone that effectively rotated the interaural axis through a 20° horizontal angle. After exposure sessions that consisted of walking repeatedly toward a fixed sound source for 20 minutes, two of the four experimental subjects demonstrated significant shifts averaging 6° in their judgments of auditory direction. The shifts partially compensated for the error of localization produced by the pseudophone. The shifts in localization are discussed in terms of the nature of the exposure situation and the factors that are likely to be responsible for compensation. Author

N65-11232# Joint Publications Research Service, Washington, D.C.

MEASUREMENT AND COMPUTATION OF ABSORBED DOSES IN EXTERNAL AND INTERNAL IRRADIATION

A. N. Krongauz et al 25 Nov. 1964 48 p Transl. into ENGLISH of selections from the book "Izmereniye i Raschet Pogloshchennykh Doz Pri Vneshnem i Vnutrennem Obluchenii" Moscow, 1963 p 3, 4-34
(JPRS-27527; TT-64-51776) OTS: $2.00

Methods of measuring doses of roentgen and gamma radiation used in practical radiotherapy are presented. Formulas and tables are given for computing absorbed and integral doses in the use of radioactive isotopes of gold, sodium, iodine, and phosphorus for therapeutic and diagnostic aims. D.E.W.

N65-11249# Joint Publications Research Service, Washington, D.C.

ANTIRADIATION PROPERTIES OF ARYLAMIDES AND ARYLHYDRAZIDES OF THIOCARBOXYLIC ACIDS

A. A. Gorodetskiy, P. S. Pel'kis, E. Z. Ryabova, and R. G. Dubenko 25 Nov. 1964 15 p Transl. into ENGLISH of excerpts from the book "Protivoluchevyye Svoystva Arilamidov i Arilgidrazidov Tiokarbonovykh Kislot" Kiev, "Naukova Dumka" Publishing House, 1964
(JPRS-27544; TT-64-51793) OTS: $1.00

Presented are the results of attempts to find new antiradiation compounds in several substituted arylamides, particularly in several arylhydrazides of thiocarboxylic acids. It is concluded that the most effective preparations for prophylaxis and treatment of acute radiation sickness were those exhibiting solubility in water or in aqueous solutions of weak alkalinity. P.V.E.

N65-11250# Human Factors Research, Inc., Los Angeles, Calif.

ADRENALIN, NORADRENALIN AND PERFORMANCE IN A VISUAL VIGILANCE TASK

J. O'Hanlon, Jr. Aug. 1964 35 p refs
(Contract Nonr-4120(00))
(TR-750-5; AD-606136)

An experiment was undertaken to determine the relationship between signal detection performance and plasma concentrations of adrenalin and noradrenalin in adult male observers undertaking a visual vigilance task. Signal difficulty level was equated for each observer in a preliminary experiment, and each individual was then classified as either a decrementing or nondecrementing observer on the basis of his performance on a conventional visual vigilance task. In the subsequent experiment, six decrementing and three nondecrementing observers undertook a conventional visual vigilance task. Seven other decrementing observers served as controls and viewed movies under otherwise identical conditions. Blood samples were drawn from the observers periodically during the vigilance task, and these were analyzed fluorometrically for adrenalin and noradrenalin. It was concluded that the level of circulating adrenalin declines in decrementing observers during a conventional vigilance task in a manner positively related to their performance on the task. Author

N65-11264# Joint Publications Research Service, Washington, D.C.
ANABIOTIC-FLIGHT INTO OUTER SPACE
V. Petrov and P. Yurevich 25 Nov. 1964 8 p Transl. into ENGLISH from Ekon. Gaz. (Moscow), no. 43, 1964 p 4
(JPRS-27540; TT-64-51789) OTS: $1.00

A number of examples are presented of the cessation of life processes with the later resumption of them as the organism revives. Lizards, fish, crawfish, worms, algae, and low-order plants and animals are specifically mentioned. A brief speculation about the possible application of this process to the problems of extended space flights is included. D.E.W.

N65-11277# Clark (David) Co., Inc., Worcester, Mass.
RESEARCH FOR A HEAD ENCLOSURE FOR AEROSPACE ENVIRONMENTS, 1 MAY 1961–3 AUGUST 1962
Edward J. Bedard Wright-Patterson AFB, Ohio, Aerospace Med. Res. Labs., Oct. 1963 23 p
(Contract AF 33(616)-8255)
(AMRL-Memo-M-57; AD-423943)

A comprehensive study was made of possible design and fabrication approaches for a lightweight head enclosure for aerospace environments. The prototype dome was designed and developed following careful evaluation of the requirements. The transparent hemispherical dome is hinged in the back and is attached to the standard A/P 22S-2 full pressure suit by aluminum locking rings. The convoluted neck joint restraint material is link-net of Dacron. The dome is supported by braces resting on the shoulders. An antibuffeting helmet of lightweight cotton twill houses the energy absorbing pads of Ensolite, the communication system, and Straightaway Ear Protectors. Author

N65-11305*# National Aeronautics and Space Administration, Washington, D.C.
MODIFICATIONS OF THE OCULAR REFRACTION OF PILOTS AT GREAT ALTITUDES [LES MODIFICATIONS DE LA REFRACTION OCULAIRE CHEZ LES PILOTES DES GRANDES ALTITUDES]
M. Popesco, M. Stefan, and N. Cinca Oct. 1964 21 p refs Transl. into ENGLISH of a paper presented at the 15th Intern. Astronautical Cong., Warsaw, 7–12 Sep. 1964
(NASA-TT-F-9153) OTS Prices: HC $1.00/MF $0.50

The effect of high altitudes on the ocular refraction of pilots was studied in altitude chambers by means of proxiometers. Transient myopia of a degree proportional to the altitude is produced by a spasm of the ciliary muscle. Astigmatism, myopia, and other refraction anomalies are intensified at great altitudes, leading to pilot fatigue. Persons with slight hypermetropia (+1, +2 diopt.) are less affected. Author

N65-11306*# National Aeronautics and Space Administration, Washington, D.C.
BIOLOGY AND COSMONAUTICS [BIOLOGIYA I KOSMONAVTIKA]
V. M. Sisakyan Nov. 1964 10 p ref Transl. into ENGLISH of a paper presented at the 15th Intern. Astronautical Cong., Warsaw, 7–12 Sep. 1964
(NASA-TT-F-9155) OTS Prices: HC $1.00/MF $0.50

This paper is an introductory speech given at a meeting on bioastronautics and space medicine. A general outline is given of the papers presented; important points of further research are also given, with main emphasis on physiological and psychological effects on the human organism of weightlessness, radiation damage, accumulation of anthropotoxins, etc. Author

N65-11325# Technische Hochschule München (W. Germany) Inst. für Angewandte Botanik
EXPERIMENTS ON THE EFFECTS OF COMBINED WAVELENGTHS ON PHOTOSYNTHESIS Final Technical Report
O. Kandler 1 May 1964 16 p refs
(Grant AF-EOAR-63-10)
(AFOSR-64-1650; AD-606077)

Two apparatus were constructed, of which each allows the projection of two monochromatic beams of a high light intensity on the same area of an algae suspension. One device is based on monochromators that are equipped with gratings; the other consists of projectors with interference filters. A suitable cuvette was constructed to expose an algae suspension to the beams, while they are supplied with an air-CO_2 mixture at a constant rate of flow and kept at constant temperature. Photosynthesis is measured by the increase of radioactivity that is taken up from $C^{14}O_2$. Experiments to elucidate the optimal conditions for photosynthesis under our special arrangements are described. Preliminary experiments with combined wavelengths showed the following results. If blue light (454μ) is added to red light (658μ), there is a decrease in photosynthesis of about 20% below the value obtained by the addition of photosynthesis with the single light beams. If far red light (711μ) is added to red light (658μ) a remarkable increase of 20% to 80% is observed. Author

N65-11396*# Naval School of Aviation Medicine, Pensacola, Fla.
INFLUENCE OF LABYRINTH ORIENTATION RELATIVE TO GRAVITY ON RESPONSES ELICITED BY STIMULATION OF THE HORIZONTAL SEMICIRCULAR CANALS
Manning J. Correia and Fred E. Guedry, Jr. 2 Sep. 1964 13 p refs
(NASA Order R-93)
(NASA-CR-59548; Rept.-100) OTS Prices: HC $1.00/MF $0.50

Differences in nystagmus output with different stopping positions were not entirely consistent with predictions based on the assumption that cupula deflection was influenced by gravity. A more plausible explanation, modulation of canal-initiated responses by otolith activity, was presented. A high incidence of motion sickness was encountered while

rotating subjects about the earth's horizontal axis, and it was apparently controlled by the mental task assigned to the subject. Author

N65-11407*# Naval School of Aviation Medicine, Pensacola, Fla. Naval Aviation Medical Center
THE EFFECT OF CHANGING THE RESULTANT LINEAR ACCELERATION RELATIVE TO THE SUBJECT ON NYSTAGMUS GENERATED BY ANGULAR ACCELERATION
Martin P. Lansberg, Fred E. Guedry, Jr., and Ashton Graybiel 1 Sep. 1964 42 p refs *Its* Rept.-99
(NASA Order R-93)
(NASA-CR-59565) OTS Prices: HC $2.00/MF $0.50

The effect of centripetal acceleration on nystagmus was studied by placing men at radii of 17 and 20 ft in various orientations relative to the center of rotation. Angular accelerations and decelerations were approximately $10°/sec^2$. In some of these different positions, the planes of the semicircular canals remained unchanged relative to the plane of rotation, but the orientation of the resultant force relative to the otolith system was changed. In several such situations the magnitude, plane, and direction of nystagmus were changed by centripetal accelerations between 1 and 2 g-units. Results are discussed in terms of otolith modulation of sensory input from the semicircular canals. Author

N65-11415# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
A ZERO GRAVITY PELLET DISPENSER FOR USE WITH PRIMATES IN LONG-TERM SPACE FLIGHTS Technical Documentary Report, 15 Apr.–1 Sep. 1964
Gregg A. Gilbert Oct. 1964 14 p ref
(Contract AF 29(600)-4076)
(ARL-TR-64-15; AD-450731)

This report describes a device that can be used to dispense food pellets to primates in a zero-gravity environment. The device is controlled electronically, but the food is delivered mechanically when a lever is actuated. The feeder has a capacity for enough food to sustain a 50-pound chimpanzee for as long as 30 days. Author

N65-11421# School of Aerospace Medicine, Brooks AFB, Tex.
INCREASE OF ARTERIAL OXYGEN TENSION AT ALTITUDE BY CARBONIC ANHYDRASE INHIBITION
Stephen M. Cain and James E. Dunn, II Sep. 1964 11 p refs
(SAM-TDR-64-55; AD-451065)

Unanesthetized dogs were injected intravenously with 10 mg/kg per 12 hours of the carbonic anhydrase inhibitor, acetazolamide, before exposure to a simulated altitude of 21 000 feet (P_B = 335 mm Hg). Arterial blood samples were drawn frequently from a Teflon T-cannula surgically placed in a carotid artery 1 or 2 days before the experiment. Arterial Po_2, Pco_2, pH, and lactic and pyruvic acid concentrations were measured. In comparison with untreated dogs, arterial Po_2 at altitude was 9-mm Hg higher, on the average, in treated animals. No physiologically significant accumulation of excess lactate was found. The conclusion was made that carbonic anhydrase inhibition did offer measurable protection, with respect to arterial Po_2, against altitude hypoxia and that this protection was achieved at much smaller doses of drug than had been used by other investigators. Author

N65-11422# School of Aerospace Medicine, Brooks AFB, Tex.
PORTER-SILBER CHROMOGEN INTERFERENCE IN THE MEASUREMENT OF BODY FLUID STEROID RESPONSES TO TOTAL FASTING
John R. Prigmore, Ira L. Shannon, Steven C. Beering, and Frank R. Lecoco Sep. 1964 7 p refs
(SAM-TDR-64-58; AD-450962)

Corticosteroid measurements were carried out on three obese male patients during a 12-day period of total starvation. Porter–Silber chromogens in serum and parotid fluid increased to levels indicative of either grossly altered metabolic activity of the steroid hormones or nonsteroidal Porter–Silber chromogen interference. Evidence is presented supporting the inference of chromogenic interference. Author

N65-11451*# National Aeronautics and Space Administration, Washington, D.C.
PSYCHOPHYSIOLOGICAL EFFICIENCY OF THE MACACUS MONKEY AFTER CORTEX ABLATION [PSYCHOPHYSIOLOGISCHE LEISTUNGSFAHIGKEIT DES MACACUS AFFEN NACH CORTEXAUSSCHALTUNGEN]
K. Bättig and H. E. Rosvold Nov. 1964 81 p refs Transl. into ENGLISH from Ergeb. Physiol. Biol. Chem. Exp. Pharmakol. (Berlin), v. 52, 1963 p 157–204
(NASA-TT-F-9178) OTS Prices: HC $3.00/MF $0.75

A general survey is given over the effect of ablation of the secondary cortex in *Macacus* monkeys on their performance in various learning tests. For the secondary or association cortex of the monkeys there exists a distinct subdivision into function-specific areas. Total extirpation of the frontal secondary cortex results in an irreparable loss of the ability for delayed reaction. Frontal-lobe ablation led to the inability of sensory discrimination, typical hyperactivity, and disturbance of the normal emotional behavior. Application of these findings to human pathology is still impossible, because of the lack of similar tests on human subjects. Author

N65-11459# Joint Publications Research Service, Washington, D.C.
TRANSLATIONS FROM GIGIYENA I SANITARIYA (HYGIENE AND SANITATION), NO. 8, 1964
3 Nov. 1964 86 p refs Transl. into ENGLISH from Gigiyena i Sanit. (Moscow), v. 29, no. 8, Aug. 1964
(JPRS-27200; TT-64-51455) OTS: $3.00

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8. THE ROLE OF MANGANESE IN THE ETIOLOGY OF PNEUMONIA G. Sh. Gabunia p 54–59 refs

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11. STATUTE REGULATING THE ACTIVITIES OF THE STATE SANITARY INSPECTION IN THE USSR p 70–78

N65-11460# Joint Publications Research Service, Washington, D.C.

COMPARATIVE ASSESSMENT OF THE EFFECT OF CHROMIUM CARBIDE AND BORIDE DUST ON THE ORGANISM

T. A. Roshchina *In its* Transl. from Gigiyena i Sanit. (Hyg. and Sanit.), No. 8, 1964 p 16–21 refs (See N65-11459 02-04) OTS: $3.00

Four series of tests on 60 white rats were conducted to determine the relative effect of chromium boride and carbide on the body. The test program was instituted to ascertain the applicability of the toxicological characteristics of other chromium compounds to the carbide and the boride, which are released as aerosol-type dusts in factories. It is concluded that chromium carbide dust and chromium boride dust possess a toxic effect that is expressed in the development of pathological changes in lung tissue, that the dust of the boride is more toxic than the dust of the carbide, and that the maximum allowable concentration of chromium boride and carbide dust can be higher than the concentration presently accepted in sanitation norms for chromic anhydride. D.E.W.

N65-11484# Duntley (S.Q.), La Jolla, Calif.

SURVEY OF RESEARCH RELATING TO MAN'S VISUAL CAPABILITIES IN SPACE FLIGHT Final Report

John H. Taylor Jun. 1964 81 p
(Contract NObs-86012)
(AD-606802)

All phases of space travel are considered, from initial launch through various inflight tasks, lunar and planetary exploration, relaunch from an extraterrestrial body, and eventual return to earth. Information garnered from literature on past research and from groups presently involved in work on these subjects is presented by the type of visual task involved. These tasks are orientation, rendezvous and docking, navigation, observation of earth and extraterrestrial bodies from the upper atmosphere, space astronomical observations, observation of the lunar surface and of planetary surfaces from close orbits, lunar and planetary landings with estimates of distance and closure rates, observation of the lunar surface, planetary landing, translation on the lunar surface, and extravehicular maintenance. D.E.W.

N65-11516# Joint Publications Research Service, Washington, D.C.

STUDIES IN ELECTROENCEPHALOGRAPHY

3 Dec. 1964 27 p refs Transl. into ENGLISH from Zh. Vysshei Nervnoi Deyatel'nosti (Moscow), v. 14, no. 5, Sep.–Oct. 1964 p 745–754, 755–762
(JPRS-27677; TT-64-51862) OTS: $2.00

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1. ON POSSIBILITIES OF EMPLOYING THE CORRELATION ANALYSIS OF THE ELECTROENCEPHALOGRAM (EEG) OF MAN O. M. Grindel', G. N. Boldyreva, Ye. N. Burashnikov, and V. M. Andreyevskiy p 1–13 refs

2. CHANGES IN THE EEG AND CUTANEOUS GALVANIC REACTION DURING THE PROCESS OF FORMATION OF A TEMPORARY CONNECTION BETWEEN MOTOR AND VISUAL ANALYZERS IN MAN V. M. Vasil'yeva p 14–24 refs

N65-11573# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

THE DESIGN OF A CANINE INHALATION EXPOSURE APPARATUS INCORPORATING A WHOLE BODY PLETHYSMOGRAPH Technical Progress Report

B. B. Boecker, F. L. Aguilar, and T. T. Mercer Oct. 1964 70 p refs
(Contract AT(29-2)-1013)
(LF-16) OTS: $1.00

A whole-body plethysmograph has been incorporated in an apparatus for exposing dogs individually to radioactive aerosols. This makes it possible to monitor the dog's respiratory pattern during the exposure without the use of any respiratory masks or valves. After three different transducer systems were evaluated for use with the plethysmograph, the flow-rate transducer was chosen for several reasons, including the fact that this system produces inspiratory and expiratory flow-rate data, as well as tidal volume and respiratory rate information. The aerosol is continuously produced and drawn past the dog's nose during the exposure period, and provision has been made for quantification of the aerosol in terms of concentration and particle-size distribution for each experiment. Author

N65-11581# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

CHANGES OF PULMONARY BLOOD VESSELS IN CHRONIC RADIATION SICKNESS

I. S. Amosov 10 Mar. 1964 14 p refs Transl. into ENGLISH from Med. Radio. (Moscow), v. 7, no. 4, 1962 p 57–64
(FTD-MT-63-223; AD-605906)

The mechanism of the pathogenesis in radiation pneumonia was studied in rabbits by angiocardiography of the pulmonary blood circulation, under physiological conditions and also in chronic radiation sickness. The animals received 25 R daily, for a period of 2 to 3 months, and records were made of their weight, temperature, and respiration rate. The peripheral blood was analyzed, and survey X-rays were performed on the lungs and abdominal cavities. It was found that functional and anatomical changes developed concurrent to the stages of progress in the chronic radiation disease, resulting in an increase of contractions of the pulmonary arteries, depletion of the lung vessel network of small arteries, and a general deformed fibrous pulmonary pattern. G.G.

N65-11585# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

COORDINATION OF VOLUNTARY MOVEMENTS OF A HUMAN FROM THE STANDPOINT OF GENERAL REGULARITIES OF CONTROL AND CONTROL SYSTEMS

L. V. Chkhaidze 6 Feb. 1964 55 p refs Transl. into ENGLISH from Probl. Kibernetiki (Moscow), no. 8, 1962 p 309–336
(FTD-MT-63-265; AD-602585)

The basic problems confronting the central nervous system in the control of voluntary movements are discussed. The following topics were studied: "Concept of External and Internal Forces"; "Concept of Field of Force"; "Concept of the Connection Between Muscular Effort and the Resulting Movement"; "Concept of Mode of Work of Muscles"; "Concept of Dynamic Stability of Movement"; "General Diagram of Control of Voluntary Movements in a Human"; "Certain Data on

Activity of Master and Programing Mechanism"; and "Concerning the Question of Activity of the Collating Mechanism." G.G.

N65-11618# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

VESTIBULAR REACTIVITY DURING THE CUMULATIVE ACTION OF SLOW CENTRIPETAL ACCELERATIONS

A. E. Kurashvili 24 Jan. 1964 16 p refs Transl. into ENGLISH from Zh. Ushnykh, Nosovykh i Gorlovnykh Bolezney (Kharkov), no. 1, Jan.–Feb. 1962 p 49–55
(FTD-MT-63-179; AD-602599)

The regular changes of physiological reactions under cumulation of slow centripetal accelerations were studied on dogs. The pulse fluctuations and respiration rates were registered by oscillography during the slow acceleration in a centrifuge of 2-m radius. A number of vegetative disorders were observed and found to be similar to the symptoms of seasickness. The degree of these reactions was dependent on the magnitude of the acceleration force. The exclusion of the functions of the vestibular apparatus by delabyrinthation led to the intensification of motor reactions, and to a disturbance of the cortical regulation of the reflex activity of the compensor mechanism. G.G.

N65-11638# Cincinnati U., Ohio Research Foundation

SHORT-TERM MEMORY AS A PREDICTOR OF TROUBLE-SHOOTING SKILLS

R. J. Senter and B. R. Bernstein Jul. 1963 8 p refs
(Contracts AF 33(616)-7674; AF 33(616)-6835)
(AMRL-MEMO-P-53; AD-602539)

The Short-Term Memory Test consisted of 21 subtests, or sets of different items. Each subtest was studied by the subject for a specified short period, then it was removed and the subject's memory of the materials was tested. Various types of tests of memory were used, e.g. reconstruction, true-false, multiple choice, etc. Performance on the Short-Term Memory Test correlated significantly with some measures of learning to troubleshoot some equipment. Higher correlations were obtained when subjects received incentive pay for better performance on the Short-Term Memory Test. Under the condition of incentive pay, the correlations between short-term memory and learning to troubleshoot were generally comparable to the correlations obtained between learning to troubleshoot and standard tests of symbolic reasoning and verbal reasoning. Author

N65-11665# Naval Radiological Defense Lab., San Francisco, Calif.

ABSCOPAL EFFECTS OF WHOLE-BODY X IRRADIATION ON COMPENSATORY HYPERTROPHY OF THE RAT KIDNEY

L. W. Wachtel and L. J. Cole 18 Sep. 1964 29 p refs
(USNRDL-TR-783; AD-450729)

The weight and DNA content of normal growing (i.e., intact), and hypertrophying (i.e., following uninephrectomy) rat kidneys were obtained from several hundred Sprague–Dawley white rats. The effect of whole-body X-irradiation with 500 rad and local irradiation to the kidney with 1000 rad, was then determined by following the rate and degree of hypertrophy and the DNA content of the kidney. Food restriction in nonirradiated 4-week-old rats, resulting in body weight growth retardation, elicited a marked reduction in kidney weight and in DNA content of the hypertrophying kidney 21 days after uninephrectomy. It is concluded that the reduction in kidney hypertrophy following whole-body X-irradiation with 500 rad is due in some measure to an abscopal or indirect effect, secondary to decreased body weight. Author

N65-11666# Naval Radiological Defense Lab., San Francisco, Calif.

ACCUMULATION OF LETHAL IRRADIATION DOSES BY FRACTIONATED EXPOSURE TO X-RAYS

J. S. Krebs and R. W. Brauer 22 Sep. 1964 23 p refs
(USNRDL-TR-784; AD-451037)

The LD_{50} of mice for exposure to daily fractionated irradiation has been measured for fractionation periods of from 5 to 60 days. The amount of recovery occurring during the fractionation was found to depend largely on the number of dose fractions, rather than on the size of fractions or the total time duration. The amount of recovery did not agree with the model involving exponential decay of injury with time after exposure. The results that the biological basis for the recovery is the prompt repair of sublethal injury to vital cells of the mouse during the intervals between exposures to radiation. The existence of similar recovery patterns in previous studies of dose fractionation is pointed out. The relationship of the present pattern of radiation exposure to other patterns for chronic radiation exposure is discussed briefly. Author

N65-11667# Chicago U., Ill. Committee on Mathematical Biology

AN ANALOG COMPUTER MECHANIZATION OF THE HODGKIN–HUXLEY EQUATIONS

Hugo M. Martinez 1 Oct. 1964 24 p refs
(Grants AF-AFOSR-370-63; PHS-G-CA-06475-03)
(AD-608156)

The Hodgkin–Huxley equations describing the action potentials for giant squid axons have been mechanized on an analog computer for the purpose of simulating a variety of experimental situations. The mechanization is described together with the following results: (1) response to constant currents ranging from threshold to saturation; (2) response to a 100-cps sinusoidal current at two amplitudes and two phases; and (3) the effect of removing the potassium current term. Author

N65-11717# Naval Research Lab., Washington, D.C. Organic and Biological Chemistry Branch

PRESSURE AS A FACTOR IN ALGAL GROWTH

P. J. Hannan *In its* Rept. of NRL Progr. Sep. 1964 p 11–17 refs (See N65-11715 02-11) OTS: $1.25

Photosynthesis by algae is being considered as a possible source of oxygen on board submarines. Pressure is one of many variables being studied in an effort to obtain the maximum production of oxygen from a system in which algal cultures are employed. It was found that pressure is either an advantage or a detriment, depending on the flow rate and the amount of carbon dioxide fed into the system. Author

N65-11758# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

AVIATION PSYCHOLOGY

K. K. Platonov 14 Aug. 1964 362 p refs Transl. into ENGLISH of the book "Psikhologiya Letnogo Truda" Moscow, Voyennoye Izd. Min. Oborony Soyuza SSR, 1960 p 1–351
(FTD-MT-64-177; AD-607906)

This book deals with the objects, methods, and history of aviation psychology; characteristics of mental processes in the pilot's work—problems of attention, thought, memory, emotions, and the psychomotor system; psychological analysis of flying—psychological characteristics of practice flight, flying by instruments, and high altitude, speed, and space flights; special problems of aviation psychology—psychological rationalization of flight training, the regime of flying and rest, aviation engineering; and psychological research in the practice of aviation medicine, medical-aviation expertise. Author

N65-11760# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
ADRENALIN-LIKE SUBSTANCES AND BIOLOGICAL ACTIVITY OF THE BLOOD IN CERTAIN FORMS OF NERVOUS PATHOLOGY
G. N. Kassil, E. A. Matlina, and R. A. Sokolinskaya 6 Oct. 1964 19 p refs Transl. into ENGLISH from Probl. Endokrinol. i Gormonoterap. (Moscow), v. 5, no. 1, 1959 p 70–79
(FTD-TT-63-1170/1+2; AD-607542)

The status of the sympathetic and parasympathetic branches of the vegetative nervous system in some forms of nervous pathology was investigated, and the quantitative dependence between the level of adrenalinlike substances and the biological activity of the blood was observed. A high level of adrenalinlike substances and also of the sympathetic activity of the blood was noted in cases of diseases accompanied with a painful syndrome, in certain forms of diencephalic pathology, and in Addison's disease. A low level of adrenalinlike substances in the blood was observed in myasthenia, and a subsequent improvement in the patient's health was found to be connected not only with changes in the acetylcholine exchange but also with the increase of adrenalinlike substances and the sympathetic blood activity. G.G.

N65-11772# Air Force Systems Command, Wright-Patterson AFB, Ohio Aerospace Medical Research Labs.
TEST AND EVALUATION OF QUALITATIVE AND QUANTITATIVE PERSONNEL REQUIREMENTS INFORMATION
Evan D. Stackfleth Sep. 1964 26 p refs
(AMRL-TDR-64-65; AD-607781)

Some of the problems in the validation of personnel requirements developed and predicted in the Qualitative and Quantitative Personnel Requirements Information reports are described. Included are problems inherent in the validation procedures, such as the nature of the predictor (QQPRI), the problem of criterion selection and bias, and the changing nature of the criterion. Because of the multiple nature of these problems, available testing techniques are not adequate to handle the testing and to provide desired information. A solution is presented. This solution requires a procedural change whereby validations are conducted during different but specific stages of system development and test. The validations would be oriented to obtaining the best validation at a particular time and for a particular purpose rather than attempting an overall test. Methods are suggested for determining manning deficiencies and readjusting the personnel subsystem. Author

N65-11774# Air Force Systems Command, Bedford, Mass. Decision Sciences Lab.
DECISION SCIENCES LABORATORY BIENNIAL PROGRESS REPORT, JULY 1962–JUNE 1964
Walton F. Dater, Jr. Oct. 1964 47 p refs
(ESD-TDR-64-609; AD-607443)

Progress is reported in five areas of man–machine interaction: data presentation and display; learning, problem solving, and decision making; programed teaching and automated training; communications; and direct applications of principles and techniques to military information systems and situations. R.L.K.

N65-11817# Dunlap and Associates, Inc., Darien, Conn.
DEVELOPMENT OF A MAN-COMPUTER SYSTEM FOR SOLVING A TARGETING PROBLEM
Ugo O. Gagliardi [1964] 22 p ref Presented at the Western States Navy Res. and Develop. Clin., Montana State Coll., Bozeman
(Contract Nonr-3602(00))
(AD-607520)

This study was conducted to develop a method for the design of computerized problem-solving aids. The method relies on the observation of problem-solving behavior, and utilizes the evidences of heuristic procedures displayed by the subject as indicators of processing overloads. This information is, in turn, used to formulate problem-solving aids whose effectiveness is verified experimentally. The problems used were selected because they have a formal structure that admits many interpretations—from the design of minimal switching circuits to the disposition of weapon systems. The subject's task was to allocate hypothetical missile-firing submarines so that a specified number of targets were covered by the fewest possible ships. This task is formulated as a linear integer programing problem that was solvable by Gomory's algorithm. Complete automation of the task, using this algorithm, was undesirable because the procedure was excessively time consuming when more than a few solutions were required. Experiments indicated that the subject's processing limitations resulted in a slow and biased search for elements from which to assemble solutions. The aided system delegated the subtask of finding key elements to an automated process, and let the person assemble these elements into deployments. The effectiveness of this arrangement was shown by the fact that aided subjects found more solutions and more uniformly distributed solutions than unaided subjects. Author

N65-11874*# National Aeronautics and Space Administration, Washington, D.C.
GENERAL PRINCIPLES CONCERNING THE REACTION OF THE ORGANISM TO THE COMPLEX ENVIRONMENTAL FACTORS EXISTING IN SPACECRAFT CABINS [OBSHCHIYE ZAKONOMERNOSTI REAKTSIY ORGANIZMA CHELOVEKA NA KOMPLEKSNOYE VOZDEYSTVIYE FAKTOROV SREDY, KHARAKTERNYKH DLYA KABINY KOSMICHESKIKH LETATEL'NYKH APPARATOV]
A. V. Lebedinskiy, S. V. Levinskiy, and Yu. G. Nefedov Dec. 1964 15 p Transl. into ENGLISH of a paper Presented at the 15th Intern. Astron. Congr., Warsaw, 7–12 Sep. 1964
(NASA-TT-F-273) OTS Prices: HC $0.50/MF $0.50

Special relationships arising between the organism and the medium in a hermetically sealed space, as well as the influence of such factors as ionizing radiation, moderately high air temperature, and noise, coupled with the absence of ultraviolet radiation and consequences of restricted motor activity are considered. Chamber tests were carried out lasting from 10 to 120 days, in the course of which a study was made of the medium forming in the chamber as a result of the vital activity of man and of his reactions under these conditions. In the analysis of the results, attention is drawn to the nature of the changes rather than individual differences due to metabolism of different people. The problem of the psychic compatibility of several people who are isolated in a restricted space is also discussed. D.S.G.

N65-11890# Albert Einstein Medical Center, Philadelphia, Pa.
METABOLIC AND FUNCTIONAL CHANGES IN THE HEART DURING PROLONGED HYPOTHERMIA
C. Russ and J. C. Lee Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Sep. 1964 12 p refs
(Contract AF 41(657)-417)
(AAL-TDR-64-4; AD-608212)

The effect of hypothermia of 25° C for 24 hours on myocardial metabolism and efficiency was determined on dogs fasted for approximately 15 hours and anesthetized with sodium pentobarbital. Coronary blood flow, cardiac output, myocardial oxygen and substrate utilization, and mechanical efficiency of the heart were determined at normal and reduced body temperatures. Prolonged reduction of myocardial temperature, with concomitant reduction in coronary blood flow,

led to diminished oxygen and substrate utilization. Myocardial glycolysis began following 12 hours of cooling when pyruvate utilization stopped in negative balance. After 24 hours the heart stopped utilizing carbohydrates, with negative arteriovenous differences for these substrates (in the presence of normal arterial carbohydrate levels), but continued to utilize nonesterified fatty acid. The coefficient of oxygen utilization for the heart increased following 24 hours of cooling. Hypoxia and glycolysis appeared during the late hours of cooling. Author

N65-11895# Air Force Systems Command, Wright-Patterson AFB, Ohio Aerospace Medical Research Labs.
REACH CAPABILITY OF THE USAF POPULATION. PHASE I: THE OUTER BOUNDARIES OF GRASPING-REACH ENVELOPES FOR THE SHIRT-SLEEVED, SEATED OPERATOR Final Report, Jan. 1960–Jan. 1962
Kenneth W. Kennedy Sep. 1964 89 p refs Statistical Reductions performed by Antioch Coll.
(Contract AF 33(616)-6792)
(AMRL-TDR-64-59; AD-608269)

This report contains descriptions of the outer boundaries of the minimum, 5th-, 50th-, and 95th-percentile grasping-reach envelopes of seated, shirt-sleeved operators. The two most important are the minimum and 5th-percentile envelopes. These envelopes have been calculated to permit 99+ percent or 95 percent of the Air Force population, respectively, to reach any point at their boundaries. The report contains a critical resume of previous investigations of arm reach, and a description of the AMRL Grasping-Reach Measuring Device. The data-gathering and statistical procedures are included, and applications of the reach envelopes are discussed. Horizontal contours representing the outer boundary of the minimum, 5th-, 50th-, and 95th-percentile grasping-reach envelopes are presented for each 5-inch level beginning at 5 inches below SRP (Seat Reference Point) and extending to 50 inches above SRP. The minimum envelope extends from 2.5 inches below SRP to 48 inches above; the 5th-percentile envelope from 4 inches below SRP to 48.75 inches above. Horizontal distances from SRP to the boundary of each envelope are given at 15° intervals. Author

N65-11896# Air Force Systems Command, Wright-Patterson AFB, Ohio Aerospace Medical Research Labs.
RESPIRATORY AND MICROCLIMATE TEMPERATURES WITHIN THE PARKA HOOD IN EXTREME COLD Final Report, Dec. 1963
James H. Veghte Sep. 1964 11 p refs
(AMRL-TDR-64-79; AD-608139)

The standard Air Force arctic clothing was worn to determine whether or not it provided adequate head protection in extremely cold temperatures. Subjects were exposed to −62° C for 40 to 50 minutes in an environmental chamber. Possible respiratory problems and frostbite of the cheeks and nose were the primary concern. Subjects resting or exercising experienced no respiratory or frostbite problems. Air in the hood rapidly approached ambient conditions, because of the expulsive nature of expiration and the strong convective air movement. Exercise increased the microclimate temperatures in the hood. The existing hood design was found to provide adequate head protection for AF personnel at more extreme temperatures than are normally encountered in the Arctic. Author

N65-11898# Ohio State U. Research Foundation, Columbus
ON THE STRUCTURE AND ORGANIZATION OF THE NERVOUS SYSTEM FROM AN INFORMATION PROCESSING POINT OF VIEW (NEURAL CODING, VISION, AND MOTOR CONTROL) Final Report, Oct. 1962–Mar. 1964
N. A. Coulter, Jr. Wright-Patterson AFB, Ohio, AMRL, Oct. 1964 101 p refs
(Contract AF 33(657)-9660)
(AMRL-TR-64-80; AD-608284)

A study was made of the central nervous system from an information processing point of view. The study entailed a review and critical analysis of several hundred references, and involved a considerable amount of recasting and reorganization of existing knowledge into the terms and concepts of engineering, with particular reference to potential bionic applications. The study was selective rather than comprehensive. The neural coding problem was first examined, the history of efforts dealing with this problem was reviewed, and a mathematical representation of neural signals (neurograms) and neural operators was formulated. The processing of data by the visual system was then described, with particular reference to form, color, and image fixation, automatic focusing control, intensity control, image fusion, depth perception, and the stabilization of visual space. Next, the neural control of movement was analyzed from a servomechanical viewpoint. The unit biomechanical control system was defined, and the corticospinal command of this unit system was discussed. The cerebellar coordination and extrapyramidal stabilization of sequences and combinations of biomechanical control unit actions were examined. Finally, the ability of the central nervous system to generate its own goals—a capability for which no technological counterpart yet exists—was discussed, and a preliminary sketch of a theory of teleogenetic systems was presented. Author

N65-11899# Applied Science Associates, Inc., Valencia, Pa.
A FIELD EXPERIMENTAL STUDY OF PROGRAMMED INSTRUCTION ON A MANIPULATIVE TASK Final Report, Aug. 1963–Dec. 1963
John D. Folley, Jr. (AMRL), Aubrey J. Bouck, and John P. Foley, Jr. Wright-Patterson AFB, Ohio, AMRL, Oct. 1964 47 p
(Contract AF 33(657)-11358)
(AMRL-TR-64-90; AD-608296)

Approximately 1300 basic military trainees were used in a 3 × 7 factorial study of modes and content of training on a manipulative performance task—the assembly and disassembly of the M1 carbine. The modes of training included lecture-demonstration, a printed linear program with or without an answer sheet, and an audio-visual program presented by an audio-visual device or by a printed booklet. Also evaluated was a condition in which the trainees tried to perform the final task and were assisted as required. The content of the training was varied by providing training on assembly only, or disassembly only, or both. The final criteria were the time and the number of assists required to disassemble and assemble the M1 carbine. Although the modes of training differed significantly, the rankings were very different on the two criteria. No mode of training seemed clearly superior to the other modes. The audio-visual program presented in the printed booklet seemed somewhat inferior. Training on only the assembly of the carbine resulted in as good performance as training on both assembly and disassembly. The findings probably can be generalized only to relatively simple procedural-type tasks. Replication of the study with more complex performance tasks is recommended. Author

N65-11900# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
INSTRUMENT FOR RECORDING THE PULSE WAVES AND DETERMINING THE BLOOD PRESSURE IN ANIMALS
A. A. Kudryavtsev 26 Mar. 1964 6 p Transl. into ENGLISH from Veterinariya (USSR), no. 3, 1959 p 76–78
(FTD-TT-63-1176/1+2; AD-600148)

Various devices and methods for measuring the blood pressure of animals are described. It is stated that the most suitable

apparatus for measuring blood pressure is the spring tonometer, which is described at length. D.E.W.

N65-11908*# National Aeronautics and Space Administration, Washington, D.C.
THE BIOLOGICAL EVALUATION OF RADIATION CONDITIONS ON THE PATH BETWEEN THE EARTH AND THE MOON [BIOLOGICHESKAYA OTSENKA RADIATSIONNYKH USLOVIY NA TRASSE ZEMLYA-LUNA]
Yu. M. Volynkin, A. V. Antipov, V. A. Guda, M. D. Nikitin, and P. P. Saksonov Dec. 1964 15 p refs Transl. into ENGLISH of a paper Presented at the 15th Intern. Astron. Congr., Warsaw, 7-12 Sep. 1964
(NASA-TT-F-279) OTS Prices: HC $0.50/MF $0.50

This report briefly reviews the physical characteristics of the basic types of cosmic radiation in near-earth space, and determines the quantities of biological doses created by each type of radiation. It shows that in flight along the trajectory around the moon during the quiet activity of the sun, a shield of 1 to 2 g/cm^2 will provide crew members protection against the danger of irradiation. Protons that are regenerated during a chromospheric flare on the sun represent a real threat to the health and life of the astronauts. Several methods and sources are discussed for protecting man from the damaging action of cosmic radiation in his flight from the earth to the moon. Author

N65-11931# Argonne National Lab., Ill.
BIOLOGICAL AND MEDICAL RESEARCH DIVISION Semiannual Report, Jul.–Dec. 1963
S. Phyllis Stearner et al Jun. 1964 135 p refs
(Contract W-31-109-ENG-38)
(ANL-6906) OTS: $4.00

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11. LACK OF EFFECT OF EXOGENOUS CATALASE ADMINISTERED DURING PREGNANCY ON CATALASE CONTENT OF PROGENY Robert N. Feinstein, John E. Seaholm, and Judith B. Howard p 73–74 refs

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20. THE METABOLISM OF MITOCHONDRIAL PROTEINS. I. THE ISOZYMES OF GLUTAMIC-PYRUVIC TRANSAMINASE Robert W. Swick, Paula L. Barnstein (Lawrence Coll., Wis.), and John L. Stange p 93–100 refs

21. EFFECT OF ISOTOPE EXCHANGE ON THE PROTONATION OF DNA Lyle G. Bunville p 101

22. NUCLEAR CHANGES IN RAT LIVER CELLS DURING THIOACETAMIDE ADMINISTRATION A. D. Barton and Elizabeth A. Cerny (Coe Coll., Iowa) p 102–105 refs

23. NUCLEAR CHANGES IN RAT KIDNEY CELLS AFTER CASTRATION AND ADMINISTRATION OF TESTOSTERONE A. D. Barton and Kathleen M. Tracy (Cornell Coll., Iowa) p 106–109 refs

24. EFFECT OF X-RADIATION ON OXIDATIVE PHOSPHORYLATION IN RAT LIVER MITOCHONDRIA. II. John F. Thomason and Sharron L. Nance p 110–112 refs

25. PHOSPHOLIPHASE C, LOW $_p$H, AND TEMPERATURE EFFECTS ON ACID PHOSPHATASE RELEASE FROM RAT LIVER, SPLEEN AND THYMUS Y. E. Rahman p 113–117 refs

26. FINE STRUCTURE OF THE LACUNAE AND CANALICULI IN BONE F. Wassermann and James A. Yaeger p 118–125 refs

27. VARIOUS ASPECTS OF FIXATIVES FOR ULTRATHIN SECTIONS AND RESOLUTION IN ELECTRON MICROSCOPY Theodore N. Tahmisian, Carol J. Christiansen, Rosemarie L. Devine, and Betty Jean Wright p 126–129 refs

N65-11933# Joint Publications Research Service, Washington, D.C.
HYGIENIC STANDARDS FOR CONSTANT NOISE IN INDUSTRY
A. A. Arkad'yevskiy 27 Nov. 1964 10 p refs Transl. into ENGLISH from Gigiena i Sanit. (Moscow), no. 7, Jul. 1964 p 25–30
(JPRS-27559; TT-64-51807) OTS: $1.00

The normal levels of steady noise in industry were studied, with special attention being given to the levels at which no disturbance of hearing sensitivity occurs. It was concluded that noise is harmless at intensities of 90, 85, 75, and 65 decibels,

with peak sound pressures at frequencies of 200, 600, 1250, and 4000 cycles per second, and that brief noises with the same maximum levels of sound energy but with intensities of 100, 90, 85, and 75 decibels differ, having an unfavorable fatiguing effect on the organism. Physiological data for the nonspecific effects of constant noise are given. D.E.W.

N65-11959# Naval Radiological Defense Lab., San Francisco, Calif.
DNA SYNTHETIC RATES AND CHROMOSOME REPLICATION IN GENERATING MARROW CELLS
E. L. Alpen and D. Cranmore 31 Aug. 1964 19 p refs
(USNRDL-TR-779; AD-450347)

The normally dividing bone marrow cells of the domestic cat provide suitable material for the examination of DNA replication patterns in individual chromosomes. Autoradiographic studies of chromosomes labeled with tritiated thymidine indicate a direct relation of chromosome size to duration of DNA synthetic activity of the 10 hours of the S-period studied. In this same period dividing cells achieved a maximum labeling of 80%. This suggests that a portion of the normally dividing cell population undergoes an arrest of considerable length in the G^2-period. Author

N65-12007# School of Aerospace Medicine, Brooks AFB, Tex. Dental Sciences Div.
REDUCTASE ACTIVITY AND SULFHYDRYLS IN THE DEHYDROGENASE HISTOCHEMISTRY OF HUMAN GINGIVA
William A. Gibson and Ira L. Shannon Sep. 1964 10 p refs
(SAM-TDR-64-48; AD-450950)

The nonenzymatic reduction of Nitro BT was studied in human gingival tissue sections at a pH of 7.5 and incubation times of 30, 60, 90, and 120 minutes in mixtures of Nitro BT and NAD, with and without the addition of respiratory inhibitors. The presence of cyanide but not Amytal or azide resulted in time increases in Nitro BT reduction. The reduction of disulfide to sulfhydryl groups by cyanide under histochemical conditions was demonstrated by the reduction of Nitro BT, which occurred after blocking of tissue sulfhydryl groups by pretreatment with n-ethyl maleimide. Using the DDD method of Barrnett and Seligman for sulfhydryls it was found that an increased sulfhydryl activity occurred after preincubation in mixtures containing cyanide. A slight but significant increase in sulfhydryl activity was also noted after preincubation in mixtures containing a coenzyme-dependent or coenzyme-independent substrate. Author

N65-12032# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
BIOSYNTHESIS OF PROTEIN
M. F. Gulyy 5 Aug. 1964 321 p refs Transl. into ENGLISH of the book "Biosintez Belka" Kiev, Izd. Akad. Nauk Ukr. SSR, 1963 p 5-204
(FTD-TT-63-1219/1+2; AD-607905)

The problems of protein biosynthesis and the role of proteolytic enzymes in the synthesis of plasteins (proteinlike substances) are treated in detail. The problems of enzymatic synthesis of protein under high pressure and of transpeptidase functions of proteases are examined. The biosynthesis of protein, in connection with other processes that serve as energy sources, is presented in detail. The enzymatic systems concerned in the process of activation of amino acids and of polypeptides and ammonia, and also the structure, properties, and role of soluble ribonucleic acid in this process are described. The significance of the microsomes and high-polymer nucleic acids, of lipids, and of vitamin B_{12} in protein biosynthesis, the problems of coding, the possibility of nonenzymatic incorporation of amino acids into protein, and other problems are also examined. Author

N65-12040# Ionics, Inc., Cambridge, Mass.
RECOVERY OF POTABLE WATER FROM URINE BY MEMBRANE PERMEATION Final Report, May 1963–Apr. 1964
Arthur W. Warner, Daniel L. Brown, and Werner Glass Wright-Patterson AFB, Ohio, AMRL, Sep. 1964 51 p refs
(Contract AF 33(657)-11353)
(AMRL-TDR-64-73; AD-607759)

An experimental program was conducted to determine the feasibility of using membrane permeation for the reclamation of potable water from human urine. On the basis of favorable results obtained in the feasibility study, a laboratory-model urine reclamation system was built. Model components selected were theoretically capable of operating in a zero-gravity environment to recover 5000 ml of water per 24-hr period. The laboratory model weighs about 128.5 lb, has a total component volume of about 2.0 ft^3, and requires approximately 262 W of power to operate. Energy requirement of the system is about 4.4 kW hours per 5000 ml of product. Excellent quality water is obtained from the system, using raw human urine as the feed source. Yields are above 85%. Author

N65-12045# California U., Los Angeles
BEHAVIORAL AND NEUROPHYSIOLOGICAL STUDIES OF UDMH IN THE CAT Technical Report, May 1962–Jul. 1964
M. D. Fairchild and M. B. Sterman Wright-Patterson AFB, Ohio, AMRL, Sep. 1964 30 p refs
(Grant DA-CML-18-108-C-51)
(AMRL-TDR-64-72; AD-608089)

Studies concerning the behavioral and neurophysiological actions of UDMH in cats were carried out employing three separate experimental approaches: (1) Collection of behavioral and electrophysiological data from animals prepared with indwelling recording electrodes and isolated in a controlled environment after various doses of UDMH; (2) determination of thresholds for seizure induction by electrical stimulation of the hippocampus in unanesthetized, but immobilized "acute" preparations; and (3) development of a unique behavioral apparatus, which provides for the evaluation of subconvulsive doses of UDMH in relation to specific CNS regulatory mechanisms. The latter experiment has not yet reached the stage of UDMH administration and testing. The first set of experiments disclosed a direct relationship between dose and time of onset of characteristic behavioral and EEG signs preceding convulsions. The acute experiments indicate an initial increase in ventral hippocampal seizure threshold after administration of low doses of UDMH. Author

N65-12055# Joint Publications Research Center, Washington, D.C.
BIONICS
L. P. Krayzmer 2 Dec. 1964 59 p refs Transl. into ENGLISH of the book "Bioniki" Tbilisi, State Publishing House "Soviet Georgia", 1963 p 1-93
(JPRS-27635; TT-64-51839) OTS: $3.00

This book describes basic questions of bionics as a scientific discipline that examines the possibility of applying knowledge of biologic processes and methods to engineering problems. Primary attention in this book is given to those questions dealing with perception, storing, transmitting, and converting information in living organisms, and with the possibility of applying this knowledge when working out technical cybernetic systems to increase their versatility, flexibility, and reliability. Author

N65-12067# Maryland U., College Park
SPECTRAL SENSITIVITY OF SMALL RETINAL AREAS Final Progress Report, Jan. 1–Jul. 31, 1964
John Krauskopf 31 Jul. 1964 14 p refs

(Contract DA-49-193-MD-2327)
(AD-448595)

Work on four projects is reported: (1) ophthalmoscopic investigations of the physical basis of the Stiles-Crawford effect, which indicate that the change in reflectivity is greatest for the center of the pupil and falls off toward the margin; (2) study of average evoked potentials following saccadic eye movements, which indicates that amplitude and latency are dependent on the luminance of the steadily viewed fixation target; (3) theoretical analysis of the effects of small monochromatic stimuli; and (4) behavioral studies of the spectral sensitivity of the turtle. M.P.G.

N65-12074# Joint Publications Research Service, Washington, D.C.
RADIOACTIVITY AND DOSIMETRIC CONTROL
A. S. Srapionov 1 Dec. 1964 73 p refs Transl. into ENGLISH of excerpts from the book "Radioaktivnost' i Dozimetricheskiy Kontrol'" Tashkent, Nauka Publishing House, 1964
(JPRS-27625; TT-64-51836)

This study pertains to the construction and safety shielding of laboratories for processes employing polonium-beryllium and radium-beryllium neutron sources. Calculations for the shielding against powerful neutron streams were performed. A combination of several shielding materials is recommended, consisting of a layer of paraffin, a layer of a neutron absorbent (boric acid, boron carbide, or cadmium sheet), and an inner core of cast iron or lead. The reliability and quality of the shielding was verified with dosimetric instruments by measuring the flux of fast neutrons, and a maximum permissible overall radiation level of 0.1 re per man per week was established as a safety standard. G.G.

N65-12076*# Boeing Co., Seattle, Wash.
MANNED ENVIRONMENTAL SYSTEM ASSESSMENT
Washington, NASA, Nov. 1964 337 p refs
(Contract NASw-658)
(NASA-CR-134) OTS Prices: HC $5.00/MF $1.75

A complete integrated life support system capable of providing life support for 5 men for 30 days was developed, designed, fabricated, and installed inside a variable altitude chamber for test. The first test attempt ended after 4 1/2 days because of crew illness and a catastrophic equipment failure. Prior to resumption of the second attempt all subsystems were reviewed for performance and modified as required to insure reliable mechanical operation. Trace contaminant studies were made resulting in the substitution of many equipment fabrication materials, additional filtration, and increased capacity air catalytic oxidization. The second attempt was successful. Discussed are all aspects of the program including systems, technology, behavioral, and medical and clinical. Individual development, subsystem and system tests, results, analyses, conclusions, and recommendations are included. Author

N65-12090# BioTechnology, Inc., Arlington, Va.
EFFECTIVENESS OF THREE VISUAL CUES IN THE DETECTION OF RATE OF CLOSURE AT NIGHT
James F. Parker, Jr., Robert R. Gilbert, and Richard F. Dillon Mar. 1964 51 p
(Contract CPR 11-8683)
(BTI-64-1)

This study was concerned with an evaluation of the visual cues used at night by a driver when he decides he is overtaking the vehicle in front of him. The basic paradigm was one in which, for any given experimental trial, two of three visual cues (area, brightness, and visual angle) were manipulated so as to maintain an apparent constancy, while the third, the one on which the overtaking decision had to be made, was varied. The effectiveness of each cue was tested at three levels of cue intensity and at three speeds of approach. The following conclusions were drawn: (1) The control condition, in which normal taillights were used, is significantly superior to the operation of any single cue. (2) Both the visual-angle cue and the brightness cue are superior to the area cue. (3) The level of visual angle and of brightness was significant, whereas the level of area was not. (4) Approach speed did not influence effectiveness. (5) Sensitivity to change in visual-angle cue appears to conform to the Weber psychophysical function. D.S.G.

N65-12131# Lankenau Hospital, Philadelphia, Pa. Div. of Research
CARDIODYNAMIC AND METABOLIC EFFECTS OF PROLONGED BED REST WITH DAILY RECUMBENT OR SITTING EXERCISE AND WITH SITTING INACTIVITY
N. C. Birkhead, J. J. Blizzard, J. W. Daly, G. J. Haupt, B. Issekutz et al Wright-Patterson AFB, Ohio, AMRL, Aug. 1964 31 p refs
(Contract AF 33(657)-9049)
(AMRL-TDR-64-61; AD-607239)

Eight healthy men were studied to evaluate the modifying effects of supine or sitting exercise or quiet sitting on the circulatory and metabolic consequences of prolonged bed rest. They were fed a weighed formula-type diet of 2500 calories (78 gm protein, 71 gm fat, 390 gm carbohydrate, and 1.630 gm calcium) throughout the study. Urinary nitrogen, calcium, and phosphorus excretions were determined from 6-day pooled samples. Four subjects remained at recumbent bed rest for 24 days except for 1 hour daily lying (2 subjects) or sitting (2 subjects) bicycle ergometer exercise, and four subjects remained at recumbent bed rest for 16 hours and sat quietly in a chair for 8 hours daily for 30 days. All subjects underwent physical training for 18 days before and after these periods of inactivity. Author

N65-12132# Ohio State U., Columbus
SUBJECT CONTROL OVER A BAYESIAN HYPOTHESIS-SELECTION AID IN A COMPLEX INFORMATION-PROCESSING SYSTEM Final Report, 1 Jun. 1963–15 Apr. 1964
Jack F. Southand, David A. Schum, and George E. Briggs Wright-Patterson AFB, Ohio, AMRL, Sep. 1964 46 p refs
(Contract AF 33(657)-10763)
(AMRL-TR-64-95; AD-608108)

An eight-man team produced evaluations of various threats posed by a hypothetical aggressor. These evaluations were made on the basis of intelligence information gathered on simulated reconnaissance overflights of the homeland area of the aggressor. The primary output from this threat evaluation team was a series of a posteriori probabilities estimations produced by the team's commanding officer (CO). In three of the four experimental conditions the CO was provided with a hypothesis-selection aid based upon a modification of Bayes' theorem (MBT). In these three conditions the CO was permitted to exert an increasing amount of control over the MBT-aid mechanism. He exerted control either by adjustment of certain parameters on the MBT model or by direct insertion of conditional probabilities into the model. The purpose of the experiment was to observe whether increasing control over the MBT-aid mechanism would increase the user's acceptance of the aid and improve his threat-diagnosis performance. Author

N65-12133# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio
A MATHEMATICAL MODEL OF THE HUMAN BODY Final Report, Jun. 1963–Aug. 1964

Ernest P. Hanavan, Jr. (M.S. Thesis) Oct. 1964 155 p refs
(GA/PHYS/64-5; AMRL-TR-64-102; AD-608463)

A mathematical model for predicting the inertial properties of a human body in various positions has been developed. Twenty-five standard anthropometric dimensions are used in the model to predict an individual's center of gravity, moments and products of inertia, principal moments, and principal axes. The validity of the model was tested by comparing its predictions with experimental data from 66 subjects. The center of gravity was generally predicted within 0.7 inches and moments of inertia within 10%. The principal vertical axis was found to deviate from the longitudinal axis of the body by as much as 50°, depending on the body position assumed. A generalized computer program to calculate the inertial properties of a subject in any body position is presented. Author

N65-12171# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

CHANGES IN THE CONTENT OF BIOLOGICALLY ACTIVE SUBSTANCES IN RATS UNDER THE ACTION OF RADIAL ACCELERATIONS

I. M. Khazen and I. L. Vaysfel'd 17 Aug. 1964 12 p refs Transl. into ENGLISH from Voprosy Med. Khim. (Moscow), v. 8, no. 5, 1962 p 493–497
(FTD-TT-64-202/1+2; AD-607878)

Rats underwent positive as well as negative acceleration up to 10 g for a 1-minute duration in the direction of the inertial forces at a rate of 2 g/sec. After this action was repeated up to 120 times, the animals were killed, and the histamine level in their blood and tissues was measured. In general, a lowering of the histamine level and of the contents of adrenalinlike substances in the mucous membrane of the intestine and in the tissues of the brain was observed. The excretion of 5-oxyindoluxus acid with the urine was also reduced, the quantity depending on the magnitude, frequency, and duration of the acceleration exposure. G.G.

N65-12183# Joint Publications Research Service, Washington, D.C.

TRANSLATIONS ON COMMUNIST CHINA'S SCIENCE AND TECHNOLOGY, NO. 125

24 Nov. 1964 19 p Transl. into ENGLISH from Chinese Periodicals
(JPRS-27506; TT-64-51755) OTS: $1.00

Translated articles are presented on the prevention of sweetpotato mildew, on the advance in aeronautical training, on the Nanking Aeronautical College, and on the progress of the Peking Aeronautical College. The translation of a letter to the editor of "Aeronautical Knowledge" (a journal) that asks how to enter an aeronautical college is also included, along with the editor's reply. D.E.W.

N65-12189# American Foundation for Biological Research Madison, Wis.

DIRECT OBSERVATIONS ON THE MODE OF INVASION OF LIVING TISSUES BY ICE

B. J. Luyet, R. J. Williams, and P. M. Gehenio Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Aug. 1964 28 p refs
(Contract AF 41(657)-343)
(AAL-TDR-63-26; AD-608211)

Direct observations, during freezing, of pieces of frog tissues or organs (mesentery, nictitating membrane, lung, pericardium, and muscle) were made by means of the apparatus for cryomicroscopy developed earlier in this laboratory. A copper-wire microheater, inserted in the preparation, permitted local heating and control of the advance or retreat of the ice front. Three stages in the ice invasion of tissues were noted: (1) Superficial freezing—at high subzero temperatures, a flimsy blanket of ice spreads over and underneath the thin layer of tissue; the advance of this blanket is generally unaffected, as to direction, by the underlying structures. (2) Intercellular freezing—at slightly lower temperatures, ice from the superficial layer is seen to spread between the cells; the advancing ice front sometimes uses tissue elements, like bundles of collagenous fibers, as pathways. (3) Intracellular freezing—at still lower temperatures, ice enters the cells; the point of entrance can often be identified; the red blood cells are seen to freeze individually and suddenly. Author

N65-12219 # National Aeronautics and Space Administration, Washington, D.C.

RESULTS OF MICROBIOLOGICAL AND CYTOLOGICAL INVESTIGATIONS ON VOSTOK TYPE SPACECRAFT [ITOGI MIKROBIOLOGICHESKIKH I TSITOLOGICHE SKIKH ISLEDOVANIY NA KOSMICHESKIKH KORABLYAKH TIPA "VOSTOK"]

N. N. Zhukov-Verezhnikov et al Dec. 1964 9 p refs Transl. into ENGLISH of a paper presented at the 15th Intern. Astronautical Congr., Warsaw, 7–12 Sep. 1964
(NASA-TT-F-281) OTS Prices: HC $0.50/MF $0.50

Numerous ground-based experiments showed that lysogenic bacteria by virtue of their pathological bacteriophage information are highly sensitive to ionizing radiation and ultraviolet rays. It is a well-known fact that human cells in monolayer cultures are also sensitive to these factors. Therefore, beginning with the second spacecraft and thereafter on vehicles of the Vostok type, experimental use was made of the lysogenic bacteria *E. coli* K-12 (λ), of cultures of normal and cancerous human cells (strains of fibroplasts, amnion, Hela), and of some other biological objects. The experiments showed that increase in length of flight is associated with intensified bacteriophage production by the lysogenic culture and slight changes in the nature of the growth of the normal and cancerous cell cultures. The biological effect noted in the experiments on Vostoks 3, 4, 5, and 6 seems to have been caused by a set of space flight factors, radiation and vibration in particular. As was demonstrated in the ground-based experiments, vibration helped to sensitize cells of the lysogenic culture to gamma irradiation (Co^{60}). Author

N65-12230# Lockheed Missiles and Space Co., Sunnyvale, Calif.

TERMINAL PHASE RENDEZVOUS CONTROL/DISPLAY OPTIMIZATION EXPERIMENTS (GENERAL DESCRIPTION)

V. E. Jones, Jr. 15 Sep. 1964 22 p refs
(LMSC-6-62-64-15)

This report describes a man-in-the-loop terminal-phase rendezvous, experimental study program. The primary objectives of this program are to develop design criteria and configurations for the terminal-phase rendezvous control–display subsystem. Author

N65-12246# Duke U., Durham, N.C.

STUDY OF THE DYNAMICS OF THE LUNG-THORAX SYSTEM Final Report

Wayland E. Hull and E. Croft Long 15 May 1964 11 p refs
(Contract Nonr-1181(07))
(AD-606521)

The response was observed of the thoraco–abdominal system in dogs that underwent force ventilation by sinusoidally varying pressure in a whole-body respirator. The tidal volume, the intrathoracic pressure, the driving pressure in the respirator, and the instantaneous rate of airflow were measured, and

the various breathing frequencies were calculated from the gained data. It was found that an increase in driving pressure resulted in a decrease of the apparent resonant frequency, and that all respiratory subsystems acted in concert to serve the common purpose of the carbon dioxyde–oxygen exchange. A digital-computer program was designed that correlated several parameters of the respiratory system, and is to be used for further reduction of analog data to a form for use in an IBM analysis. G.G.

N65-12268*# National Aeronautics and Space Administration, Washington, D.C.

CONCEPTS FOR DETECTION OF EXTRATERRESTRIAL LIFE

Freeman H. Quimby, ed. 1964 52 p refs

(NASA-SP-56) GPO Price: $0.50; OTS Price: MF $0.50

The following subjects are presented: "Evidence Relevant to Life on Mars"; "Mars Surface High-Resolution Near-Scan TV"; "The Vidicon Microscopes"; "The Gas Chromatograph"; "The Mass Spectrometer"; "The Ultraviolet Spectrophotometer"; "The J-Band Life Detector"; "Optical Rotation"; "The Radioisotope Biochemical Probe: Gulliver"; "The Wolf Trap"; "The Multivator Life-Detection System"; and "The Mars Mariners and Voyagers." G.G.

IAA ENTRIES

A65-10483
PSYCHOLOGICAL RESEARCH IN SPACE FLIGHT.
H. F. Huddleston (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).
Spaceflight, vol. 6, Nov. 1964, p. 189-192. 23 refs.

Compilation of data on the main areas of psychological research which have received attention in the two suborbital and ten orbital flights between April 1961 and June 1963. Four major aspects of the spaceflight environment are believed to defy adequate ground simulation: weightlessness, radiation, Earth-separation, and sensory impoverishment. Tabulated data for the spaceflights include: vehicle, date, occupant, age, approximate duration of weightlessness, and selected data of psychophysiological interest. D.H.

A65-10535
HUMAN OUTPUT CHARACTERISTICS DURING SPECIFIC TASK PERFORMANCE IN REDUCED TRACTION ENVIRONMENTS.
Irving Streimer, Wayne E. Springer, and Charles A. Tardiff (Boeing Co., Seattle, Wash.).
Human Factors, vol. 6, Apr. 1964, p. 121-126. 14 refs.

Analysis of the alterations in the force- and work-producing characteristics of unbraced operators performing in reduced traction environments. Data descriptive of the capabilities and requirements of man in such environments are considered invaluable in designing future space systems. To obtain such data, a study was initiated to examine the effects of varying levels of instability upon the amplitude, rate, and efficiency with which manual work was produced. Ten subjects exercised in a special suspensory system and their work output vs metabolic input ratios were determined at various levels of stability. The resultant data were subjected to analyses using Duncan's multiple correlation test. Significant increases of up to 70% in oxygen consumption per horsepower developed were found. The ratio was said to increase in nonlinear fashion as instability was increased. Decreases in output capability were also found. (Author) D.H.

A65-10536
VISUAL AFTER-IMAGES AS A SOURCE OF INFORMATION.
Warren H. Teichner and Mahlon Wagner (Massachusetts, University Institute of Environmental Psychophysiology, Amherst, Mass.).
Human Factors, vol. 6, Apr. 1964, p. 141-156. 13 refs.
Contract No. N 61339-1303.

Study of the ability of observers to extract data from induced retinal after-images as a means of increasing display exposure time in single glimpse situations. It is indicated that observers can use after-image data, and that the expected gain in reporting will be greatest for those situations where, without after-images, reporting is most difficult -e.g., under conditions of high display load or very short exposure time. The benefit demonstrated was associated primarily with the positive after-image; however, the negative after-image was not ruled out as a persistent data source. (Author)D.H.

A65-10537
EFFECT OF WHOLE BODY VIBRATION ON HUMAN PERFORMANCE.
Robert Buckhout (Washington University, St. Louis, Mo.).
Human Factors, vol. 6, Apr. 1964, p. 157-163. 12 refs.

Research on the effects of whole-body vibration at frequencies of 5, 7, and 11 cps from 25 to 35% of the human tolerance levels (defined by amplitude levels within each frequency). Under such conditions, a considerable reduction was noted in operator efficiency in performing tasks representative of those encountered in aerospace flight. Within the limits of the vibration conditions studies, the following conclusions were drawn from the research: (1) decrements in vertical tracking performance ranged from 34 to 74%, (2) decrements in horizontal tracking performance ranged from 10 to 48%, (3) the magnitude of the tracking performance decrements was related to the magnitude of integrated absolute G_z (output) measured at the sternum, and (4) more procedural errors were committed under vibration than under static conditions. (Author) D.H.

A65-10538
RELATION BETWEEN VISUAL SEARCH TIME AND PERIPHERAL VISUAL ACUITY.
Ronald A. Erickson (U.S. Naval Ordnance Test Station, Aviation Ordnance Dept., China Lake, Calif.).
Human Factors, vol. 6, Apr. 1964, p. 165-177. 6 refs.

Investigation, carried out at the US Naval Ordnance Test Station, of the relationship between peripheral visual acuity and time required to locate a target in a static structured display. Sixteen male observers were used in the tests. Peripheral acuity measured as 3.6° and 4.8° off the visual axis correlated significantly at the 0.01 level with time required to find a target in displays containing 16 or 32 rings and correlated at the 0.05 level with search time on displays of 16 and 32 blobs. Almost all correlations involving search times from object densities of 48 and/or acuity measurements made at 6.0° off the visual axis were not significant. In addition to the results concerning peripheral visual acuity, other relationships between variables were suggested by an analysis of the data. An analysis of variance established that the shape of the objects in the display (blobs or rings) and the number of objects in the display (16, 32, or 48) had a significant effect ($p<0.01$) upon search time. The interaction of shape and object density was also found to be significant at the 0.01 level. There were no significant intercorrelations between observer age, foveal acuity as measured in a naval eye examination, and peripheral acuity. Furthermore, age and foveal acuity did not correlate significantly with search performance. (Author) D.H.

A65-10539
THE PERFORMANCE OF MULTI-MAN MONITORING TEAMS.
Earl L. Wiener (Miami, University, Coral Gables, Fla.).
Human Factors, vol. 6, Apr. 1964, p. 179-184. 12 refs.
Public Health Service Grant No. AC 00126.

Examination of performance in a visual monitoring task. Four groups were involved in the study: one, two, and three-man teams, and another three-man team in which the members monitored in isolation but had their responses combined as if they were switches in a parallel circuit. The length of the vigil was 48 min, in which time 32 signals appeared. Results are said to have shown that: (1) as team size increased from one to two men, there was a significant increase in probability of detection, but the increase from two to three men was not statistically significant; (2) the combined performance of the three monitors in isolation was superior to the three monitors working together; and (3) the performance of the two and three-man groups fell short of the level predicted by a probability model for independent events. (Author)D.H.

A65-10540
LOGISTICS PLANNING FOR PHYSIOLOGICAL EXPERIMENTS IN EXTENDED MANNED SPACE FLIGHTS.
Leonard A. Cohen (Albert Einstein Medical Center, Philadelphia, Pa.).
Human Factors, vol. 6, Apr. 1964, p. 193-200.
National Institute of Mental Health Grant No. MH-05823.

Presentation of an organizational plan for conducting direct experiments into vital body functions performed by one astronaut as investigator upon another astronaut as subject during manned spaceflights. The plan is reportedly designed to evolve the most compact equipment and most efficient "in flight" experimental procedures necessary for obtaining a given list of physiological data. This list is then developed in such a manner as to produce a table containing minimum necessary equipment and also a table itemizing the most efficient combination and sequence of in-flight experimental procedures. This plan is believed to reduce equipment volume, weight, and duplication, as well as minimizing the amount of time and physical manipulation necessary to obtain the desired data, thereby optimizing the logistics of the in-flight physiological data program. (Author) D.H.

A65-10541
A DIAGRAMMATIC CLASSIFICATION OF MAN-MACHINE SYSTEM DISPLAYS.
W. W. Wierwille (Boeing Co., Seattle, Wash.).
Human Factors, vol. 6, Apr. 1964, p. 201-207.

Description of a diagram developed to classify man-machine system displays according to their complexity. This diagram is said to aid in gaining a better understanding of display concepts and in adding to the store of display-design knowledge. Displays are categorized as elementary, intermediate, or complex, depending upon the complexity of instrumentation required for implementation. The elementary group contains the pursuit and compensatory types, while the complex group contains the new contact analog and situation types. In the intermediate group are new predictor types which are reportedly useful when controlling sluggish dynamics. Several general guidelines regarding the design of displays are obtained from the display diagram. These guidelines aid in selecting those displays which may be suitable for a given man-machine control-system problem, thereby reducing the amount of display experimentation that must be performed. (Author) D. H.

A65-10542
THE EFFECT OF RULE FLEXIBILITY ON SYSTEM ADAPTATION.
Lawrence T. Alexander and Alvin S. Cooperband (System Development Corp., Santa Monica, Calif.).
(American Psychological Association, Convention, Philadelphia, Pa., 1963.)
Human Factors, vol. 6, Apr. 1964, p. 209-216; Discussion, p. 216-220. 8 refs.

Study performed to test the effect of strict vs flexible operating rules on a simulated terminal air traffic control system under a variety of traffic conditions with constant load. Twelve college students were trained in control procedures and then, having been assigned to two crews, operated the system in a sequence of 24 problem sessions in which the variables were arranged in factorial combination. Only the change to more flexible rules produced consistently significant performance changes. The differences in the way the two crews responded to the changes in the rules depended on the degree of crew cohesiveness. A theoretical formulation of system adaptation derived from earlier studies with an air defense system is discussed, and a new formulation is presented which is considered consistent with the findings in both the present and the earlier studies. (Author) D. H.

A65-10543
BIOMEDICAL SCIENCES INSTRUMENTATION; PROCEEDINGS OF THE SECOND NATIONAL BIOMEDICAL SCIENCES INSTRUMENTATION SYMPOSIUM, UNIVERSITY OF NEW MEXICO, ALBUQUERQUE, N. MEX., MAY 4-6, 1964. VOLUME 2.
Edited by William E. Murray and Peter F. Salisbury (St. Joseph Hospital, Burbank, Calif.).
New York, Plenum Press, 1964. 296 p.
$12.50.

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SESSION I - TRANSMISSION OF VIBRATORY ENERGY THROUGH TISSUE - A TOOL FOR THE MEASUREMENT OF PHYSIOLOGICAL PARAMETERS.

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MEDICAL ULTRASONIC DIAGNOSTIC TECHNIQUES. Joseph H. Holmes (Colorado, University, Denver, Colo.), p. 11-27.

BONDING METALS TO HARD ORGANIC TISSUE WITH ULTRASONIC ENERGY. Robert Hoffman and Leo Gross (Waldemar Medical Research Foundation, Inc., Woodbury, N.Y.), p. 29-40.

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AN EYE MOVEMENT RECORDER AND ITS APPLICATION TO THE STUDY OF VISUAL ILLUSIONS OF ROTATION. G. H. Byford (Royal Air Force, Farnborough, Hants., England), p. 53-64. 9 refs. [See A65-10545 01-05]

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COCHLEAR MICROPHONICS MEASUREMENTS IN EXPERIMENTAL ANIMALS AND IN MAN. B. A. Ducote and D. M. Martinez (Veterans Administration Hospital, Dallas, Tex.), p. 131-143.

IMPLANTABLE RADIO TRANSDUCERS FOR PHYSIOLOGICAL INFORMATION AND IMPLANT TECHNIQUES. W. H. Ko, E. Yon, L. Greene (Case Institute of Technology, Cleveland, Ohio), C. Long, and R. C. Grotz (Highland View Hospital, Cleveland, Ohio), p. 145-153. 8 refs. [See A65-10546 01-05]

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PROGRESS IN TELEMETERING MUSCLE POTENTIALS. Wen H. Ko (Case Institute of Technology, Cleveland, Ohio), p. 267-273.

A PROGRESS REPORT ON RADIO TELEMETRY FROM INSIDE THE BODY. R. Stuart Mackay (California, University, Berkeley, Calif.), p. 275-292.

A65-10544
EXPERIMENTAL ANALYSIS OF THE HUMAN BODY AS A MECHANICAL SYSTEM.
Edmund B. Weis, Jr. (USAF, Systems Command, Aerospace Medical Div., 6570th Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio) and Henning E. von Gierke (USAF, Systems Command, Biodynamics and Bionics Div., Wright-Patterson AFB, Ohio).
IN: BIOMEDICAL SCIENCES INSTRUMENTATION; PROCEEDINGS OF THE SECOND NATIONAL BIOMEDICAL SCIENCES INSTRUMENTATION SYMPOSIUM, UNIVERSITY OF NEW MEXICO, ALBUQUERQUE, N. MEX., MAY 4-6, 1964. VOLUME 2.
Edited by William E. Murray and Peter F. Salisbury.
New York, Plenum Press, 1964, p. 3-9. 19 refs.

Methods of and motives for mechanical analysis of the human body. A few of the practical methods of analysis, such as utilization of an X-ray apparatus and radio-opaque objects implanted in dogs in order to study the motion of the internal organs, are discussed, and some typical results are outlined. It is stated that all of this work has a common goal, which is the development of specifications for an overall mechanical model whose individual parameters are derived from one or more of the studies discussed and whose dynamics are close to the human dynamics. A few of the requirements, in terms of instrumentation, which are generated by biochemical studies are reviewed. J.R.

A65-10545
AN EYE MOVEMENT RECORDER AND ITS APPLICATION TO THE STUDY OF VISUAL ILLUSIONS OF ROTATION.
G. H. Byford (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).
IN: BIOMEDICAL SCIENCES INSTRUMENTATION; PROCEEDINGS OF THE SECOND NATIONAL BIOMEDICAL SCIENCES INSTRUMENTATION SYMPOSIUM, UNIVERSITY OF NEW MEXICO, ALBUQUERQUE, N. MEX., MAY 4-6, 1964. VOLUME 2.
Edited by William E. Murray and Peter F. Salisbury.
New York, Plenum Press, 1964, p. 53-64. 9 refs.

Development of a technique for measuring eye movements which has a sensitivity of 30 sec arc/cm of trace deflection, a dynamic range in excess of 56 db, and a bandwidth from D. C. to 300 cps. It has been used to investigate the character of eye movement associated with visual illusions of motion in which the stimulus is either a moving visual field with a stationary subject or a visual target stationary in relation to a subject undergoing an angular acceleration. (Author) J.R.

A65-10546
IMPLANTABLE RADIO TRANSDUCERS FOR PHYSIOLOGICAL INFORMATION AND IMPLANT TECHNIQUES.
W. H. Ko, E. Yon, L. Greene (Case Institute of Technology, Cleveland, Ohio), C. Long, and R. C. Grotz (Highland View Hospital, Dept. of Physical Medicine and Rehabilitation, Cleveland, Ohio).
IN: BIOMEDICAL SCIENCES INSTRUMENTATION; PROCEEDINGS OF THE SECOND NATIONAL BIOMEDICAL SCIENCES INSTRUMENTATION SYMPOSIUM, UNIVERSITY OF NEW MEXICO, ALBUQUERQUE, N. MEX., MAY 4-6, 1964. VOLUME 2.
Edited by William E. Murray and Peter F. Salisbury.
New York, Plenum Press, 1964, p. 145-153. 8 refs.
Research sponsored by the Case Institute of Technology; Department of Health, Education, and Welfare Grant No. RD-769.

Description of the results of some attempts to design a general-purpose radio transducer for bioelectrical information, and a program to modify or to design another set of radio transducers for the transmission of force and displacement of a body or its parts. The results of twenty-two implant procedures for telemetering bioelectrical signals by means of radio transducers are tabulated and discussed. The problem of connective-tissue formation as a result of the implants is examined, and future areas of research are indicated. J.R.

A65-10547
THE ARTIFACT PROBLEM IN TELEMETRY OF PHYSIOLOGICAL VARIABLES.
A. F. Ax, L. Andreski, R. Courter, C. DiGiovanni, S. Herman, D. Lucas, and W. Orrick (Lafayette Clinic, Detroit, Mich.).
IN: BIOMEDICAL SCIENCES INSTRUMENTATION; PROCEEDINGS OF THE SECOND NATIONAL BIOMEDICAL SCIENCES INSTRUMENTATION SYMPOSIUM, UNIVERSITY OF NEW MEXICO, ALBUQUERQUE, N. MEX., MAY 4-6, 1964. VOLUME 2.
Edited by William E. Murray and Peter F. Salisbury.
New York, Plenum Press, 1964, p. 229-233. 6 refs.
Contract No. AF 33(657)-9352.

Discussion of the problem of multiple recording of physiological variables, especially those telemetered, based on presence or absence of contaminating noise. Automatic editing procedures for separation of signal from noise are examined. The problem is documented by a study of telemetered respiration rate. Solutions of the editing problem considered include "pattern recognition" by analog circuitry rather than by digital computer so as to cut processing costs. J.R.

A65-10633
IONIZING RADIATION - EFFECT ON GENETIC TRANSCRIPTION.
Ernest C. Pollard (Pennsylvania State University, Biophysics Dept., University Park, Pa.).
Science, vol. 146, Nov. 13, 1964, p. 927-929. 15 refs.
Grant No. NsG 324.

Discussion of experiments with cells of Escherichia coli grown on maltose and induced by the addition of thiomethyl galactoside to produce β-galactosidase. In cells, irradiated shortly after induction, the transcription of DNA is found to cease, and the enzyme produced by the messenger RNA reaches maximum. The calculated halflife of the unstable messenger RNA, found from these results, is presented over a temperature range from 8.1 minutes at 10°C to 0.7 minute at 45°C. The kinetics of cessation of transcription provide information on both messenger RNA decay and the rate of transcription. Arrhenius graphs for both quantities are plotted. The activation energies measured for decay and transcription are 11,000 and 22,000 cal/mole, respectively, and are said to be important characteristics of enzymatic behavior. V.Z.

A65-10639 #
MEDICAL EXPERIMENTS IN GEMINI.
S. P. Vinograd (NASA, Office of Manned Space Flight, Washington, D. C.).
Astronautics and Aeronautics, vol. 2, Nov. 1964, p. 70-73. 8 refs.

Review of the basic framework of the Gemini medical experiments program, with description of the in-flight experiments scheduled for inclusion aboard manned Gemini flights. The fundamental purpose is to investigate the ability of man and machine to support prolonged manned flights of up to a year or more. The major stresses relate to weightlessness and combinations of it with other factors. Studies to be undertaken are a cardiovascular reflex-conditioning experiment, with the application of inflatable cuffs to the upper thighs as a countermeasure to possible cardiovascular deterioration, followed by a tilt-table study to determine cardiovascular effects of spaceflight. The effects of in-flight exercise will be examined, and in-flight phonocardiograms will be made. Body fluids will be examined for hormonal assays. Bone densitrometry will be used to determine if any demineralization has taken place and to what extent. A calcium-balance study is planned to reveal changes in the mobilization and metabolism of calcium under weightless conditions. In-flight electroencephalograms will be made and a vestibular experiment conducted. F.R.L.

A65-10693 #
METABOLIC HEAT BALANCES IN WORKING MEN WEARING LIQUID-COOLED SEALED CLOTHING.
Jeremy F. Crocker, Paul Webb (Webb Associates, Yellow Springs, Ohio), and David C. Jennings (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND NASA, MANNED SPACE FLIGHT MEETING, 3RD, HOUSTON, TEX., NOVEMBER 4-6, 1964, TECHNICAL PAPERS (AIAA Publication CP-10).

New York, American Institute of Aeronautics and Astronautics, 1964, p. 111-117. 6 refs.
Contract No. NAS 9-723.

Description of tests on liquid cooling suits designed to remove from 100 to 500 kcal/hr from men working under simulated heat transfer and working conditions expected in lunar exploration. Heat-balance measurements are made by isolating the subjects in an adiabatic, vapor-impermeable outer garment through which energy exchange is restricted to: (1) heat transferred into the liquid circulating in the cooling garment, (2) metabolic gas exchange, and (3) external work performed by walking on a grade or lifting weights. The results are summarized and discussed. P. K.

A65-10694 #
TECHNIQUES FOR PHYSIOLOGICAL MONITORING OF HUMAN PERFORMANCE IN A PRESSURIZED SPACE SUIT.
J. C. Hardy and R. Lang (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND NASA, MANNED SPACE FLIGHT MEETING, 3RD, HOUSTON, TEX., NOVEMBER 4-6, 1964, TECHNICAL PAPERS (AIAA Publication CP-10).
New York, American Institute of Aeronautics and Astronautics, 1964, p. 118-125.

Description of a method for determining the metabolic load for subjects performing various work activities in pressurized suits. The method utilizes a tissot gasometer, modified for spirometry, to obtain data on the relationship between ventilation flow rate, CO_2 production rate, and partial pressure of CO_2 in the helmet. A technique for correlating inspired partial pressure of CO_2 for unsuited and suited conditions, by evaluating alveolar CO_2 tension, is presented. A program developed to evaluate space suit performance is described, as is a specific test sequence. P. K.

A65-10695 #
CONTROL OF MAN'S THERMAL ENVIRONMENT DURING AN EXTRAVEHICULAR MISSION.
Gilbert M. Freedman (NASA, Manned Spacecraft Center, Houston, Tex.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND NASA, MANNED SPACE FLIGHT MEETING, 3RD, HOUSTON, TEX., NOVEMBER 4-6, 1964, TECHNICAL PAPERS (AIAA Publication CP-10).
New York, American Institute of Aeronautics and Astronautics, 1964, p. 126-131.

Discussion of methods and problems of providing thermal control for astronauts performing extravehicular tasks. Problem areas covered include the control of heat conduction through the walls of the space suit, and local protection from hot or cold spots. Among the external thermal control methods discussed is the use of a thermal-insulation coverall. Design considerations for such a coverall are reviewed, and testing programs using unmanned suits are described. The results of these tests indicate the feasibility of the coverall concept for limiting heat leak, producing safe inside wall temperatures, and protecting the suit. P. K.

A65-10696 #
WATER RECOVERY BY MEMBRANE PERMEATION.
John J. Konikoff and Ralph A. Miller (General Electric Co., Philadelphia, Pa.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND NASA, MANNED SPACE FLIGHT MEETING, 3RD, HOUSTON, TEX., NOVEMBER 4-6, 1964, TECHNICAL PAPERS (AIAA Publication CP-10).
New York, American Institute of Aeronautics and Astronautics, 1964, p. 132-137. 6 refs.

Description of a simple, low-energy method for recovering potable water from urine and wash water by using a permselective silicone rubber membrane. The technique takes advantage of the fact that in certain materials, the permeability of water vapor is many times greater than the permeability of liquid water, ammonia, urea, uric acid, and other materials commonly found in human urine. The results of laboratory tests, indicating the feasibility of the method, are reviewed. A proposed engineering model incorporating the permselective membrane is described, and optimum power requirements for such a system are discussed. P. K.

A65-10697 #
THE MONITORING OF SYNERGISTIC STRESS INDUCING ENVIRONMENTAL FACTORS.
Victor T. Tomberg.
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND NASA, MANNED SPACE FLIGHT MEETING, 3RD, HOUSTON, TEX., NOVEMBER 4-6, 1964, TECHNICAL PAPERS (AIAA Publication CP-10).
New York, American Institute of Aeronautics and Astronautics, 1964, p. 138-141. 30 refs.

Discussion of a bio-instrumentation and monitoring system which relates complex environmental variables to the development of psychophysiological stress, making it possible to regulate the environment in advance of syndromes. The system, which takes into account the effects of altitude, O_2, CO_2, and CO intake, temperature-humidity, and radiation dose, can be used for training and acclimatizing aircraft crews, and for research. An interacting stress concept is developed, along with a mathematical model for the synergistic and antagonistic computation of tolerance levels; these make it possible to evaluate dangerous conditions in advance so that protective measures can be undertaken manually or automatically through a closed-loop system. It is therefore possible, using a combination of environmental and bodily sensors, to build a biomonitor which features the display and a warning system for integrated individual and combined stress effects. P. K.

A65-10698 #
OXYGEN RECLAMATION FROM METABOLIC CARBON DIOXIDE.
Martin Macklin (Thompson Ramo Wooldridge, Inc., Electromechanical Div., Cleveland, Ohio).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND NASA, MANNED SPACE FLIGHT MEETING, 3RD, HOUSTON, TEX., NOVEMBER 4-6, 1964, TECHNICAL PAPERS (AIAA Publication CP-10).
New York, American Institute of Aeronautics and Astronautics, 1964, p. 142-147. 11 refs.
Research supported by Thompson Ramo Wooldridge, Inc., NASA, and Navy.

Description of an integrated system for obtaining O_2 from metabolic CO_2 in a closed cabin. A molecular sieve and an electrochemical carbonation cell concentrate and purify the CO_2; a Bosch reduction reactor reduces this to water and carbon; the water is transferred to an electrolysis cell, and the O_2 formed is returned to the cabin. The integration of these subsystems is discussed. P. K.

A65-10700 #
AN ANALYTICAL PROCEDURE FOR THE DESIGN AND EVALUATION OF CREW WORK STATIONS.
John P. Dunn (Martin Marietta Corp., Martin Co., Denver Div., Advanced Technology Dept., Denver, Colo.) and Richard A. Skidmore (Martin Marietta Corp., Martin Co., Denver Div., Human Factors Dept., Denver, Colo.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, AND NASA, MANNED SPACE FLIGHT MEETING, 3RD, HOUSTON, TEX., NOVEMBER 4-6, 1964, TECHNICAL PAPERS (AIAA Publication CP-10).
New York, American Institute of Aeronautics and Astronautics, 1964, p. 153-165. 10 refs.

Description of an analytical method for establishing near-optimum crew-station layouts, as an aid in the design and evaluation of crew-station simulators. A sequential analysis is performed which contains a system definition, a task analysis, preliminary instrument and control layouts, a time/duty analysis, and mathematical verification, and which yields a graphic time line analysis. This time line shows crew size, duties, interactions, malfunction and abort sequences, percent utilization of each crew member, and actual operating times for each instrument and control. These outputs are shown in relation to time and such environmental factors as g-loading and vibration. Times are derived from a mathematical model whereby all functional operations, instrument interpretations, control movements, and error-compensating factors are combined in a single equation that provides real-time answers. Some sample flight-control problems are worked out to illustrate the method. P. K.

A65-10722
ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U.S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4, 5, 1964, PROCEEDINGS.
Symposium sponsored by the U.S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock (U.S. Air Force Academy, Colorado Springs, Colo.).
Colorado Springs, U.S. Air Force Academy, 1964. 296 p.

CONTENTS:

A65-10723 #
BIOENGINEERING CONTRIBUTIONS TO ACCELERATION STRESS RESEARCH AND SIMULATION.
Randall M. Chambers (U. S. Naval Air Development Center, Aviation Medical Acceleration Laboratory, Human Factors Branch, Johnsville; Pennsylvania, University, School of Medicine, Philadelphia, Pa.).

IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4,5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 9-25.
13 refs.

Review of recent experiments conducted to simulate the accelerations encountered in manned spacecraft during launch, recovery, and abort maneuvers. The use of a computer-controlled two-gimbal human centrifuge to study the effects of acceleration stress is described. Methods are presented for measuring physiological and performance acceleration-tolerance limits, visual function, discrim ination reaction time, and complex skill performance, during acceleration stress. The development of acceleration protective devices, such as form-fitted contour couches, and psychophysiological performance measures, are noted. P. K.

A65-10724 #
THE MAGNETOCARDIOGRAM.
Robert A. Stratbucker (Nebraska, University, College of Medicine, Dept. of Physiology-Pharmacology, Omaha, Neb.), Clyde M. Hyde, and Jerald Varner (Nebraska, University, Dept. of Electrical Engineering, Lincoln, Neb.).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4,5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 26-33.
Research supported by the Nebraska Heart Association; National Heart Institute Grant No. PHS-HE-0845801.

Experimental and analytical study of the magnetic field associated with cellular electrical phenomena in cardiac tissue. In experiments with isolated and perfused guinea-pig hearts, the electrocardiogram and the magnetocardiogram were recorded simultaneously. A mathematical relationship between the two is derived and is shown to agree well with the experiments. The expressions are expanded in an effort to predict the nature of the magnetocardiogram under conditions which might have clinical applicability. The equations are modified to include a magnetic sensing device located exterior to the body. The contribution of displacement currents is considered, and it is shown that, for the cardiac electrical conditions existing in the human body, the magnetic field on the chest wall is about 10^{-15} gauss. It is said that high-permeability pickup cores wound with millions of turns of wires might conceivably be used to detect this signal. P. K.

A65-10725 =
BIOPHYSICAL MONITORING OF EXPERIMENTAL ANIMALS.
Harry A. Gorman and Roger B. Grau (Martin Marietta Corp., Martin Co., Life Sciences Dept., Denver, Colo.).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4,5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 34-48.

Description of methods for monitoring biophysical parameters in experimental animals under real and simulated flight conditions. The bio-instrumentation described includes miniature back-pack radio, hardwire telemetry, transducer-transmitter systems, and an implantable generator and rechargeable battery for powering radio telemetry. These systems provide radio-telemetry of physiological parameters such as electroencephalography, electrocardiography, electroculography, respiration, blood pressure, and temperature. P. K.

A65-10726 #
A NUMERICAL INDICATOR FOR INDIRECT SYSTOLIC AND DIASTOLIC BLOOD PRESSURES.
L. A. Geddes, M. Hinds, T. W. Coulter, A. G. Moore (Baylor University, College of Medicine, Div. of Biomedical Engineering, Houston, Tex.), and J. Canzoneri (Houston, University, Houston, Tex.).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4,5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 49-55.
16 refs.

Description of a device, incorporating Korotkoff's auscultatory method, for numerically indicating systolic and diastolic blood pressures. The R wave of an electrocardiogram is used as an interrogatory signal to actuate circuits to inquire for the presence of Korotkoff sounds at specified times during the deflation cycle of the arm-occluding cuff. Performance data and circuit modules are presented. P. K.

A65-10727 #
DEVELOPMENT OF AN ELECTRICAL IMPEDANCE PLETHYSMOGRAPH SYSTEM TO MONITOR CARDIAC OUTPUT.
R. Patterson, W. G. Kubicek (Minnesota, University, Dept. of Physical Medicine, Minneapolis, Minn.), E. Kinnen, D. Witsoe (Rochester, University, Dept. of Electrical Engineering, Rochester, N. Y.), and G. Noren (Minnesota, University, Dept. of Pediatrics, Minneapolis, Minn.).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4,5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 56-71.
Contract No. AF 41-(657)-403; National Institutes of Health Grant No. (1501) FR-05085-01; Vocational Rehabilitation Administration Grant No. RT-2.

Description of a method for measuring pulmonary blood volume changes over the cardiac cycle, by observing changes in intrathoracic impedances. Pulmonary blood flow values are computed by measuring the electrical impedance changes on the surface of the thorax between one electrode band placed around tne neck and one band placed around the lower portion of the thorax. The development of the system is described. The impedance-measured cardiac output is compared with measurements made by the Fick method for 26 children with congenital heart defects. The average difference between the methods, omitting two cases with large atrial defects, is ± 8%. Including all the cases, the difference is ±12.8%. P. K.

A65-10728 =
EXOBIOLOGY.
Frank B. Salisbury (Colorado State University, Dept. of Botany and Plant Pathology, Fort Collins, Colo.).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4, 5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 75-83.
10 refs.

Discussion of possible evidence for the existence of extraterrestrial life. Conditions imposed by current theories on the origin of life are noted. The possible detection of biological remains in meteorites is briefly reviewed. Observations of Mars are discussed, including those of seasonal color changes in surface markings, the "canal" network, the apparent uniqueness of some features

of the Martian satellites, and the appearance of bright flares on the surface. The latter three cases are taken as possible indications of higher life forms on the planet. Possible implications of reported observations of extraterrestrial beings and vehicles are discussed.
P. K.

A65-10729 #
SYSTEMS CONSTRAINTS ON THE SEARCH FOR EXTRATERRESTRIAL LIFE.
Dennis H. Le Croissette (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4, 5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 84-87.

Review of constraints imposed by mission requirements on systems for detecting living organisms on the surface of Mars. The phases of a mission for landing a capsule on the Mars surface are reviewed. The severest constraints are found to be the limitation in data transmission rate to below 10 bits/sec (thus eliminating the possibility of picture transmission), relatively low scientific payload and the severe impact which the capsule will suffer on reaching the surface. An additional problem is the need to sterilize the capsule to prevent contamination of Mars by terrestrial organisms. It is concluded that only a marginal possibility exists of landing a definitive life-detection system on Mars in this decade. P. K.

A65-10731 #
PRINCIPLES OF OPTICAL MEASUREMENTS APPLIED TO BIOLOGICAL GROWTH IN THE WOLF TRAP.
Charles R. Weston (Rochester, University, Dept. of Biology, Rochester, N. Y.).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4, 5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 99-109.
NASA-supported research.

Description of the "Wolf Trap" for detecting and monitoring extraterrestrial microbial growth. In the device, the growth of microorganisms is determined by measuring the intensity of light scattered by the organisms. With the present optics in the two chambers of an engineering breadboard, the Wolf Trap gives a reliable signal at $\sim 10^5$ bacteria/milliliter. The breadboard is controlled from a battery-operated portable console which supplies power, simulates spacecraft interface functions, and provides a convenient method of monitoring the data. The entire breadboard can be sterilized at 145°C for 24 hr, in line with the requirement for Martian landings. P. K.

A65-10732 #
TUTORIAL SESSION IN BIODYNAMICS.
John P. Stapp (USAF, Brooks AFB, Tex.).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4, 5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 113-122.

Study of the physiological effects of abrupt decelerations, such as those expected for the parachute landing impacts of the Apollo space capsule. Humans and anesthetized animals were studied on a sled accelerated on rails by a pneumatic catapult and stopped by a water inertia brake. Subjects were decelerated abruptly from brake entry velocities of 20 to 45 fps to stop in 4 to 34 in. The human subjects, in 16 body orientations, were exposed to stopping distances of 17 to 34 in. for seven different conditions of impact rate, duration, and magnitude, simulating different types of landing surfaces. Autopsies on two of the animals (a black bear and a chimpanzee) are discussed, as are selected tests of the human subjects. The results indicate a safe limit of 25 peak G, provided body restraints minimize adverse displacements. It is recommended that inflatable air cushions be installed on either side of the head rest in the Apollo capsule to prevent hyperflexion of the neck.
P. K.

A65-10733 #
PROBLEMS IN PERSONAL PROTECTION AND PERFORMANCE DURING EXTRAVEHICULAR OPERATIONS.
William L. Lee, Jr. (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Altitude Protection Branch, Wright-Patterson AFB, Ohio).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4, 5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 123-140.
9 refs.

Discussion of problems involved in protecting astronauts performing extravehicular tasks from the high-order vacuum, electromagnetic and corpuscular radiation, and micrometeoroid hazards of the space environment. Methods of providing the motion and sensory capabilities necessary for the performance of specific tasks are discussed. P. K.

A65-10734 #
INSTRUMENTATION IN BEHAVIORAL RESEARCH.
Gregg A. Gilbert (USAF, Systems Command, Aeromedical Research Laboratory, Comparative Psychology Branch, Holloman AFB, N. Mex.).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4, 5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 141-145.

Description of equipment used with the operant-conditioning method for evaluating animal performance in space environments. In this method, the subject is presented with a stimulus to which he is trained by reinforcement to make an overt response. The behavioral research apparatus described includes: performance panels, which provide stimuli to the subject and provide the manipulandum on which the subject must respond; reinforcement equipment, which provides positive reinforcement (food and water) and negative reinforcement (electrical shock and high-intensity noise); the control segment of the behavioral programming equipment, which controls all timing functions and defines the responses as correct or incorrect and data-recording equipment. P. K.

A65-10735 #
A MULTIPLE DIPOLE MODEL OF THE HUMAN HEART.
V. J. Eckelkamp and P. E. Stanley (Purdue University, School of Aeronautical and Engineering Sciences, Lafayette, Ind.).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4, 5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 147-165.
20 refs.

Synthesis of an electrical model, using multiple dipoles of the human heart. The body surface potentials resulting from electrical activity in the heart are studied analytically, and an equivalent electrical generator, employing four current dipoles and capable of producing these same potentials, is synthesized. The relationship

between the equivalent generator and the actual electrical activity in the heart is discussed. P. K.

A65-10736 #
ELECTRICAL AXIS OF THE FETAL HEART.
Saul D. Larks (Marquette University, Dept. of Electrical Engineering, Biomedical Engineering, Milwaukee, Wis.).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4, 5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 166-174.
7 refs.
Public Health Service Grant No. HD-00558-03.

A method for determining the mean manifest electrical axis of ventricular activity for the fetal heart. Studies of fetal electrocardiograms indicate a mean value of the fetal cardiac electrical axis which is consistent with the relatively important role played by the right side of the fetal heart in intrauterine life. The electrical axis of the fetal heart can be used as a tool for the study of cardiac development, for the assessment of fetal well-being, for identification and study of congenital cardiac malformations, and for the investigation of drug effects on the developing human fetus. P. K.

A65-10737 #
SOME PROBLEMS IN RECORDING THE ELECTROENCEPHALOGRAM DURING ELECTROANESTHESIA.
Reginald A. Herin and R. John Morgan (Colorado State University, Dept. of Physiology, Fort Collins, Colo.).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4, 5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 175-186.
13 refs.

Discussion of difficulties encountered with the use of electroencephalograms (EEG) to evaluate the anesthetic depth for dc-electroanesthesia. The EEG and electrocardiogram (EKG) of a dog were recorded for various current values of electroanesthesia. It was found that at times, particularly at low current levels, the EEG can be recorded. At other times, a periodic waveform is obtained which has the same frequency as the EKG but a modified shape. Possible explanations for this are considered. P. K.

A65-10738 #
THE STUTTERING PROBLEM CONSIDERED FROM AN AUTOMATIC CONTROL POINT OF VIEW.
Blaine R. Butler (U. S. Air Force Academy, Colorado Springs, Colo.).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4,5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 187-209.
21 refs.

Description of a model of the human speech system, considered as a feedback control mechanism, which can be made unstable - i.e., made to stutter. Stuttering is considered to be an unstable situation, and the ear, which is variable gain device, is chosen as the cause of this instability. Certain known clinical corrections to stuttering are applied to an analog model of the speech system which was made unstable, and are shown to restore the stability of the system. P. K.

A65-10741 #
APPLICATIONS OF THE SQUEGGING OSCILLATOR IN BIOMEDICAL INSTRUMENTATION.
Virgil Ellerbruch (Wyoming, University, Laramie, Wyo.).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4, 5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 222-226.

Description of biomedical instrumentation employing self-pulsing, squegging oscillators for low-power digital telemetry. Devices covered include an internal-temperature transmitter, utilizing the thermal sensitivity of a transistor to modulate the signal, a pulse-rate transmitter, employing a finger-attached resistive photocell which detects a change in reflectance during systol, and a rumen rate transmitter, employing a configuration-dependent resistive element to modulate the signal. Specific applications of the devices considered include part of a high-altitude conditioning study, comparing the heart rates at high altitudes of subjects initially from high- or low-altitude environments. These tests are said to indicate no substantial difference in heart rates. P. K.

A65-10744 #
THE EFFECTS OF DECOMPRESSION ON FLATUS PRODUCTION CARBON DIOXIDE CONTENT IN MAN.
F. R. Steggerda (Illinois, University, Dept. of Physiology and Biophysics, Urbana, Ill.).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4,5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 259-262.
7 refs.

Study of the rate of flatus production and its gaseous composition for ascents in a decompression chamber from ground level to 35,000 ft. Tests with 14 male subjects indicate that both flatus volume and the concentration of CO_2 increase with altitude. The average amount of flatus collected during the 65-min ascent period was over 800 cm^3 and the percentage CO_2 increased from 10% at ground level to more than 60% at 35,000 ft. It is noted that controlled diets containing high concentrations of pork and beans result in flatus volume and CO_2 concentrations similar to those observed upon decompression to 35,000 ft. Since the compound Mexaform has been shown to inhibit gas production when consumed with high pork-and-beans diets, it is suggested that it be tested as a flatulence-inhibitor during ascents. P. K.

A65-10745 #
CHANGES IN THE EKG OF THE RAT DURING ACCELERATION STRESS.
Grover J. D. Schock (U. S. Air Force Academy, Dept. of Chemistry and Physiology, Colorado Springs, Colo.).
IN: ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM, FIRST, U. S. AIR FORCE ACADEMY, COLORADO SPRINGS, COLO., MAY 4,5, 1964, PROCEEDINGS.
Symposium sponsored by the U. S. Air Force Academy and the Committee on Electrical Techniques in Medicine and Biology, Institute of Electrical and Electronics Engineers.
Edited by Grover J. D. Schock.
Colorado Springs, U. S. Air Force Academy, 1964, p. 274-280.

Discussion of electrocardiograms (EKG) of rats subjected to accelerations above 20 g. It is found that, immediately after onset of centrifugation, a transient bradycardia develops, followed by a tachycardia and a more or less regular respiration. These last until decompensation begins, signaled by a phenomenon similar to "filibration." Immediately after "filibration." the heart rate falls rapidly to a rate of 120 per minute or less. If centrifugation is stopped at this time, about 50% of the rats recover. Gross changes observed in the EKG are ascribed as possible effects of hypoxia. P. K.

A65-10763 ≠
THE BEHAVIOR OF CHEMICAL PROCESSING EQUIPMENT IN SUBGRAVITATIONAL FIELDS.
Sami Atallah (Tufts University, Dept. of Chemical Engineering, Medford, Mass.).
International Astronautical Federation, International Astronautical Congress, 15th, Warsaw, Poland, Sept. 7-12, 1964, Paper. 12 p. 6 refs.

Discussion of the effects of a reduced gravitational field on complex equipment. Chemical processes planned for the Moon include water recovery and purification, surface metal recovery, electrolytic processes, and production of organic compounds. Operations such as the crushing, grinding, separation, and conveying of solids, pumping, distillation, extraction, evaporation, and fluidization are dependent on gravity. Physical phenomena which are dependent on or interact with gravitational forces are free fall, potential energy, drag and buoyant forces, surface tension, centrifugal motion, and electrostatic and magnetic fields. Examples of equipment which would be affected by a reduced gravitational field are ball mills, fluidized beds, and distillation plate columns.
F. R. L.

A65-10831 ≠
MANNED CHAMBER TESTING OF THE APOLLO PROTOTYPE SPACE SUIT.
G. Frankel, G. Albright, and I. Axelrod (Republic Aviation Corp., Space Environment and Life Sciences Laboratory, Farmingdale, N.Y.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, SPACE SIMULATION TESTING CONFERENCE, PASADENA, CALIF., NOVEMBER 16-18, 1964, TECHNICAL PAPERS (AIAA Publication CP-11).
New York, American Institute of Aeronautics and Astronautics, 1964, p. 45-51.
Research supported by the United Aircraft Corp.

Determination of the ventilation efficiency of the Apollo prototype spacesuit. A heat balance is established between the metabolic heat generated by a suited subject and the heat transferred to his environment in a space test chamber. The mass flow rates of the constituents of the ventilation stream both into and out of the suit are found from partial pressure data monitored by a mass spectrometer. The mass flow rate of CO_2 is converted into metabolic heat output, and the flow rate of water is used to calculate the ventilation efficiency. Suited subjects, biomedically instrumented, perform work on a bicycle ergometer at a simulated altitude of 35,000 feet. The metabolic output is held at 1500 Btu/hr while the ventilation flow rate is increased from 2.5 to 5.8 scfm or held at 4.1 scfm in another test series with the metabolic output established at 1200 and 1600 Btu/hr.
V.Z.

A65-10862 #
DEVELOPMENT AT 1 g OF EXPERIMENTAL LESIONS OF PREMATURE AGING CAUSED BY THE LONG-PROTRACTED ACTION OF SUPERGRAVITY [EVOLUTION A 1 g DES LESIONS EXPERIMENTALES DE VIEILLISSEMENT PREMATURE, PRODUITES PAR L'ACTION DE LA SURGRAVITE DE LONGUE DUREE].
Al. Vrabiesco, M. Costiniu, and G. Enachesco (Institut de Gériatrie "Bucureşti", Bucharest, Rumania).
International Astronautical Federation, International Astronautical Congress, 15th, Warsaw, Poland, Sept. 7-12, 1964, Paper. 21 p. 19 refs. In French.

Experimental investigation of the postsupergravitational development of lesions caused by accelerations of long duration. The following results are described: (1) supergravity caused lesions to tissues of rats similar to those encountered in aging and of an intensity proportional to the g number, to the duration of supergravity, and to the sensitivity of the individual tissue; (2) within 2 to 3 months after the discontinuance of supergravity, a tendency was observed to a return to the physiological limits of the age, proportional to the g number to which the animals had been subjected, and to the regenerative ability of the individual tissue. A reversibility of the morphological lesions was found at the level of the skin and striated muscles, in spite of the advanced age of the animals.
M.M.

A65-10870 ≠
CONSIDERATIONS ON THE PSYCHOLOGICAL INTERPRETATION OF THE E.E.G. RESULTS AT THE FLYING PERSONNEL.
Valeriu Ceauşu, Constantin Cristescu, and Mariana Enachescu (Ministry of Transports and Telecommunications, Medical Dept., Laboratory of Aeronautical Psychophysiology, Bucharest, Rumania).
International Astronautical Federation, International Astronautical Congress, 15th, Warsaw, Poland, Sept. 7-12, 1964, Paper. 8 p. 5 refs.

Examination, by means of combined psychophysiological and EEG tests, of the psychic characteristics of flying personnel. It is stated that the comparison of the EEG data with those of the psychophysiological examination contributes to the determination of the SNA (superior nervous activity) type. The primary criteria helping in the differentiation of the types are the following: (1) frequency, amplitude, and incidence of the electric response rhythms; (2) latency and duration of the arrest reaction; (3) latency, amplitude, and duration of the galvanic-cutaneous reflex; (4) the presence of surprise reaction; (5) the latency of the simple psychomotor reaction; (6) the value of the utmost speed of the rhythmic motor reaction; and (7) the promptness of adaptation to new stimuli. It is noted that the combined method of examination offers important data for the determination of emotional stability.
M.M.

A65-11129 ≠
CARBON DIOXIDE EXCRETION DURING CONTROLLED ALVEOLAR HYPERVENTILATION.
J. C. Stoddart (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).
International Astronautical Federation, International Astronautical Congress, 15th, Warsaw, Poland, Sept. 7-12, 1964, Paper. 4 p.

Brief description of a method for obtaining voluntary control of alveolar ventilation in experimental investigations of hyperventilation as a cause of in-flight disturbances. An investigation into the effects of controlled hyperventilation on output of carbon dioxide from body stores, end-tidal carbon dioxide tension, cardiac output, and oxygen consumption is reported. An attempt is also described to relate electroencephalographic and electromyographic disturbances to carbon dioxide excretion. The necessity is stressed of correlating these findings with in-flight studies being performed simultaneously.
J.R.

A65-11184
INSTRUMENTATION FOR LIFE SUPPORT ON THE MOON.
Thomas B. Weber (Beckman Instruments, Inc., Scientific and Process Instruments Div., Fullerton, Calif.).
IN: INSTRUMENT SOCIETY OF AMERICA, ANNUAL CONFERENCE, 19TH, NEW YORK, N.Y., OCTOBER 12-15, 1964, PROCEEDINGS. VOLUME 19. PART II - PHYSICAL AND MECHANICAL MEASUREMENT INSTRUMENTATION.
Pittsburgh, Instrument Society of America, 1964. 8 p. (Preprint 16.1-3-64).

Discussion of dynamic bioastronautical instrumentation for biochemical, biodynamic, psychomotor, and other disciplines. Specialized instrumentation is now being fabricated to meet the needs of man traveling in space as well as on permanent exotic stations. The degree of sophistication will depend upon the stringent requirements of weight and volume. To date several bioastronautical instruments which are flight qualified have been evaluated. These components accurately and rapidly give an indication of man's ability to subsist in this hostile ecology. The ultimate to be expected is the integration of the various components into a meaningful environmental and biomedical control system. Since there is an interrelation of the instrumentation, it is considered that a control monitor should be developed which will allow the continuous monitoring of the air as an indication of pollution and optimal composition, and also of man as an indication of his health and ability to perform.
(Author) F.R.L.

A65-11394
OXYGEN MASK WITH TACTILE COMMUNICATION DEVICES.
Ferdynand Zawistowski (Technion - Israel Institute of Technology, Faculty of Aeronautical Engineering, Haifa, Israel).
Aerospace Medicine, vol. 35, Nov. 1964, p. 1040-1043.

Adaptation of the pilot's oxygen mask to the incorporation of a tactile transducer that can provide the pilot with warning signals from various gages or from the wireless communication system. The method is based on the oxygen mask because (1) modern flight procedures require the wearing of the mask throughout any combat or exercise flight, thus permitting uninterrupted communication; (2) the mask covers densely nerved regions that are extremely sensitive to tactile signals; and (3) the area is free, since it is not used for any other purpose besides oxygen delivery (the usual microphone does not interfere). Preliminary experiments show the system to be both feasible and practicable at frequencies from 40 to 400 cps. W.M.R.

A65-11395
A COMPARISON OF METHODS FOR THE EVALUATION OF PROTECTIVE HEADGEAR.
J. B. Roberts and E. H. Hygh (U.S. Naval Ordnance Laboratory, Corona, Calif.; Utah, University, Physics Dept., Salt Lake City, Utah).
Aerospace Medicine, vol. 35, Nov. 1964, p. 1044-1047. 7 refs.

Mathematical analysis of the swingaway and rigid anvil systems for the impact testing of helmets used for vehicular and sports protection. It is noted that nonresilient helmet liners are apt to fare better on the swingaway device. As an illustration, it is assumed that the helmet liner is capable of absorbing a total of 120 ft-lb of energy. On a swingaway test in which the input energy is 120 ft-lb, the energy available for conversion to heat on the first blow is about 60 ft-lb, and the helmet quite likely will stand another blow of the same magnitude. On the other hand, if the same input energy is used in an anvil test, over 100 ft-lb is converted to heat on the first blow, and there is absolutely no chance for the nonresilient liner to withstand a second blow. This is seen to be an important consideration in the testing of any helmet destined for use in an environment where multiple blows are to be expected. Possible cavitation damage is also found to be best indicated by a fixed-anvil test. W.M.R.

A65-11399
EFFECTS OF IMPACT ACCELERATION ON GUINEA PIGS PROTECTED BY A FLUID-FILLED BLADDER DEVICE AND BY TOTAL WATER IMMERSION.
F. C. Thiede, C. F. Lombard, and S. Davis Bronson (Northrop Corp., Northrop Space Laboratories, Biodynamics Laboratory, Hawthorne, Calif.).
Aerospace Medicine, vol. 35, Nov. 1964, p. 1057-1062. 13 refs.

Study directed toward the optimum design of a limit-stretch garment to prevent blast-type injury from pressure imbalances in a fluid environment used to alleviate the effects of acceleration. Impact acceleration pathology in guinea pigs at 50 g, positioned either footward or transverse supine 12.5° from the horizontal, proved to be essentially the same whether protection was afforded by full fluid immersion, a limit-stretch fluid-filled bladder, or a fully contoured container. Intratracheal pressure pulses, however, indicated that intrapulmonic pressure buildup at impact is greater with fluid immersion and container only than with the bladder device. Pathology with 100-g headward acceleration was extensive in the heavier organs with the container-only mode, while lung pathology was much more severe in the immersed animals oriented footward and headward. It appears that a fluid-filled lightweight device based on the studied design can offer to man the same protection from impact acceleration as full fluid immersion, but with much less weight and without the compression effects on thorax and chest. (Author) W.M.R.

A65-11400
A SELF-CONTAINED ATMOSPHERIC PROTECTIVE ENSEMBLE FOR TITAN II.
E. C. Wortz, N. J. Belton (Garrett Corp., AiResearch Manufacturing Co., Los Angeles, Calif.), N. W. LeVora (Martin Marietta Corp., Martin Co., Baltimore, Md.), and B. P. Davis (Martin Marietta Corp., Martin Co., Canaveral Div., Cocoa Beach, Fla.).
Aerospace Medicine, vol. 35, Nov. 1964, p. 1062-1066.

Description of the design, development, and testing of a one-piece, gas-and-liquid-tight, anthropometric enclosure for the protection of personnel during toxic propellant transfer. The development criteria were that the ensemble provide adequate breathing, cooling, and ventilating air for one hour; adequate humidity control; adequate visibility and mobility; be impermeable to UDMH, hydrazine, and N_2O_4; and have an operating range of -20 to +120°F. The design of the outer garment, helmet, and faceplate and the design of the environmental control system are described. Discussion of the testing program covers developmental, environmental, physiological, psychophysical, and materials testing. W.M.R.

A65-11401
URINE AS A NITROGEN SOURCE FOR PHOTOSYNTHETIC GAS EXCHANGERS.
V. H. Lynch, E. C. B. Ammann, and R. M. Godding (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Research Laboratories, Palo Alto, Calif.).
Aerospace Medicine, vol. 35, Nov. 1964, p. 1067-1071.

Determination of the ability of human urine and individual urinary nitrogen compounds to support the growth of Chlorella pyrenoidosa. Maximum growth rates were achieved through the addition of inorganic salts. Urea is found to be an ideal nitrogen source for algal growth since only slight pH changes occur during its utilization. In the process, purines and the amino acids related to the Krebs urea-ornithine cycle and the citric acid cycle are consumed, while creatinine and hippuric acid are rejected. Accumulation of these compounds during urine recycling is discussed. Conversion of urea to ammonia is found to be undesirable for a closed environmental control system. W.M.R.

A65-11642
LIFE SUPPORT - THE NEXT GENERATION.
Michael G. Del Duca, Eugene B. Konecci, and A. Layton Ingelfinger (NASA, Office of Advanced Research and Technology, Biotechnology and Human Research Div., Washington, D.C.).
Space/Aeronautics, vol. 41, June 1964, p. 84-91. 5 refs.
Contract No. NAS 1-2934.

Description of advanced concepts for maintaining multiple crews in orbital and exploratory missions for periods up to a year. The problem is seen as one of optimization: finding the optimum combination of heat, atmosphere, water, food, and hygiene management methods and integrating it within the overall vehicular design For long missions, the material balance on a per man per day basis is given as an input of 1.3 lb of dry food, 4.5 lb of water, and 2.0 lb of oxygen vs an output of 2.3 lb of carbon dioxide, 2.2 lb of water vapor, 3.0 lb of urine, and 0.3 lb of fecal matter. Special attention is given to atmospheric control and the water and waste subsystems. Methods for the storage of oxygen (high-pressure gaseous storage at ambient temperatures and cryogenic storage at low (subcritical) or moderate (supercritical) temperatures and pressures) are weighted against systems of physical-chemical oxygen regeneration. The latter generally start with CO_2 and include molecular sieve adsorption, solid amine absorption, and electrodialysis. An alternate scheme is the production of oxygen through the electrolysis of water that may come from urine, cabin condensate, feces, or from the wash used for personal hygiene. W.M.R.

A65-11787 #
BASIC RESEARCH AS RELATED TO LIFE SUPPORT SYSTEMS.
Leonard M. Libber (U.S. Navy, Office of Naval Research, Physiology Branch, Washington, D.C.).
Northeastern States Navy Research and Development Clinic, Philadelphia, Pa., Nov. 18-20, 1964, Paper no. 56. 15 p.

Discussion of some physiologically stressful problems that require further scientific information of a fundamental nature before the ultimate in life-support systems can be developed. The problems are those associated with stress produced by cold or heat; high-altitude stress that may be experienced by soldiers in mountainous regions, such as the Alps or Himalayas, or experienced by pilots in the form of hypoxia; different types of acceleration, particularly linear acceleration as experienced during crash conditions, or resulting from different types of seat ejection, and frequently resulting in vertebral fractures; and physiological stress produced due to the presence of nonionizing radiation, with particular reference to the microwave radiation produced by radar devices. V.P.

LC ENTRIES

A65-80001
TIME AND DOSAGE EFFECTS OF MEPROBAMATE ON VISUAL DETECTION.
Arthur Platz, Leonard Uhr, Margaret Clay, James G. Miller, and Alfred B. Kristofferson (Mich. U., Mental Health Res. Inst., Ann Arbor).
Psychopharmacologia, vol. 6, 1964, p. 42–48. 8 refs.

Sixteen male subjects, 21 years and older, were run in a double-blind own-control design under three dosages of meprobamate (400, 800, and 1600 mg.) and matching placebo, to determine response curves on a visual detection task over a 4 1/2-hour period, from 5:00 to 9:30 p.m. To control for possible daily cycle effects, 2 additional runs under placebo and 1600 mg. meprobamate were conducted from 8:00 a.m. to 12:30 p.m. The evening tests showed statistically significant dosage effects, time effects, and a significant drug-by-subject interaction. The morning tests showed no difference between performance under placebo as compared to 1600 mg. of meprobamate, although there was a significant drug-by-subject interaction. This differential drug effect was discussed in terms of its possible dependency on the momentary physiological and psychological state of the individual and his diurnal metabolic rhythm.

A65-80002
CHANGES IN THE NUMBER OF EOSINOPHIL LEUKOCYTES IN THE PERIPHERAL BLOOD AFTER STATIC AND DYNAMIC WORK LOADS [ZMENY POCTU EOZINOFILOV V PERIFERNEJ KRVI PO STATICKOM A DYNAMICKOM ZATAZENI].
Imrich Borsky and Miloslav Hubač (Ustave Hygieny Práce A Chorobz Povolania X, Bratislava, Czechoslovakia).
Pracovni Lékarstvi, vol. 16, Jun. 1964, p. 193–197. 14 refs. In Czech.

Eosinophil response in fifteen healthy 20 to 24-year-old students was investigated following 2 graded static workloads (holding a load weighing 7.5 and 30 kg.) and predominantly dynamic loads (lifting loads weighing 7.5 and 30 kg. to a height of 40 cm.). Soon after completion of the work lasting 5 minutes, as compared with values at rest, a significant increase of eosinophils was found after all 4 types of work– on an average by 18% to 21%. During the subsequent minutes of recovery (5, 15, and 30 minutes) an insignificant drop of eosinophils, on an average by 0% to 13%, was recorded. The differences in the primary increase and the subsequent decrease after the workload were not statistically significant in the different types and amounts of work performed. It is apparent that the eosinophil resonse is not a suitable criterion of the size or type of workload when minor muscular work is involved.

A65-80003
ACTION OF ADENOSINE-5-MONOPHOSPHORIC ACID ON SURVIVAL OF RED BLOOD CELLS IN RABBIT INTOXICATED BY LEAD OR PHENYLHYDRAZINE [ACTION DE L'ACIDE ADENOSINE-5-MONOPHOSPHORIQUE SUR LA SURVIE DES GLOBULES ROUGES CHEZ LE LAPIN INTOXIQUE PAR LE PLOMB OU LA PHENYLHYDRAZINE].
A. Gajdos (Lab. de Recherches, Paris, France, D. Dantchev, (Inst. Natl. Hyg., Paris, France) and H. Bénard (Lab. de Acad. Natl. de Méd., Paris, France).
Revue francaise d'Etudes cliniques et biologiques, vol. 8, Jan. 1963, p. 62–66. 24 refs. In French.

Erythrocyte survival was measured with radioactive chromium in rabbits poisoned with lead or phenylhydrazine. Daily intramuscular administration of adenosine-5-monophosphoric acid in a dose of 50 mg. per animal, produced a definite hemolytic action. The possible biochemical mechanism of this action is discussed.

A65-80004
DRUGS AND JUDGMENT: EFFECTS OF AMPHETAMINE AND SECOBARBITAL ON SELF-EVALUATION.
Gene Marshall Smith and Henry K. Beecher (Mass. Gen. Hosp., Dept. of Anaesthesia, Boston).
Journal of Psychology, vol. 58, Oct. 1964, p. 397-405. 18 refs.
Mallinckrodt Chemical Works supported research.
Contracts No. PHS-M-987 and DA-49-007-MD-2136.

Each of 78 graduate and undergraduate college students attempted to solve 25 calculus problems and afterward estimated the number of his correct solutions. Subjects did this on each of five occasions: twice after taking amphetamine sulfate (14 mg. per 70 kg. of body weight), once after taking secobarbital sodium (50 mg. per 70 kg. of body weight), and twice after taking a placebo. After taking placebo the subject overestimated, to a significant degree, the number of problems solved correctly. After taking amphetamine or secobarbital the overestimation tendency, or judgment error, was still greater. The increase in judgment error was statistically significant with amphetamine but but only suggestive with secobarbital. Implications of the findings concerning the effect of amphetamine on judgment are discussed.

A65-80005
CONTRIBUTIONS TO THE THEORY OF MEASURING THE GALVANIC SKIN RESPONSE [BEITRAGE ZUR MESSTHEORIE DER HAUTGALVANISCHEN REAKTION].
Carl Hagfors (Max-Planck-Inst. für Arbeitsphysiol., Dortmund, Germany).
Psychologische Beiträge, vol. 7, 1964, p. 517–538. 29 refs. In German.

Skin resistance and electric skin conductance are compared as to their suitability for galvanic skin response measurements. Physiological data support the use of the latter, since its application yields a better index of changes in momentary total conductance. The total conductance may be considered as the basal conductance plus an additional value which is a function of the total number of sweat glands activated by central nervous impulses. For calculation of the real value of each reaction it is assumed, that (a) a linear relationship exists between changes in conductance and the number of active sweat glands, and (b) the number of activated sweat glands is more or less proportional to the magnitude of the central activating impulses. Thus, in contrast to the absolute value of the reactions, the interrelationship among the reactions is not affected by the height of the basal conductance. The interrelationship between the magnitudes of skin conductance reflects the interrelationship of the activating impulses. Statistics of choice are the normal distribution and independence of the intraindividual variance from the individual conductance value. Suggestions are made as to statistical methods for analysis of the data.

A65-80006
TOPOGRAPHICAL INVESTIGATIONS ON THE THERMAL RADIATION PROPERTIES OF LIVING HUMAN SKIN [TOPOGRAPHISCHE UNTERSUCHUNGEN UBER DIE STRAHLUNGSEIGENSCHAFTEN DER LEBENDEN MENSCHLICHEN HAUT].
W. Gartner and H. Göpfert (Freiburg U., Inst. für Balneol. und Klimaphysiol., Germany).
Pflügers Archiv für die gesamte Physiologie, vol. 280, Jul. 30, 1964, p. 224–235. 22 refs. In German.

Thermal radiation was measured at certain skin areas on the back, the underarm, and the sole of 60 subjects. At the same time it was related to contact temperature determined at the same places. In addition to these topographical comparisions, another series measured changes in contact and thermal radiation temperatures on the underarm after application of a tourniquet. Statistical evaluation of data show that heat radiation temperatures are never identical to the contact temperatures; and the heat radiation values approach but never reach 1 (mean heat radiation for the back 0.976; underarm 0.960; and sole 0.941). Shutdown of arterial circulation lowers the heat radiation value of the underarm (0.932). The conclusion is that the external layers of integument are partially penetrated by ultraviolet heat. Counterarguments based on water absorption in this spectral region are refuted on histological grounds.

A65-80007
THERMAL RADIATION OF LIVING HUMAN SKIN AS A FUNCTION OF CIRCULATION (UBER DIE ABHANGIGKEIT DER TEMPERATURSTRAHLUNG DER LEBENDEN MENSCHLICHEN HAUT VON DER DURCHBLUTUNG).
W. Gärtner, K. Ling, and H. Göpfert (Freiburg U., Inst. für Balneol. und Klimaphysiol., Germany).
Pflügers Archiv für die gesamte Physiologie, vol. 280, Jul. 30, 1964, p. 236–242. 10 refs. In German.

Thermal radiation and contact temperatures of the skin surface were registered together with circulation in the peripheral blood vessels in 10 subjects throughout variations of the temperature gradients of the integument by cooling and rewarming as well as complete shutdown of circulation. The difference between heat radiation and contact temperatures increases with arterial occlusion and decreases with increase in peripheral circulation. The curves approach each other during the reactive phase after restoration of circulation. Cooling also lowers the temperature differential. The only interpretation possible is that the most peripherally located vessels of the integument influence the heat radiation.

A65-80008
A SIMPLE AND RELIABLE METHOD OF CONTINUOUS RECORDING OF PULSE RATE FOR CLINICAL AND OCCUPATION-MEDICAL INVESTIGATIONS [EINE EINFACHE UND ZUVERLASSIGE METHODE DER KONTINUIERLICHEN PULSFREQUENZREGISTRIERUNG FUR KLINISCHE UND ARBEITSMEDIZINISCHE UNTERSUCHUNGEN].

Dieter Szadkowski and Gerhard Lehnert (Klin. für Berufskrankh. der Berufsgenossenschaft der Kermaischen und Glas-Ind., Bad Reichenhall, Germany).
Arbeitsmedizin, vol. 2, Jul. 1964, p. 33-37. 49 refs. In German.

A method is described for continuous pulse rate registration in cardiovascular function tests and in applied physiological research. The apparatus includes a pulse recording device which is hooked onto the electrocardiograph. The count is taken of the R component recorded from precordial leads. A total of 62 ergometric function tests were carried out with 31 subjects. Adaptation of heart rate to work was studied at ergometric loads of 60 and 90 watts, 25 investigations at each load. The mean increase of heart rate, notwithstanding wide individual variability, is from 123 beats/min. at 60 watt work, to 146 beats/min. at 90 watts. The resting pulse frequency is 77 beats/min. Increase of heart rate during work and its subsequent regression occur very rapidly. Calculated values for oxygen pulse agree with those reported by others. Statistically significant deviations were recorded from a small number of patients, where the pulse rate increased to 167 beats/min. at 60 watt load and 178 beats/min. at 90 watt load. Calculation of the oxygen pulse uncovered uneconomic heart function.

A65-80009
ACCIDENTAL HYPOTHERMIA.
Martin W. McNicol and Roger Smith (Central Middlesex Hosp., Park Royal, London, Great Britain).
British Medical Journal, vol. 1, Jan. 1964, p. 19-21. 11 refs. Med. Res. Council supported research.

Fifteen cases of accidental hypothermia are described. The alveolar-arterial oxygen tension gradient and blood carbon-dioxide tension indicated anoxia present in all cases. Anoxia is suggested to be an important factor in the high mortality rate. Respiratory depression, carbon dioxide retention, and circulatory collapse also occurred. The course of treatment is described, and the future use of oxygen is suggested.

A65-80010
SIGNIFICANCE OF THE STAPEDIUS REFLEX FOR THE UNDERSTANDING OF SPEECH.
G. Lidén, B. Nordlund, and J. E. Hawkins, Jr. (Gothenburgh U., Dept. of Otolaryngol., and Lab. of Audiol., Sweden).
Acta Oto-Laryngologica, Supplementum 188, 1964, p. 275-279. 15 refs.

The stapedius muscle reflex appears to have a twofold function: (1) protection of the inner ear from loud sounds and noise, and (2) a high-pass filter action which improves the information-to-noise ratio. The contractions of the stapedius muscle favor the hearing of higher frequencies by reducing the transmission of lower frequencies to the cochlea.

A65-80011
CURRENT PROBLEMS OF BIOLOGICAL TELEMETRY [NEKOTORYE PROBLEMY SOVREMENNOI BIOLOGICHESKOI TELEMETRII].
V. V. Parin and R. M. Baevskii.
Fiziologicheskii Zhurnal SSSR, vol. 50, Aug. 1964, p. 924-933. 39 refs. In Russian.

Telemetry may be used advantageously in cytological, physiological, behavioral, and medical research. Biotelemetry must approach several problems: (1) registering of physiological data in subjects at a considerable distance; (2) following physiological activity of an organ when a direct contact is not possible; and (3) conducting a physiological study of subjects in rapid motion. Five types of telemetric apparatus for classification of the system are proposed: (1) located on board of a vehicle; (2) movable; (3) automatic relay system; (4) stationary; and (5) internal probes, such as intestinal radiocapsules or electrodes implanted in tissues. The source of energy for operating the telemetric systems can be batteries, radiofrequency generators, or biological processes (muscular work, tissue potentials, heat production, blood flow, or peristaltic movements). Piezoelements can also be utilized. The system can be controlled either manually by the investigator, or automatically. Telemetric systems can be combined to register several parameters simultaneously, with a concurrent record of changes in stimuli.

A65-80012
RELATIONSHIP BETWEEN ELECTRICAL ACTIVITY OF INSPIRATORY AND EXPIRATORY MUSCLES [O SOOTNOSHENII ELEKTRICHESKOI AKTIVNOSTI INSPIRATORNYKH I EKSPIRATORNYKH MYSHTS].
M. E. Marshak and T. A. Maeva (USSR, Acad. Med. Sci., Inst. of Normal and Pathol. Physiol., Moscow).
Fiziologicheskii Zhurnal SSSR, vol. 50, Aug. 1964, p. 1052-1058. 18 refs. In Russian.

The relationship between the action potentials of the respiratory muscles during inspiration and expiration was studied in cats with bipolar needle electrodes inserted into the intercostal and oblique abdominal muscles and diaphram. Neurons controlling inspiration and expiration showed reciprocal action. The changes in phase were under the control of neurons in the tractus solitarius. Under stress, such as difficultry in breathing or asphyxia, this coordination may be disturbed. Ligation of the vagus nerve caused a change in the respiratory rhythm, which indicated participation of this nerve in regulating the periodicity of respiration.

A65-80013
EFFECT OF STARVATION AND GLUCOSE ABSORPTION ON PAS-REACTIVE GRANULES IN JEJUNAL EPITHELIUM OF MOUSE.
R. David Baker (Tex. U. Med. Branch, Dept. of Physiol., Galveston).
Texas Reports on Biology and Medicine, vol. 22, Fall 1964, p. 410-423. 23 refs.
Grants No. PHS-G-A-4816 and PHS-G-A-5778.

An attempt was made to confirm the findings of a previous investigator who concluded that the process of glucose absorption is associated with the production of periodic acid-Schiff's reagent (PAS) positive granules in the apical cytoplasm of villous epithelial cells from mouse jejunum. Repetition of experiments in which mice were subjected to various periods of starvation with or without glucose feeding led to the following conclusions: (1) starvation resulted in the formation of PAS-positive granules in intestinal epithelial cells, and (2) feeding of glucose to otherwise starved animals caused no decisive increase in granule formation beyond what could have been caused by starvation alone. A second set of experiments directly tested the effect of glucose absorption on granule formation utilizing isolated segments of small intestine in vivo. No effect could be detected. The origin, chemical composition, and possible functions of these granules are not known, but several possibilities have been discussed.

A65-80014
EFFECTS OF AGE AND STIMULUS SIZE ON PERCEPTION.
James M. Thomas (Lackland AFB, San Antonio, Tex.) and Don C. Charles (Iowa State U., Ames).
Journal of Gerontology, vol. 19, Oct. 1964, p. 447-450. 5 refs.

Young, middle-aged, and old faculty and graduate students were administered 30 Wechsler Adult Intelligence Scale (WAIS) picture completion cards and 30 Cureton Word Recognition items. Ten cards of each were presented in standard size, ten at two diameters larger, and ten at a three diameters larger than the standard size. Middle-aged and young subjects performed better than old subjects on all sizes and both sets of stimuli. Hypothesized improvement of performance in old subjects with increased stimulus size was not found for the WAIS cards, but was significantly better with each enlargement for the old population on the Cureton cards. It seems that increased visual stimulation improves performance only on tasks which are challenging or difficult for the subjects.

A65-80015
STEADY-STATE AND SYNCHRONOUS GROWTH OF CHLORELLA PYRENOIDOSA.
R. R. Schmidt and H. T. Spencer (Va. Polytech. Inst., Dept. of Biochem. and Nutr., Blacksburg).
Journal of Cellular and Comparative Physiology, vol. 64, Oct. 1964, p. 249-255. 19 refs.
Grant No. NSF-G-B-1960.

Steady-state cultures of Chlorella pyrenoidosa exhibited exponential increases in cell number, dry weight, absorbancy, and total cellular nitrogen as well as a cell size distribution which remained essentially constant as a function of time. These cultures contained a greater percentage of small physiologically young cells than larger, more mature cells in stages of nuclear or cellular division. Thus, the metabolic characteristic of steady-state cultures is predominantly daughter cell-like in nature. The theoretical aspects for the skewed cell size distributions are discussed. In contrast, cultures synchronized by intermittent illumination, exhibited a constantly shifting cell age distribution characterized by periodic rather than continuous cell division. Although synchronized cultures exhibited exponential increases in total cellular phosphorus, dry weight, and nitrogen, the slopes of these functions were slightly lower than those observed for steady-state cultures. The use of algal cultures synchronized by intermittent illumination to reflect the metabolic behavior of a cell during normal development is discussed.

A65-80016
CORRELATION BETWEEN PULMONARY ARTERY PRESSURE AND LEVEL OF ALTITUDE.
Julio Cruz-Jibaja, Natalio Banchero, Francisco Sime, Dante Peñaloza, Raúl Gamboa, and Emilio Marticorena (Peruvian U. of Med. and Biol. Sci., High Altitudes Res. Inst., Cardiovascular Lab., Lima, Peru).

Diseases of the Chest, vol. 46, Oct. 1964, p. 446-451. 16 refs.
Grants No. PHS-G-GM-8576 and PHS-G-HE-06910-02.

Right heart catheterization was performed in 58 normal subjects from sea level and high altitudes. It demonstrated a good correlation between pulmonary artery pressure and altitude level of birthplace. The pressure values are higher as the altitude level increases. The relationship between these two variables was studied statistically and a curve of parabolic shape was fitted. Other physiologic aspects related to chronic hypoxia seem to have the same correlation type as pointed out for pulmonary artery pressures.

A65-80017
ON THE NATURE OF BINOCULAR DISPARITY
Lloyd Kaufman.
American Journal of Psychology, vol. 77, Sep. 1964, p. 393-402. 14 refs.

Any discriminable pattern can produce an effective disparity. Contours or physical forms are involved only insofar as they carry the patterning. Subjective contours, produced by adjacent physical-contour segments, cannot be the crucial stimuli, because contour can be pitted against brightness-patterning, and patterning will prevail in producing a depth-effect. Brightness, and organizations of different but commensurable physical forms, can carry the patterning. The object-point model worked because the two eyes normally see the same objects in the visual field. The objects have forms or contours which display pattern-disparity. Steropsis, in these terms, is the reaction of the visual system to transverse phase-differences in the informations contained in the stimulus-patterns in the two eyes. This reaction is the modification of the experience of one monocular image by a suppressed contralateral image. It need not be a fused image.

A65-80018
THE EFFECT OF BODY TILT ON TACTUAL-KINESTHETIC PERCEPTION OF VERTICALITY.
Martin Bauermeister, Heinz Werner, and Seymour Wapner (Clark U., Worcester, Mass.)
American Journal of Psychology, vol. 77, Sep. 1964, p. 451-456. 5 refs.
Grant No. NIMH-G-MH-00348.

Thirty men and thirty women, while blindfolded, adjusted a metal bar to a position which appeared vertical (apparent vertical) under body tilts ranging from 90° left, through upright, to 90° right. Adjustments were made with both hands, the right hand alone, and the left hand alone. The following results were obtained: (1) independent of whether one hand or two hands were used, increasing body tilt led to changing deviations of apparent from objective vertical, which were a nonlinear function of degree of tilt: with body tilt increasing to approximately 70°, there were increasing displacements of apparent from objective vertical opposite the direction of body tilt; with further increasing tilt, up to 90°, this tendency was reversed. (2) There were differences in effects of body tilt on apparent vertical depending on hands used: Adjustments with the left hand were located to the right of adjustments using both hands, and adjustments using the right hand were located to the left of adjustments with both hands. The results were interpreted in terms of an organismic theory of perception.

A65-80019
THE WORK OF THE AIR FORCE MEDICAL OFFICERS IN THE AVIATION CADET SCHOOLS AS PSYCHOLOGICAL CONTRIBUTION TO PREVENTIVE MEDICINE [L'OPERA DEL MEDICO D'AERONAUTICA PRESSO LE SCUOLE DI FORMAZIONE BASICA DEL PILOTA QUALE CONTRIBUTO PSICOLOGICO NEL QUADRO DELLA MEDICINA PREVENTIVA].
Mario Strollo.
Rivista Aeronautica, vol. 40, Oct. 1964, p. 1559-1575. In Italian.

The flight surgeon's duties during flight training include studying the pilot in relation to his physical, objective, and social environment; considering the somatopsychic makeup which affects his work efficiency; and determining the pathology derived from the relationship of man to machine. During the formative processes of pilot training the flight surgeon evaluates and attempts to preserve proper mental conditions, such as awareness and vigilance during flight. He measures the facilities for perceptive processes and determines incompetence during critical moments. The flight surgeon may prevent the onset of psychosomatic disorders by aiding cadets in understanding the role of the group in relation to training procedures. By analyzing individual motivation with regard to anxieties, human factors, productivity, stability, etc. during the training period he can prevent the development of many emotional states that affect the pilot's duties. Reviewed are Taylor's time studies (carried out at the Bethlehem Steel Company) dealing with selection, training, and motivation in industrial medicine, and methods of assessing attitudes towards work.

A65-80020
A CASE OF PROLONGED SLEEP DEPRIVATION.
Larry M. Anderson and David S. Gorfein (Utah State U., Dept. of Psychol., Logan).
Journal of General Psychology, vol. 71, Oct. 1964, p. 291-292.

Simple and disjunctive reaction times were measured three times a day in a subject undergoing prolonged sleep deprivation (a disc-jockey attempting to set a marathon broadcasting record). The total achieved sleep deprivation period was 252 hours. At the 208th hour of the marathon and several weeks after it, a Structured Objective Rorschach Test (SORT) was administered. An analysis of variance of both simple and disjunctive reaction time data showed no significant changes over the 10-day period or at different times of day. The SORT protocol indicated a drop from normal in concentration, a tendency towards pedantic responding, and a lower score in cooperation as compared to the subject's normal function. Orientation disturbances were reported. With respect to communication, disturbances appeared at the input level (reading) but not in the output (speaking). It is concluded that even under prolonged stress, high motivation can prevent severe impairment of function.

A65-80021
THE EFFECT OF GENERAL ANXIETY AS AN INDEX OF LABILITY ON THE PERFORMANCE OF VARIOUS PSYCHOMOTOR TASKS.
G. M. C. Wassenaar (U. Coll. Western Cape, Kasselsvlei, Capetown, South Africa).
Journal of General Psychology, vol. 71, Oct. 1964, p. 351-357. 9 refs.

In a preliminary investigation, the influence of general anxiety (as indicated by the Taylor Manifest Anxiety scale) upon the performance in psychomotor tasks was investigated. The relationships between test performances were studied by means of product-moment correlations and the centroid method of factor analysis. Four factors were extracted. The second factor seems of special importance since it has been identified as a general anxiety factor with a detrimental effect upon psychomotor tasks. Factor I was identified as impulsiveness and factor IV as perceptive adaptation. Factor III was discussed but left unidentified.

A65-80022
CREATINE PHOSPHOKINASE AND OTHER SERUM ENZYME ACTIVITY AFTER CONTROLLED EXERCISE.
Kenneth F. Swaiman and Essam A. Awad (Minn. U., Depts. of Neurol. and Phys. Med., Minneapolis).
Neurology, vol. 14, Nov. 1964, p. 977-980. 19 refs.

Although there is conflicting evidence in past reports, most data suggest strenuous exercise in man and lower animals will cause transient elevation in glutamic oxaloacetic transaminase. Studies which subjected human subjects to strenuous controlled exercise over a 10-minute period did not reveal any significant increase in serum concentration of creatine phosphokinase, glutamic oxaloacetic transaminase, lactic dehydrogenase, malic dehydrogenase, or aldolase. It is concluded that the exercise was not of sufficient duration or severity to produce changes previously reported. Studies using assay of enzymes, specific for muscle, should allow separation of the possible contribution of hepatic enzyme leak to the overall increase in the serum enzyme activity reported by other authors.

A65-80023
FUNDAMENTAL ASPECTS OF IMPACTS TO THE HUMAN BODY.
L. M. Patrick (Wayne State U., Detroit, Mich.)
Journal of Environmental Sciences, vol. 7, Oct. 1964, p. 25-29. 9 refs.
Grants No. PHS-G-AC-00054-05 and PHS-G-DE-01416-03.

The problem of determining human tolerance levels to impact injury is a difficult one to solve because of the limited amount of human experimental evidence and because of the number of variables involved. The use of cadavers and animals is suggested. The author discusses factors in the dynamics and responses of the human body to acceleration and impact on the head. Seat cushions and the dynamic load factor are related to jerk and mean acceleration levels. Factors to be studied when considering the overall effect of impact are the direction, duration, and magnitude of impact, the impacting surface, effects of acceleration, dynamics of the body and impacting device, and the interaction between the hydraulic surge and the muscular and ligamentous attachments on remote areas.

A65-80024
CHANGES IN CUTANEOUS SENSITIVITY AFTER PROLONGED EXPOSURE TO UNPATTERNED LIGHT.
John P. Zubek, J. Flye, and D. Willows (Manitoba U., Winnipeg, Canada).
Psychonomic Science, vol. 1, Oct. 1964, p. 283-284.
Canadian Defence Res. Board Grant 9425-08; and Canadian Natl. Res. Council Grant APT-106.

Subjects who were exposed to diffuse, homogeneous illumination for a week showed an increase in tactual acuity and in sensitivity to

heat and pain. This cutaneous supersensitivity, however, was not as pronounced as that occurring after a week of darkness.

A65-80025
DESTRUCTION OF STEREOPSIS.
T. G. R. Bower and W. M. Goldsmith (Cornell U., Ithaca, N.Y.)
Psychonomic Science, vol. 1, Oct. 1964, p. 287–288. 5 refs.

Three theories of stereopsis are described and an experiment performed to decide between them. The results fit Hochberg's (1964) suppression model. An alternative hypothesis which would also explain the data is that the necessary condition for stereodepth is a presuppression cyclopean view of the stereograms, a view which is eliminated by the adapting contour "switching off" one eye.

A65-80026
INHIBITION OF A SIMPLE VISUAL REACTION TIME BY A SECOND STIMULUS: A FAILURE TO REPLICATE.
Joseph S. Lappin and Charles W. Eriksen (Ill. U., Urbana).
Psychonomic Science, vol. 1, Oct. 1964, p. 293–294. 14 refs.
Grants No. PHS-G-M-1026 and PHS-G-K6-MH-22014.

Helson and Steger (1962) have reported that simple reaction time to a light stimulus was increased if a second light occurred as long as 180 msec after the primary stimulus. This experiment is unsuccessful in producing the phenomenon. Some defects in methodology in the Helson and Steger experiment are considered.

A65-80027
PROACTIVE DECREMENTAL EFFECTS ON RESPONSE SPEED IN A CONTINUOUS DRT TASK.
Olga Favreau (McGill U., Montreal, Quebec, Canada).
Psychonomic Science, vol. 1, Oct. 1964, p. 319–320. 6 refs.
Canadian Defence Res. Board Grant 9425-10.

Thirty subjects performed a 324-trial, subject-paced, **two-signal, frequency-imbalanced,** disjunctive reaction time task. Responses on trials following the occurrence of the infrequent signal yielded longer reaction times than responses on other trials. This effect is attributed to novelty produced startle, and is different from series effects previously reported.

A65-80028
FATIGUE: VISUAL CONSIDERATIONS, (II).
R. H. Beck.
Pilot, vol. 20, Oct. 1964, p. 10–20. 35 refs.

The emergence into the jet age has intensified many old problems of flight fatigue, and has presented a host of new ones, many of which have yet to be solved **satisfactorily.** Visual problems inducing fatigue include glare, solar radiation, space myopia caused by loss of background reference at high altitudes, hypoxia or low oxygen intake, and insufficient cockpit lighting. It is strongly suspected that glaucoma may be prematurely induced by a reduction of atmospheric pressure. Among the factors that affect jet crew fatigue are: (a) extremes of temperature and humidity, (b) workloads, (c) increased responsibility, (d) intensified scrutiny of pilot personnel, (e) family and personal problems, and (f) apprehension. Fatigue produces a willingness to accept lower standards of accuracy and performance, which in turn create potentials of reduced safety.

A65-80029
THRESHOLD INTENSITIES OF THERMAL RADIATION EVOKING SENSATIONS OF WARMTH.
F. A. Chrenko (Natl. Inst. for Med. Res., Div. of Human Physiol., Hampstead, Gt. Brit).
Journal of Physiology, vol. 173, Sep. 1964, p. 1–12. 20 refs.

Threshold intensities of thermal radiation evoking sensations of warmth on the forehead were determined by the method of limits in 43 subjects, including 22 women. Thresholds were variable and one of the factors associated with variability was the temperature of the skin. The higher the skin temperature the lower the threshold. With skin temperature constant, the threshold increased with the temperature of the source of radiation (or decreased with the peak **wavelength).** Changes in temperature of the skin have a much greater effect on the threshold than changes in the temperature of the source of radiation. On the average, the thresholds of the women subjects were lower than those of the men and the difference was statistically significant. The results are in accord with electrophysiological research on thermal receptors in the skin.

A65-80030
PHOTO-LABILE CHANGES AND THE DIRECTIONAL SENSITIVITY OF THE HUMAN FOVEA.
H. Ripps and R. A. Weale (London U., Inst. of Ophthalmol., England).
Journal of Physiology, vol. 173, Sep. 1964, p. 57–64. 15 refs. Zaret Found., N.Y. supported research.
Grant No. PHS-G-BT-1025.

The method of fundus reflectometry has been used in the study of **effects of oblique incidence of bleaching light on foveal cone pigments,** an orange or blue bleaching beam being made to enter the eye either at the pupillary center or near the periphery. The peripheral beam is photolytically less efficacious than the ventral. Calibration of the latter shows that the reduction in efficacy of the former bears a high correlation to the Stiles-Crawford effect measured subjectively in a conventional manner. Differences between the results obtained with the orange and blue beams are attributed in part to the transmission characteristics of the crystalline lens and in part to the spectral variation of the directional properties of the foveal receptors.

A65-80031
PERFORMANCE DECREMENT IN VIGILANCE, THRESHOLD, AND HIGH-SPEED PERCEPTUAL MOTOR TASKS.
Jane F. Mackworth (Defence Res. Med. Labs., Toronto, Canada).
Canadian Journal of Psychology, vol. 18, Sep. 1964, p. 209–223. 55 refs.

The decrement in performance found in vigilance, threshold determinations, and high-speed perceptual motor tasks appears to be a linear function of the square root of time on task; it is suggested that the common factor is a requirement for continuous attention. The decrement can be prevented in both active and passive tasks by rest pauses, knowledge of results, and amphetamine.

A65-80032
RELATION OF SLANT AND SHAPE JUDGMENTS IN REDUCED VIEWING.
A. H. Smith (Defence Res. Med. Labs., Toronto, Canada).
Canadian Journal of Psychology, vol. 18, Sep. 1964, p. 224–234. 9 refs.

Observers estimated the slant and drew the apparent shape of a homogeneous white circle and a similar rectangle under monocular and binocular reduction conditions for zero and four degrees of geometric slant. In terms of the requirement that, when slant is underestimated relative to geometric slant, but is significantly greater than zero, shape estimates should approach, but not coincide with, the projective shape, the results failed to support the **invariance hypothesis. The findings** are discussed in relation to the view that the hypothesis should be tested **without** reference to the projective geometry of the stimuli.

A65-80033
PHYSIOLOGY OF NYSTAGMUS [K FIZIOLOGII NISTAGMA].
V. A. Kisliakov (I. P. Pavlov Inst. of Physiol., Leningrad, USSR).
Fiziologicheskii Zhurnal SSSR, vol. 50, Sep. 1964, p. 1073–1078. 21 refs. In Russian.

Rabbits were rotated in a fixed position in a cage, with the axis of rotation between the ears. Electrodes were implanted in the bones at the posterior corner of the eyes. After prolonged rotation with an unobstructed view, the cage was covered to exclude light. The animals showed an optokinetic nystagmus in the direction opposite to the rotation. Vestibular stimulation changed the frequency of the nystagmus; it either increased or decreased it, depending on the direction of vestibular nystagmus.

A65-80034
LUNG COLLAPSE IN JET PILOTS (POST-FLIGHT PULMONARY ATELECTASIS) [LONGCOLLAPS BIJ DE STRAALJAGERPILOOT (POST-FLIGHT PULMONARY ATELECTASIS)].
J. C. Gans.
Nederlands Militair Geneeskundig Tijdschrift, vol. 17, Sep. 1964, p. 240–243. In Dutch.

A routine X-ray examination of the lungs undertaken immediately after a landing uncovered post-flight pulmonary atelectasis in a jet pilot. Another X-ray examination a week later showed regression of the signs. Anamnesis of the flight included high g-forces, use of an **anti-g-suit** and use of an oxygen mask, breathing pure oxygen. This case is discussed in detail in connection with the **"post-flight syndrome"** of respiratory symptoms and signs suggestive of pulmonary atelectasis. Three conditions are deemed essential for its appearance: acceleration forces, inflation of an **anti-g-suit** causing elevation of the diaphragm, and breathing of 100% oxygen.

A65-80035
EXPERIMENTAL STUDIES ON SOUND TRANSMISSION IN THE HUMAN EAR. III. INFLUENCE OF THE STAPEDIUS AND TENSOR TYMPANI MUSCLES.
E. B. Neergaard, H. C. Andersen, C. C. Hansen, and O. Jepsen (Aarhus U., Dept. of Otolaryngol., Denmark).
Acta Oto-Laryngologica, Supplementum 188, 1964, p. 280–286.
Danish State Res. Found., Philips Found. and Oticon Found. supported research.

Three attenuating mechanisms have been demonstrated in the sound conduction system of the examined temporal bone: (1) pull

applied to the stapedius muscle causes attenuation at all frequencies measured, but this is most pronounced in the low frequency range; (2) pull applied to the tensor tympani also causes attenuation of the low frequency range, but the effect is definitely smaller than that of the stapedius; (3) at high input sound pressures an independent physical mechanism tends to limit the transmission of the higher frequencies. The three mechanisms essentially act without formation of harmonics. The action of the two muscles upon the transmission of sound appears to be independent. The total attenuation of the three mechanisms amounts to approximately 20 dB throughout the frequency range of 125 to 3500 cycles per second at an input sound pressure of 137 dB above 2.10^{-4} dyne/cm^2.

A65-80036
MIDDLE EAR MUSCLE REFLEXES ELICITED BY ACOUSTIC AND NONACOUSTIC STIMULATION.
Gisle Djupesland (Rikshospitalet, Inst. of Audiology, and Ear, Nose, and Throat Dept., Oslo, Norway).
Acta Oto-Laryngologica, Supplementum 188, 1964, p. 287-292. 6 refs.

Middle ear muscle reflexes in man are surveyed in conjunction with data on the function of the tensor tympani muscle obtained from (a) direct study during 114 operations for otosclerosis, and (b) recordings of the acoustic impedance of the eardrum. Impedance measurements in 55 individuals with normal eardrum and normal hearing revealed spontaneous impedance changes related to general motor activity. Also conditional tympanic reflexes to anticipated noise were observed. Cutaneous intra-aural reflexes were demonstrated to be bilateral, i.e., tactile stimulation of either homolateral or contralateral ear elicits stapedius reflex. Cutaneous stimulation also gives a short reduction of pure tone stimuli at frequencies below 1000 c.p.s. similar to that obtained by acoustic stimulation of the contralateral ear. Contraction of the tympanic muscle was observed during voluntary or reflex contraction of the periorbital muscles or with all stimuli which induced marked reflex contractions of the periorbital muscles. Pure tone stimulation at 65 to 115 dB elicits contraction of the stapedius; sudden loud and unpleasant sounds will result in closing of eyes and simultaneous contraction of tensor tympani. Thus, the contraction of tensor tympani is a part of the cochleopalpebral reflex.

A65-80037
SOUND LOCALIZATION IN FREE FIELD AND INTERAURAL THRESHOLD DIFFERENCES.
Thorleif Sohoel, Gunnar Arnesen, and Kjell Gjaevenes (Ulleval Sykehus, Ear, Nose, and Throat Dept., Audiological Lab., Oslo, Norway).
Acta Oto-Laryngologica, Supplementum 188, 1964, p. 293-297. 6 refs.

The ability of locating sound sources of individuals with normal hearing depends on the type of signal employed. In unilateral deafness sound localization to certain types of signals is lost. Experiments were performed with the intent of determining the relation between the ability of sound localization in the horizontal plane and the threshold difference between the two ears, one deafened, the other with normal hearing. The subjects were blindfolded, seated in a rotating chair, and placed at different angular positions to the sound source in an anechoic chamber. As stimuli, 500 and 4000 c.p.s. pure tones together with a 1/1 octave band noise with a central frequency of 2000 c.p.s. were used. Signal intensity was varied at random between 55 and 70 dB. Angular localization was inhibited by a sufficiently high mechanical interaural threshold difference for the stimuli. Reduction in angular localization was more frequent on the deafened side. The results are discussed from a clinical point of view.

A65-80038
TASK-CONTROL OF AROUSAL AND THE EFFECTS OF REPEATED UNIDIRECTIONAL ANGULAR ACCELERATION ON HUMAN VESTIBULAR RESPONSES.
William E. Collins (FAA, Civil Aeromed. Res. Inst. Oklahoma City, Okla.)
Acta Oto-Laryngologica, Supplementum 190, 1964, p. 5-34. 64 refs.

Ten subjects were each exposed to a habituation series of 200 mild clockwise (CW) accelerations in total darkness while performing a number of attention-demanding tasks. Decelerations were subthreshold. Preliminary and post-tests indicated that slow phase nystagmus and duration of the ocular response declined bidirectionally as a function of the habituation trials. That the total reduction in response was not as great as that reported in earlier studies seems due to the task-control of alertness. A marked change in the form of the response occurred. Specifically, stimulus repetition produced an increase in frequency of nystagmus during the stimulus period and for a few seconds thereafter. The remaining "tail" of the response showed an overall depression. These changes, although greater for the practiced directions, were evident for both CW and counterclockwise (CCW) stimulation. Measurements of subjective velocity were obtained during several pre- and post-test trials but never during the habituation series. A decline in the intensity of the sensation to CW acceleration was produced by the habituation series but the subjective experience to CCW acceleration was unaffected. Thus, a directionally specific decline in the subjective vestibular response occurred in the absence of attending to the rotatory sensation in the habituation trials, and without visual cues. A second post-test given after one month with no intervening stimulation showed little or no restoration of nystagmus. However, the subjective reaction demonstrated a clear, albeit incomplete, pattern of recovery.

A65-80039
EFFECTS OF HYPOTHALAMIC LESIONS ON THE ERYTHROPOIETIC RESPONSE TO HYPOXIA IN RABBITS.
Sverre Halvorsen (Oslo U., Anat. Inst., Neurophysiol. Lab .; and Rikshospitalet, Pediat. Res. Lab., Oslo, Norway).
Acta Physiologica Scandinavica, vol. 61, 1964, p. 1-19. 29 refs.

The effects of hypothalamic lesions on the erythropoietic response to hypoxia have been investigated. The lesioned rabbits were exposed to low oxygen (6.5% to 8.5%) and the erythropoietic response evaluated by means of reticulocyte counts. Eleven out of 26 rabbits showed a normal response to hypoxia while 15 showed a reduced response. Of these 15 rabbits, 6 showed a normal response when ACTH was given prior to the hypoxic test indicating that the reduced response to hypoxia in these rabbits was due to ACTH deficiency following the hypothalamic lesions in these six rabbits were in the ventral and median part of the hypothalamus. Seven out of the 15 rabbits neither responded normally to hypoxia alone nor to hypoxia following ACTH injections. The lesions in these seven rabbits were in the posterior part of the hypothalamus. It is concluded that an extrapituitary influence on erythropoiesis may be exerted from this region.

A65-80040
ON THE INTERPLAY OF END ORGANS OF THE VESTIBULAR APPARATUS (UBER DAS ZUSAMMENSPIEL DER ENDORGANE DES VESTIBULARAPPARATES).
Helmut Güttich (München, U.- HNO-Klin., Germany).
HNO, vol. 11, 1964, p. 126-128. In German.

The role of the labyrinth in spatial orientation is discussed with respect to voluntary or passive movement of the body or execution of motor acts. Angular movements are perceived via the semicircular canals and the cupula. Ewald's second law on endolymph action on the cupula in each canal is explained citing specific examples. Otolith organs relay information on motion or position in the horizontal and vertical planes. The otoliths exert a shearing action on the sensory hairs, whereby the utricle transmits information on the centrigugal pull sideways and the saccule imparts the gravitational pull in the vertical direction. The latter is believed to have a role in development of rhythm. Under a stimulus conflict the otolith apparatus suppresses stimulation from the semicircular canals.

A65-80041
MOTION PICTURE RECORDING OF THE OPTOKINETIC AND THE VESTIBULAR NYSTAGMUS [KINEMATOGRAPHISCHE REGISTRIERUNG DES OPTOKINETISCHEN UND VESTIBULAREN NYSTAGMUS].
W. Grau and H. Strobel (Leipzig U., Universitatsklin und Poliklin. für Hals-, Nasen- und Ohrenkranke, Germany).
HNO, vol. 11, 1964, p. 142-145. 16 refs. In German.

Cinematographic recording of nystagmus on a 16-mm film is discussed with respect to its diagnostic usefulness. Its disadvantages are lack of objective registration of the frequency and the amplitude of nystagmus. The advantages are lesser expenses, simplified recording technique and evaluation, precision, and possibilities for repeated demonstration of interesting case material to large audiences. Diagnostically cinematographic recordings are a valuable supplement to electronystagmography.

A65-80042
RELATIONSHIP BETWEEN CHEMICAL STRUCTURE AND THE EXTENT OF PROTECTION AGAINST IONIZING RADIATION GIVEN BY ALCOHOLS TO SALMONELLA TYPHIMURIUM LT2.
A. B. Sidle (MRC Unit, Royal Coll. of Surg., London, Gt. Brit.)
Nature, vol. 204, Nov. 7, 1964, p. 597-598.

Bacteria, Salmonella typhimurium, cultures were exposed to radiation (electrons and X-rays) carried out over six intervals covering the range 0-5 krads. The alcohols tested were pentane-1,5-diol, butane-1,4-diol, butane-1,3-diol, glycerol, propane-1,3-diol, erythritol, ethanediol, methanol, ethanol, isopropanol, mannitol, and n-propanol. In addition to these, primary, secondary, and tertiary butanol, isobutanol, amyl and tertiary amyl alcohol, allyl alcohol, and pargyl alcohol were investigated, but proved too toxic to be included in the radiation trials. For control and test, respectively, the logarithm of the survival fraction was plotted against the radiation dose for each alcohol examined. The following were observed: (1) there is a regular increase

of protection with increasing chain length in the case of the diols; (2) with the polyhdric and monohydric alcohols, the tendency is for a decrease in protection with increasing chain length; and (3) diols are a better class of protector than either the polyhydric or the monohydric alcohols.

A65-80043
COMBINED EFFECT OF LOW-FREQUENCY VIBRATION AND A 50-ROENTGEN DOSE OF X-RAY ON THE BONE MARROW CELLS IN MAMMALS [KOMBINIROVANNOE DEISTVIE NIZKOCHASTOTNOI VIBRATSII I RENTGENOVSKIKH LUCHEI V DOSE 50 R NA KLETKI KOSTNOGO MOZGA MLEKOPITAIUSHCHIKH].
Iu. S. Demin.
Doklady Akademii Nauk SSSR, vol. 157, 1964, p. 972-974. 6 refs. In Russian.

The effects of ionizing radiation alone, and combined with vibration, on the cytological state of the bone marrow were studied in male albino mice. The animals were exposed to a radiation dose of 50R. Some animals were subjected to vertical vibration of 70 cps and 0.4 mm amplitude for 20 min, 3 to 5 min prior to irradiation. Individual animals were sacrificed at different periods of time, from 1/2 hr to 48 hrs. Samples of bone marrow were studied microscopically for disturbances of mitosis in the anaphase. No significant difference was noted in the effect of combined radiation and vibration, as compared with radiation alone, except for a slight increase in the number of chromosome reorganizations, and an increase in the number of adhesions. A decrease in the number of chromosomal bridges indicated that the vibration effect took place during the presynthetic phase. The duration of the mytotic cycle was 14 hours in the erythrocytic cells and 21 hours in the myciocytic cells. After irradiation, the cycle became longer. The time of study included at least 1 cycle, because normalization occurred after 48 hours.

A65-80044
LOCALIZATION OF OPTIC ILLUSIONS OF SET [K VOPROSU O LOKALIZATSII OPTICHESKIKH ILLIUZII USTANOVKI].
Sh. N. Chkhartishvili (Akad. Nauk Gruzinskoi SSR, Inst. of Psychol., Tiflis).
Voprosy Psikhologii, no. 5, Sep.-Oct. 1964, p. 94-102. In Russian.

The phenomena, known as figural aftereffect and similar to optic illusions of set, according to investigations of J. Gibson, W. Köhler, and H. Wallach, are narrowly localized in the visual areas of the brain. The present experiment showed that the bases of optic illusions of set were not localized in a particular region of the brain. The illusions of set transferred from one region to another, while in the investigations of above-mentioned authors such transposition of a figural aftereffect was absent.

A65-80045
DYNAMICS OF EMOTIONAL-VOLITIONAL PROCESSES OF COSMONAUTS DURING PARACHUTE JUMPS [O DINAMIKE EMOTSIONAL'NO-VOLEVYKH PROTSESSOV PRI PARASHIUTNYKH PRYZHKAKH U KOSMONAVTOV].
G. F. Khlebnikov and V. I. Lebedev.
Voprosy Psikhologii, no. 5, Sep.-Oct. 1964, p. 3-10. 17 refs. In Russian.

Soviet cosmonauts engaged in the initial stages of parachute-jump training displayed emotional reactions considerably different from the behavior of well trained parachutists. During training, the volitional process stabilized and emotional tension decreased, as was shown by wrist dynamometry and by pulse rate recordings before and after jumps.

A65-80046
A MODIFIED METHOD FOR REGISTERING EYE TREMOR [NOVOE O METODIKE REGISTRATSII TREMORA GLAZ].
Iu. B. Gippenreiter, N. Iu. Vergiles, and L. P. Shchedrovitskii (Moscow U., Dept. of Psychol., USSR).
Voprosy Psikhologii, No. 5, Sep.-Oct. 1964, p. 118-121. 10 refs. In Russian.

Two methods for registering minute eye movements are described. In the first method, a small mirror is attached to the sclera. A light beam is passed through a slit and is reflected on a moving film. The second method consists of an electromechanical device which permits the registration of high frequency movements of small amplitude and detects secondary derivatives of tremors.

A65-80047
EFFECT OF ACUTE DISTURBANCE IN DAILY RHYTHM OF VITAL FUNCTIONS OF THE PROFESSIONAL WORKING CAPACITY IN MAN [O VLIIANII OSTROGO NARUSHENIIA SUTOCHNOGO RITMA ZHIZNENNYKH FUNKTSII NA PROFESSIONAL'NUIU RABOTOSPOSOBNOST' CHELOVEKA].
L. A. Veidner-Dubrovin and N. A. Matiushkina (Inst. of Phys. Culture Imeni P. F. Lesgafta, Leningrad, USSR).
Voprosy Psikhologii, no. 4, Jul.-Aug. 1964, p. 61-68. 9 refs. In Russian

Fatigue causes a decrease in man's capacity of performing professional work when his daily routine is disturbed. It lengthens time requirements to do a given work task and decreases accuracy. Body movements which require coordination are particularly affected when a person has to meet deadline conditions.

A65-80048
"INTRINSIC EYE MOTOR NOISES" [O "SOBSTVENNYKH DVIGATEL'NYKH SHUMAKH GLAZA"].
Iu. B. Gippenreiter (Moscow U., Dept. of Psychol., USSR).
Voprosy Psikhologii, no.4, Jul.-Aug. 1964, p. 69-82. 13 refs. In Russian.

The results are presented of an experimental investigation (Iarbus' method of eye movement registration) of processes of the interaction of visual and motor components of work of the visual system under conditions of a set of identical objects. On the basis of the experiments, a a new concept, "Proper Eye Motor Noises", is introduced. It reflects the noise producing action of involuntary micromovements of the eyes in the tasks of fixation and tracing of elements of a set of identical objects. The optimum and acceptable meanings of a set of identical objects for practical work with them are given. The results of the experiments are related to the problem concerning the resolving capacity of proprioception of eye muscles in the set mechanism system of the eye.

A65-80049
ON THE PARTICIPATION OF THE CENTRAL AND VEGETATIVE NERVOUS SYSTEM IN THE MECHANISM OF ULTRASONIC ACTION ON THE ABSORPTION PROCESSES IN THE GASTROINTESTINAL TRACT [PRO UCHAST' TSENTRAL'NOI I VEGETATYVNOI NERVOVOI SISTEMY V MEKHANIZMI DII UL'TRAZVUKU NA PROTSESY VSMOKTUVANNIA V SHLUNIKOVO-KYSHKOVOMU TRAKTI].
V. R. Faitel'berg-Blank (Ukrainian Res. Inst. for Health Resort Sci. and Physiotherapy, Odessa).
Fiziologichnyi Zhurnal, vol. 10, Sep-Oct. 1964, p. 647-654. 12 refs. In Ukrainian.

The question of participation of the central and vegetative nervous systems in the mechanisms of ultrasonic action on the absorption processes in the gastrointestinal tract has not been discussed in the literature. To study this question the author conducted investigations on six dogs with Pavlov pouches and on eight dogs with isolated intestinal loops by Thiry's method. The functional state of the central nervous system and the reticular formation of the brain were altered by strychnine, chloralhydrate, barbamyl, and aminazine; while the vegetative nervous system was altered by atropin, carboxylin, ergotoxin, adrenalin, and proserin; the ganglia were excluded by hexonium. The effect of ultrasonic vibrations on the absorption processes in the gastrointestinal tract was investigated against this background. The investigations showed that the central and vegetative nervous systems participate in the mechanism of ultrasonic action on the absorption processes in the gastrointestinal tract.

A65-80050
BODY TEMPERATURE AND HEAT GENERATION IN ALBINO RATS UNDER THE EFFECT OF RADIAL ACCELERATION [TEMPERATURA TILA TA VYDILENNIA TEPLA U BILYKH SHCHURIV PID VPLYVOM RADIAL'NYKH PRYSKOREN'].
V. V. Matsynin.
Fiziologichnyi Zhurnal, vol. 10, Sep.-Oct. 1964, p. 663-670. 16 refs. In Ukrainian.

Body temperature and heat generation in albino rats under single and multiple effects of radial acceleration were studied in three series of experiments. In 64 experiments the method of continuous recording on a ERR-09 potentiometer was used to study temperature changes occurring simultaneously in the brain, liver, muscles, and rectum of albino rats after accelerations of 10, 20, 30, and 40 g. A reduction in temperature of 0.4 to 1.7 ^{0}C. was noted in these organs, the minimum temperature drop occurring at 10 g. At 20 g the temperature changes were twice as high. At 30 and 40 g the temperature fell almost as much as at 20 g. The change in temperature of the investigated organs was identical in each experiment, indicating that the temperature reaction of animals to acceleration is of a general nature. In 20 experiments the method of direct calorimetry was used to study heat generation in albino rats at accelerations of 10 and 20 g. At 20 g the quantity of generated heat was 35% less and at 10 g 13% greater than in the control group of animals.

A65-80051
THE DETERMINANTS OF THE NORMAL TIMED VITAL CAPACITY.
Bruce J. Sobol and Cemil Emirgil (Grasslands Hosp., Cardiopulmonary Lab., Valhalla, N.Y.)
American Review of Respiratory Diseases, vol. 90, Nov. 1964, p. 771–778. 20 refs. Westchester Tuberculosis and Public Health Assoc. and Burroughs Wellcome and Co. supported research.

The records of 387 normal subjects chosen from 4,342 subjects studied were analyzed to determine the normal values for the forced expiratory volume percent (FEV%) as well as the determinants of FEV_1 %. When males were compared with females and when young people were compared with older ones, no consistent significant difference was found in the FEV_1%. However, when analyzed in terms of the forced vital capacity (FVC), and by age and sex, keeping the FVC constant, it was demonstrated that FEV_1% not only is not a constant for all normal subjects but is a function of age, sex, and FVC. Femininity and aging tend to lower the FEV_1%, although lowering of the FVC tends to raise it. It is suggested that normal values for FEV_1% take these effects into account.

A65-80052
HYPERBARIC OXYGEN AND CORNEAL NEOVASCULARISATION.
Paul Henkind (NIH, Div. of Neurol. Diseases and Blindness, Bethesda, Md.)
Lancet, vol. 2, Oct. 17, 1964, p. 836–838. 10 refs.

Sixteen adult guinea pigs were anesthetized with sodium pentobarbitone and injected with 0.1 ml. of sterile 0.3 M. alloxan into the right anterior chamber of each animal. Five to seven days after the injection, corneal neovascularization became evident, and 8 of the animals were placed in a pressure chamber supplied continuously with 100% oxygen at 1.5 to 2 atmospheres of pressure. Carbon dioxide was absorbed with soda lime placed in a tray beneath the animal platform. The control animals were kept in their usual cages. When severe respiratory difficulty ensued (after 17 to 37 hours of continuous exposure to hyperbaric oxygen) the pressure chamber was slowly decompressed, and the animals were removed to the atmosphere where their eyes were examined with a hand slit lamp and a binocular dissecting microscope. The extent and pattern of corneal neovascularization were similar in both the oxygen-treated and the control animals, the vascularization being more extensive at the termination of the experiment than at the beginning. The untreated left eyes of all the animals appeared perfectly normal.

A65-80053
THE STRUCTURAL BASIS OF TIMING.
Stuart J. Dimond (Trinity Coll., Dublin, Ireland).
Psychological Bulletin, vol. 62, Nov. 1964, p. 348–350. 21 refs.

An attempt is made to find the structural basis of timing. Although the physiological evidence allows no precise statement, there is some evidence for the involvement of anatomical structures. This evidence is reviewed, and a theory is proposed as to the function of these areas in timing.

A65-80054
SHORT TERM MEMORY AND REACTION TIME: KEEPING TRACK OF SEVERAL VARIABLES.
Robert E. Morin and Andrew Konick (Kent State U., Ohio).
Psychonomic Science, vol. 1, Nov. 1964, p. 325–326.
Grant No. NSF-G-GB-1600.

Twenty subjects associated two responses with each of four geometric figures, which served as stimuli. Thereafter the subject responded to the stimuli alternating his responses so that the correct response was always the word not given the last time to the same stimulus shape. The task was to keep track of the most recent state (response) for each of four variables (stimuli). The results indicate that reaction time and response accuracy depend on the remoteness, in terms of time and number of intervening trials, of a previous response which serves as the stimulus for a present response.

A65-80055
ADAPTIVE RESPONSES TO IONIZING RADIATION.
John Garcia, Nathaniel A. Buchwald, C. D. Hull, and R. A. Koelling (Long Beach State Coll., Dept. of Psychol., Calif.; V. A. Hosp., Long Beach, Calif.; and Calif. U., Dept. of Anat., Los Angeles).
Boletín del Instituto de Estudios Médicos y Biológicos, vol. 22, Apr. 1964, p. 101–113. 15 refs.
Grant No. PHS-G-RH-00068; and Career Award GMK-3509.

Ionizing radiation produces effects upon behavior through two distinct mechanisms, in addition to the well-known effect upon the retina. Exposures of less than one roentgen will produce immediate arousal in sleepy animals and have been used as signals in discrimination tests. The probability of the animal perceiving radiation is a function of the log of the intensity (dose rate). The response habituates rapidly in the absence of reinforcement. This resembles the action of a peripheral receptor. The olfactory system is the locus of maximum sensitivity for the response. Radiation also acts as a noxious stimulus to produce avoidance reactions toward any stimulus associated with exposure. The effect is not immediate and is a function of the total dose received by the animal. Avoidance effects resemble the action of internal receptors responding to toxic products produced by the radiation. The abdomen is the locus of maximum sensitivity for avoidance reactions. Adaptive responses to radiation fields were discussed within the framework of this dual-receptor model.

A65-80056
BIOCHEMICAL CHANGES INDUCED BY ULTRAVIOLET LIGHT.
Mark Allen Everett (Okla. U., Med. Center, Dept. of Dermatol., Oklahoma City).
Dermatologia Tropica, vol. 3, Apr.–Jun. 1964, p. 97–101. 43 refs.

At present we possess considerable information regarding specific biochemical alterations produced in various compounds by ultraviolet light. In formulating theories to explain the physiologic reactions observed in skin following exposure to ultraviolet rays we have failed to utilize this knowledge. Although the nature of actinic degeneration of skin has been clarified, we understand only poorly the systemic effects produced by ultraviolet and the fundamentals of the erythema reaction. A number of clearly defined changes occur in nucleotides when they are exposed to ultraviolet light. These alterations include disulfide bond fission, isomerization, water addition at double bonds, dimerization, and attenuation of hydrogen bonding. It is suggested that these processes will be of fundamental importance in the mechanisms underlying actinic degeneration of the skin and the erythema reaction.

A65-80057
EFFECT OF ALVEOLAR HYPOXIA ON PULMONARY VASCULAR RESISTANCE.
Thomas C. Lloyd, Jr. (Western Reserve U., School of Med., Dept. of Med., Cleveland, Ohio).
Journal of Applied Physiology, vol. 19, Nov. 1964, p. 1086–1094. 22 refs. Cleveland Area Heart Soc. and Ohio Tuberc. and Health Assoc. supported research.

The responses to graded hypoxia in 58 excised dog lung lobe preparations were measured during constant perfusion and ventilation. When perfused with blood, alveolar hypoxia always evoked a pressor response, whereas a dilator response always appeared when a synthetic perfusate was used. Hexamethonium, atropine, and brom-lysergic acid diethylamide did not alter the pressor response; dibenzyline appeared to diminish the response but this may have been due to the reversal of effect of any epinephrine present. A pressor response could also be produced with KCN. The response to alveolar hypoxia was shown to be unrelated to pulmonary arterial blood oxygen tension, but the resistance increase was demonstrated to be in the precapillary vessels. The hypoxic pressor response was transient and easily depressed by a period of severe hypoxia even though pressor drug responses remained unchanged. The possibility of mediation of the arterial narrowing by a reflexible mechanism is considered.

A65-80058
ARE RADAR WAVES DANGEROUS TO MAN [SIND RADARWELLEN FUR DEN MENSCHEN GEFAHRLICH ?]
Hubert Fischer and Horst Müller.
Truppenpraxis, no. 10,) Oct. 1964, p. 757–758. 8 refs. In German.

Certain symptomatic complaints have been noted by some of the radar personnel working in close vicinity of radar antennas, i.e., sensations of heat, tinnitus, dizziness, fatigue, headache, and eye pain. Thorough investigations have uncovered no physical basis. However, it is recommended, that susceptible individuals avoid work in close proximity to radar devices. If at all necessary, the work should be carried out in good ventilation and at a lowered environmental temperature. Work around radar installations with high density radar beams should not be carried out while the device is in operation. The beam energy can reach a density over 10^4 of the permissible dose at sending frequencies in the superhigh-frequency range of up to 30,000 megacycles. Proper safety measures are to be observed, such as the demarcation of the immediate vicinity of the radar device.

A65-80059
THE EFFECT OF HYPOTHERMIA ON LUNG FUNCTION.
Emil Blair, William G. Esmond, Safuh Attar, and R. Adams Cowley (Md. U., School of Med., Dept. of Surg., Surg. Res. Labs., Baltimore).
Annals of Surgery, vol. 160, Nov. 1964, p. 814–823. 30 refs.

Various aspects of mechanical function of the lungs were investigated in anesthetized dogs at different levels of hypothermia. Lung function was depressed significantly only below 28^0 C. The depression is quite marked initially, but if hypothermia is prolonged, a significant

degree of improvement in ventilation develops. This improvement indicates that the depression in initial hypothermia is probably due to alterations in chemoceptor activity, particularly to CO_2. Direct cold impairment of the lungs occurs only at approximately 10° C. These studies support research and clinical views that 28° C is a significant landmark in the physiologic changes due to hypothermia.

A65-80060
MUSCULAR TENSION, TASK RESISTANCE AND SPACE OF RESPONSE.
Herman Kagan (Ariz. U., Tucson).
Psychological Record, vol. 14, Oct. 1964, p. 417–425. 9 refs.
Grants No. NSF-G-52488 and NSF-G-8720.

The effect of induced tension (IT) and response resistance (RR) on reaction time (RT) was investigated by subjecting two highly trained subjects to many weeks of trials, employing a wide range of IT and RR. The results were individually computed by an analysis of variance technique. The results show that IT has a detrimental effect on RT when relatively high RR's are employed, but has no detrimental effect when relatively low RR's are employed. Under any IT level, RT is directly proportional to RR. The results suggest that induced tension is superfluous to already existing muscular tension created by set except when the RR cannot be discriminated from zero resistance.

A65-80061
STUDY OF A PHOTOSYNTHETIC GAS EXCHANGER, A QUANTITATIVE REPETITION OF THE PRIESTLEY EXPERIMENT.
James H. Eley, Jr. and Jack Myers (Tex. U., Austin).
Texas Journal of Science, vol. 16, Sep. 1964, p. 296–333. 21 refs.
Contract AF 41(609)-1556.

Gas exchange of a dwarf mouse and an illuminated suspension of Chlorella ellipsiodea was investigated. Exchange of carbon dioxide and oxygen were observed by calibrated analyzers which were used in constant flow systems for the individual components or on fractions of the recirculated gas flow in the closed system. Performance of the algal suspension was observed simultaneously in terms of cell production rate. Two experiments of 15 and 24 days are reported on performance of the closed system. They demonstrate that the major difficulty in obtaining complete balance in gas exchange between a plant and an animal lies in matching the ratios of exchange of carbon dioxide and oxygen. In the 24-day experiment, 98% of the desired perfect match was obtained. A still better match could be achieved by control of the mouse diet or by conditions which would permit greater flexibility in supply of ammonia or urea as nitrogen sources of algae. In any practical photosynthetic gas exchanger, such as required to provide for the human respiratory demands, flexibility in control of algal assimilatory quotient probably will be required.

A65-80065
PROBLEMS OF INDUSTRIAL HYGIENE AND OF THE BIOLOGICAL EFFECT PRODUCED BY RADIO-WAVES OF DIFFERENT BANDS [VOPROSY GIGIENY TRUDA I BIOLOGICHESKOGO DEISTVIIA RADIOVOLN RAZLICHNYKH DIAPAZONOV].
Z. V. Gordon (USSR, Acad. of Med. Sci., Inst. of Hyg. of Labor and Profess. Diseases, Moscow).
Vestnik Akademii Meditsinskikh Nauk SSSR, vol. 7, 1964, p. 42–49. 19 refs. In Russian.

Processes involved in the creation and employment of the sources producing electromagnetic waves in the radiofrequency range may be linked with adverse working conditions. Depending upon the latter, as well as upon technical parameters and the way in which the energy of electromagnetic waves is actually utilized, various principles of protection against the action of radiowaves can be adopted. Biological reactions arising as a result of radiowave action, especially of microwaves, are primarily characterized by shifts occurring on the level of the central nervous system (cerebral biopotentials, conditioned reflex activity, response of rats to a sound stimulus, morphological, and histochemical changes). Depending upon the waveband one can note certain peculiarities in the body responses.

A65-800
MODIFICATION OF THERMOREGULATORY RESPONSES TO COLD BY HYPNOSIS.
Abbott T. Kissen, Clifford B. Reifler, and Victor H. Thaler (AF Systems Command, Aerospace Med. Div., Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
Journal of Applied Physiology, vol. 19, Nov. 1964, p. 1043–1050. 5 refs.

Forty exposures (4.5° to 5.0°C.) were conducted in an environmental chamber under both hypnosis and nonhypnosis conditions. Five subjects, wearing one clo. insulation, were cold exposed for one hr. four times for each condition and each subject served as his own control. Variables monitored included mean skin and rectal temperatures, heart and shivering rates, basal skin resistance, and vigilance task performance. In hypnosis, shivering was suppressed, heart rate lowered, and vigilance task performance improved. Basal skin resistance differed in terms of pattern and level being generally higher under hypnotic conditions. Rectal temperatures were lower despite maintaining skin temperature at the same level as during nonhypnosis conditions. These findings indicate that with the thermal stress imposed and levels of trance achieved, there is a general amelioration of the psychophysiological effects of the stress. The mechanism responsible for this form of "adaptation" remains speculative but is consistent with generalized suppression of sympathetic activity.

A65-80067
REACTIONS TO HEAT OF ARABS AND CAUCASIANS.
C. H. Wyndham, B. Metz, and A. Munro (Transvaal and Orange Free State Chamber of Mines, Math. Statist. Div., Appl. Physiol. Lab., Johannesburg, South Africa).
Journal of Applied Physiology, vol. 19, Nov. 1964, p. 1051–1054. 5 refs.

The physiological reactions to heat of samples of French servicemen and of Arabs in the Sahara Desert were compared with those of South African Caucasians. Both Sahara groups displayed evidence of partial acclimatization; their reactions were better than those of the unacclimatized; but not as good as those of the acclimatized South African Caucasians. The French servicemen were slightly better acclimatized than the Arabs; they had lower rectal temperatures and heart rates, and higher sweat rates. This paradoxical finding indicates that the Arabs, although their ancestors have lived in the Sahara Desert for some centuries, display no greater adaptation to hot conditions than recent Caucasian inhabitants. The morphology of the Arab gives him a greater surface-area to mass ratio than the Caucasian. This favors heat loss, but under the test conditions the Arabs had no apparent advantage in physiological reactions. The differences in morphology of the Arab and Caucasian appear to be related more to their nutritional state and physical activity levels than to any structural adaptation to heat.

A65-80068
REACTIONS TO HEAT OF ABORIGINES AND CAUCASIANS.
C. H. Wyndham, R. K. McPherson, and A. Munro (Transvaal and Orange Free State Chamber of Mines, Human Sci. Lab., Johannesburg, South Africa; and School of Trop. Med. and Hyg., Sydney, Australia).
Journal of Applied Physiology, vol. 19, Nov. 1964, p. 1055–1058. 6 refs.

A study was made of the physiological reactions to heat of Australian Caucasians and aborigines in the hot, humid tropics. Their results were then compared with those of unacclimatized and acclimatized Caucasians (South Africa). The Australian shows signs of a partial degree of acclimatization in that his heart rate and rectal temperature are lower and his sweat rate is higher than those of the unacclimatized South African Caucasian. The aborigine presents a less clear picture in that his rectal temperature is lower but his heart rate and sweat rate are the same as the unacclimatized Causasian. A striking difference between the Caucasians and aborigines in Australia is the much higher sweat rates of the Caucasians. The lower sweat rates of the aborigine might result from the morphological feature of a greater surface area-to-mass ratio whereby he loses heat by radiation and convection more adequately than the Caucasian and therefore is able to conserve sweat; alternatively, he appears to have a more sensitively adjusted thermoregulatory control channel between rectal temperature and sweat rate.

A65-80069
MEASUREMENT OF UPPER AND LOWER AIRWAY RESISTANCE AND CONDUCTANCE IN MAN.
Richard W. Blide, H. David Rerr, and William S. Spicer, Jr. (Md. U., School of Med., Div. for Pulmonary Diseases, Dept. of Med., Baltimore).
Journal of Applied Physiology, vol. 19, Nov. 1964, p. 1059–1069. 14 refs.
Grant No. NIH-G-AP00045.

The resistances to flow in the upper (Ruaw) and lower (Rlaw) airways of human lungs were measured simultaneously with total airway resistance (Raw) and the volume of thoracic gas (Vtg) using the plethysmographic method and lateral pressure taps at the tracheal and oral levels. Ruaw is found to decrease slightly in a curvilinear fashion with increasing Vtg while its reciprocal, Guaw, is linearly related to Vtg with a negative Vtg intercept in normal subjects. Lower airway

conductance (Glaw) is linearly related to Vtg with a slope of approximately 1.0 liters/sec per cm H_2O per liter. From the partitioned resistances it is deduced that total airway conductance (Gaw) is curvilinear but approximately linear over the majority of the Vtg. A method of calculating resistance and conductance in the upper and lower airways from Raw versus Vtg data is presented using the equation Raw = Vtg/(A+ B vtg) where B^2/A = dGlaw/dVtg. Three hundred and sixty-two records of Raw versus Vtg data from 22 normal, asthmatic, and bronchitic subjects are then evaluated by this method and the results compared to those obtained by direct measurement.

A65-80070
USE OF A CROSS- CIRCULATION TECHNIQUE IN STUDYING RESPIRATORY RESPONSES TO CO_2.
C. C. Michel and F. F. Kao (N.Y., State U., Downstate Med. Center, Dept. of Physiol., Brooklyn).
Journal of Applied Physiology, vol. 19, Nov. 1964, p. 1070–1074.
19 refs.
Contract NYC-I-194; and Grants No. NIH-G-H-4032, C9; PHS-G-IGS-101; and PHS-G-HTS-5282.

The effect of hypercapnia and hypocapnia on ventilation was investigated in cross-circulated dogs in which the recipient dog's head and neck regions were perfused by blood from a donor dog. Hypercapnia of the donor dog was produced by administering CO_2-O_2-N_2 gas mixtures in the inspired air. Hypocapnia was produced by hyperventilating the donor dog with the aid of a respiratory pump. When the donor dog was hyperventilated, the ventilation of the recipient was maintained at or just below its resting level and it was independent of the arterial P_{CO_2} of the donor. The donor dog was apneic when the artificial hyperventilation was suspended and this response was not abolished by vagotomy. Bilateral vagotomy caused an increase in ventilation in the recipient when its head was perfused by hypocapnic blood. Bilateral removal of the carotid receptors did not influence the response to CO_2 qualitatively although there was some reduction in the ventilation of the recipient to cephalic hypercapnia. The ventilation of the recipient dog was best correlated to the pH and P_{CO_2} of its cerebrospinal fluid in both hypercapnic and hypocapnic states.

A65-80071
CARBON DIOXIDE AND PULMONARY VENTILATION IN MUSCULAR EXERCISE.
F. F. Kao, C. C. Michel, and S. S. Mei (N.Y. State U., Downstate Med. Center, Dept. of Physiol., Brooklyn).
Journal of Applied Physiology, vol. 19, Nov. 1964, p. 1075–1080.
24 refs.
Contract NYC-I-194; Grants No. PHS-G-HTS-5282 and NIH-G-H-4032,C-10.

The effect of endogenous CO_2 from exercising muscles and exogenous CO_2 from CO_2 inhalation was investigated in six pairs of cross-circulated dogs. The exercising hindlimbs of one dog (neural) were perfused exclusively from a second dog (humoral). The ventilatory response of the neural dog during exercise followed the predicted isometabolic hyperbola toward hyperventilation, whereas the ventilation of the humoral dog followed closely the relationship which existed between ventilation (V) and arterial carbon dioxide tension (Pa_{CO_2}) during CO_2 inhalation. When the neural dog was given CO_2 mixtures during steady state of induced exercise, its ventilation increased in a rectilinear function of the Pa_{CO_2}. The V, Pa_{CO_2} line intersects the isometabolic curve for the exercise level at a Pa_{CO_2} close to the resting Pa_{CO_2}. A metabolic acidosis developed in the humoral dog, although the blood flow to the perfused hindlimbs appeared to be adequate during muscular exercise.

A65-80072
EFFECT OF O_2 AT HIGH AMBIENT PRESSURE ON BLOOD FLOW AND O_2 CONSUMPTION OF THE KIDNEY.
D. W. Rennie and F. G. Knox (N.Y. State U., School of Med., Dept. of Physiol., Buffalo).
Journal of Applied Physiology, vol. 19, Nov. 1964, p. 1095–1099.
9 refs. Life Insurance Med. Res. Fund supported research.

Renal blood flow of chloralosed dogs, measured while they breathed 100% O_2 at ambient pressures of 1, 2, 3, and 4 atm absolute (OHP), declined exponentially as an inverse function of PIO_2 until at 4 atm. O_2 it was 57% of control. Denervating the kidney did not affect the response, the mechanism of which remains unknown. Mean arterial blood pressure increased to 112% and heart rate decreased to 60% of control as O_2 pressure increased from 1 to 3 atm abs., suggesting a generalized systemic vasoconstriction in which the kidney participated. It is estimated that the measured decrease in renal blood flow during OHP would account for approximately 20% of the total decrease in peripheral blood flow. Renal O_2 consumption was not affected by OHP. This can be accounted for in terms of a constant filtered and reabsorbed sodium load.

A65-80073
LACTATE AND PYRUVATE GRADIENTS BETWEEN RED BLOOD CELLS AND PLASMA DURING ACUTE ASPHYXIA.
Salha S. Daniel, Hisayo O. Morishima, L. Stanley James, and Karlis Adamsons, Jr. (Columbia U., Depts. of Anesthesiol., Pediat., and Obstet. and Gynecol., New York City; and Presbyterian Hosp., Div. of Anesthesiol., Pediat., and Obstet. and Gynecol., New York City, N. Y.)
Journal of Applied Physiology, vol. 19, Nov. 1964, p. 1100–1104.
11 refs.
Contract NYC-1-148; and Grants No. PHS-G-RG-9069, and PHS-G-A-4359.

The rate of equilibration of lactate and pyruvate between plasma and red cells was studied during asphyxia and following addition of sodium lactate in vivo and in vitro. In the resting, well-oxygenated guinea pig, the mean plasma to red cell ratio of lactate was 1.55 and that of pyruvate 2.47. During asphyxia, the plasma to red cell ratio of lactate rose and that of pyruvate fell, indicating a delay in equilibration. Incomplete equilibration affected particularly the lactate to pyruvate ratio in the two compartments. Infused neutral sodium lactate penetrated the red cells at a rate comparable to that observed following endogenous release of lactic acid during acute asphyxia. In vitro at pH 6.8 to 7.4 at 38° C, the time to 50% equilibration of lactate between plasma and cells of human blood was less than 2 min. It is concluded that during acute asphyxia and resuscitation, whole blood values of lactate and pyruvate do not bear a constant relationship to those of plasma.

A65-80074
USE OF HEART RATE FOR EVALUATING CARDIAC STRAIN DURING TRAINING IN WOMEN.
Mary E. Maxfield (E. I. du Pont de Nemours and Co., Haskell Lab. for Toxicol., and Ind. Med., Wilmington, Del.)
Journal of Applied Physiology, vol. 19, Nov. 1964, p. 1139–1144.
6 refs.

The usefulness of heart-rate information to measure cardiac performance is demonstrated for young women during physical training. Data were studied in terms of rate, total number of beats (cardiac cost), and recovery phenomena. Provided work remained constant, training decreased the heart rate during both work and recovery, with corresponding reduction in the sum of beats (total cardiac cost). If working rates are not obtainable, recovery rates as (1) the sum of beats (recovery cost) or (2) $P_{avg\ 1,2,3}$, the average of counts taken during the last 30 sec. of the 1st, 2nd, and 3rd min. of the recovery period, can substitute for total cost as a measure of cardiac performance. The effect of increasing the work accomplished upon cardiac cost and $P_{avg\ 1,2,3}$ is discussed and use of a comparative standard for assessing cardiac strain from the value of $P_{avg\ 1,2,3}$ is suggested.

A65-80075
CARDIOVASCULAR RESPONSES TO ICE-COLD SHOWERS.
William R. Keatinge, Malcom B. McIlroy, and Alan Goldfien (Calif. U., School of Med., Cardiovascular Res. Inst. and Dept. of Med., San Francisco).
Journal of Applied Physiology, vol. 19, Nov. 1964, p. 1145–1150.
34 refs.
Grants No. PHS-G-HEO-6285 and Nonr-222(55).

A shower of ice-cold water (0° to 2.5° C) over the chest caused large increases in systolic and diastolic arterial pressures, pulse pressure, and pulse rate in normal subjects. Cardiac output rose by 59% and 100% in the 2 subjects measured. The changes in pressure were considerably larger than those caused by a cold pressor test or by anxiety. The changes appear to be due to sympathetic nervous reflexes to the heart and blood vessels rather than release of adrenal catecholamines, as plasma epinephrine did not increase and plasma norepinephrine rose only by 0.32 mg/liter. Hyperventilation and evidence of peripheral venoconstriction occurred during the showers, but neither voluntary hyperventilation nor increased venous return from a change in posture produce the changes in blood pressure seen during showers.

A65-80076
EFFECT OF CARBON DIOXIDE ON HEART RATE.
John C. Mithoefer and Homayoun Kazemi (Mary Imogene Bassett Hosp., Cardio-Pulmonary Lab., Cooperstown, N.Y.)
Journal of Applied Physiology, vol. 19, Nov. 1964, p. 1151–1156.
29 refs.
Grants No. NIH-G-H-3915-C2 and NIH-G-3915-C3.

Pentobarbital, by its sympathomimetic effect, produces tachycardia in the dog which is slowed by hypercapnia. The parasympathomimetic effect of chloralose anesthesia, in the intact dog, results in a slow heart rate which is increased by hypercapnia. This opposite response to CO_2 appears related to the opposite autonomic effects of the two agents, since when tachycardia is induced in dogs anesthetized with chloralose, they then respond to hypercapnia by cardiac slowing. In experiments reported here and in data available in the literature, there appears to be a correlation between prehypercapnic heart rate and the chronotropic effect of CO_2. Results reported suggest that cardiac slowing by hypercapnia occurs through a direct effect of CO_2 rather than pH and that the mechanism has both central and peripheral mediation; the former transmitted by vagal pathway with a specific site of action at the sinus node.

A65-80077
PHYSIOLOGICAL EFFECTS OF ACTIVE AND PASSIVE EXERCISE.
F. B. Benjamin and L. Peyser (Rep. Aviation Corp., Life Sci. and Space Environ. Lab., Farmingdale, Long Island, N.Y.)
Journal of Applied Physiology, vol. 19, Nov. 1964, p. 1212–1214. 13 refs.

A comparison of the physiological effects of active and passive exercise was accomplished using two methods. In the first series of experiments, the exercise was held constant. In the second method, an attempt to match oxygen consumption was employed. The results, evaluated in view of preceding investigations in the same area, indicate that: (1) Passive exercise increases ventilation in excess of the metabolic need. The greater ventilation increases the ventilating equivalent that lowers the end-tidal P_{CO_2}, possibly causing respiratory alkalemia. (2) The increase in ventilation accompanying passive exercise does not produce a corresponding increase in heart rate. (3) Passive exercise increases heat production beyond the level indicated by oxygen consumption. These findings support the concept of a temperature factor being involved in the hyperventilation of exercise.

A65-80078
INFLUENCE OF WATER TEMPERATURE ON OXYGEN UPTAKE BY SWIMMING RATS.
Mary Ann Baker and Steve M. Horvath (Calif. U., Environ. Stress Lab., Santa Barbara).
Journal of Applied Physiology, vol. 19, Nov. 1964, p. 1215–1218. 23 refs.
Contract DA-49-193-MD-2202.

Oxygen uptake and rectal temperature of 10 rats forced to swim to exhaustion for 45 min. in cold, hot, and thermoneutral water were measured during swimming. In 20° C water, rats swam for 12.6 min. and had a final rectal temperature of 26.9° C. In 42° C water, the mean swimming time was 14.1 min. and the final rectal temperature was 42.6° C. All rats swam for 45 min. in water at 37° C, and the final rectal temperature was not different from the preswim temperature. Oxygen uptake during swimming in 37° C water rose and stabilized at a rate of about three times basal in a pattern suggesting that the swimming work was moderate. Animals swimming in cold and hot water were exhausted before their oxygen uptakes stabilized, but the increasing oxygen uptakes during the early parts of these swims were similar to that in neutral water. It appeared that while the metabolic rate was adjusted to the level of work and was not greatly affected by severe changes in body temperature, alterations in body temperature profoundly influenced the duration of work in the hot or cold environments.

A65-80079
VALIDITY OF PHONOARTERIOGRAPHIC BLOOD PRESSURES DURING REST AND EXERCISE.
Joseph A. Mastropaolo, Jeremiah Stamler, David M. Berkson, Hans U., Wessel, and Walter E. Jackson (Chicago Board of Health, Div. of Adult Health and Aging, Cardiopulmonary Fitness Testing Lab., Ill.; and Chicago Wesley Mem. Hosp., Cardiopulmonary Lab., Ill.)
Journal of Applied Physiology, vol. 19, Nov. 1964, p. 1219–1233. 29 refs.
NIH Grant HTS-5344; and Chicago Heart Assoc. and Natl. Heart Inst. Grant H4197.

A modification of the auscultatory blood pressure method, the phonoarteriogram, was developed. The innovated method essentially is a modified amplifying stethoscope. The pressure in the cuff is recorded from a pressure transducer, and the systolic and diastolic criteria are recorded from a microphone. The phonoarteriogram gives the advantage of a permanent record, includes pulse sound data, is not affected by hearing acuity, permits determination often denied using auscultation in high ambient noise and exercise conditions, and eliminates observer bias. Three hundred and forty resting determinations and 218 exercise determinations on 60 subjects indicated good agreement between the phonoarteriogram and auscultation. In 50 systolic and diastolic intra-arterial determinations before compression of the cuff, during rest and exercise from one subject, the phonoarteriogram was as valid as auscultation. In 56 intra-arterial determinations during deflation of the cuff, i.e., simultaneous with the indirect measurements, during rest and exercise from a second subject, the phonoarteriogram was less fallible than auscultation, particularly during exercise. Phonoarteriograms are valid, reliable, and objective blood pressure records.

A65-80080
ORGUEIL METEORITE: ORGANIC NITROGEN CONTENTS.
Ryoichi Hayatsu (Chicago U., Enrico Fermi Inst. for Nucl. Studies, Ill.)
Science, vol. 146, Dec. 4, 1964, p. 1291–1293. 21 refs.
Grant NsG-366.

Purines, amino derivatives of sym-triazine, and substituted guanidines *isolated from the Orgueil meteorite were identified* by chromatographic, spectroscopic, and other techniques. The presence of large amounts of sym-triazine derivatives is of particular interest, because these compounds have no known biochemical significance. The latter were either produced by an extraterrestrial life form whose biochemical pathways differ from those of terrestrial life, or they were made by *abiotic processes. The former alternative cannot be* excluded a priori, but it opposes all recent arguments for a biological origin of the meteoritic organic compounds.

A65-80081
CONTAMINATED METEORITE.
Edward Anders, Eugene R. Dufresne, Ryoichi Hayatsu (Chicago U., Enrico Fermi Inst. for Nucl. Studies, Ill.) Albert Cavaille (Musée d'Histoire Naturelle, Montauban, France (Tarn-et-Garonne), Ann Dufresne (Georgetown U., Wash., D.C.) and Frank W. Fitch
Science, vol. 146, Nov. 27, 1964, p. 1157–1161. 17 refs.
Grant NsG-366.

One stone (sample No. 9 419) of the Orgueil meteorite shower contains an assortment of biogenic materials: coal fragments, seed capsules of the reed Juncus conglomeratus, other plant fragments, and an optically active, water-soluble protein material resembling collagen-derived glues. This sample seems to have been accidentally or deliberately contaminated shortly after the fall of the meteorite in 1864. It is emphasized that sample No. 9 419 is the only stone of the Orgueil shower for which there is evidence of alteration by human intervention. There is no reason to believe that the Orgueil meteorite samples in which other investigators claimed to have found evidence of extraterrestrial life (biogenic hydrocarbons and "organized elements") were similarly altered and contaminated.

A65-80082
INSTANTANEOUS HEART ACTION DURING ROCKET AIRCRAFT FLIGHT.
John W. A. Brant and Charles T. Hage (NASA, Flight Res. Center, Edwards, Calif.)
Life Sciences, vol. 3, 1964, p 679–688. 17 refs.

Data are presented from an electrocardiographic continuum monitored on board the X-15 rocket aircraft during the phase of a high-performance flight. Time series arrays and frequency tables complete with characteristic statistics were obtained for heart rate and heart acceleration from values computed at every heart beat, and at 3-second intervals. Overall increase in heart rate during the first two flight phases is effected by relatively small accelerations of long duration, whereas decrease in heart rate during the last three phases is accompanied by decelerations of longer magnitude despite the longer acceleration durations. In the third phase, the durations of heart accelerations and decelerations are about equal in magnitude. This phase is clearly a period of nonhomeostasis and may be considered a period of maximum physical and psychophysiological stress. Thus, instantaneous heart acceleration is an important quantitative indicator. The usefulness of using, whenever possible, the universe of values for expressing a psychophysiological state, as well as the worth of using instantaneousness in real time to express dynamic heart regulation (considered homologous to instantaneous heart acceleration) is demonstrated.

A65-80083
HYPERVENTILATION AND SHIVERING ACTIVITY.
Robert W. Bullard (Ind. U., Dept. of Anat. and Physiol., Bloomington; and Ind. U. Med. Center, Dept. of Physiol., Indianapolis).
Life Sciences, vol. 3, 1964, p. 395–405. 16 refs.
Contract DA-49-0070-MD-947.

Oxygen consumption, various body temperatures, shivering activity, and other physiological factors were measured during control cold exposure periods and cold exposure periods combined with voluntary hyperventilation. This was done primarily to determine the role played by the increased work of breathing in the inhibition of shivering by 6% carbon dioxide. Results indicated that hyperventilation is complicated

by respiratory cooling and hypocapnia. When both of these factors are eliminated by ventilation of warmed saturated air bolstered with 2.5% to 4.0% oxygen, some shivering inhibition may actually occur. However, interpretation of the records indicates that such inhibition is not as pronounced as that associated with breathing 6% carbon dioxide. The inhibition of shivering that occurred consistently early in periods of hyperventilation may be attributed to the increase work of breathing. Results also point to the interpretation that the hypercapnia produced by breathing. Results also point to the interpretation that the hypercapnia produced by breathing 6% carbon dioxide in cold air has a direct inhibitory effect on shivering, as this is the only experimental procedure accompanied by respiratory cooling in which shivering was inhibited.

A65-80084
MODIFICATIONS IN VISUAL AND KINESTHETIC AFTER-EFFECTS IN SENSORY DEPRIVATION [MODIFICAZIONI DI EFFETTI CONSECUTIVI FIGURALI VISIVI E CINESTESICI NELLA PRIVAZIONE SENSORIALE].
R. Canestrari, P. Bonaiuto, and C. Umiltà (Bologna U., Ist. di Psicologia, Rome, Italy).
Bollettino della Società Italiana di Biologia Sperimentale, vol. 40, Aug. 31, 1964, p. 958–962. 18 refs. In Russian.

Males between 19 and 26 were divided into 2 groups (controls and sensory deprived) of 8 persons. The visual and kinesthetic aftereffects were tested in both groups. A comparative examination of individual data proved that in all sensory-deprived subjects there appeared a total decrease in the amplitude of both visual and kinesthetic aftereffects. The definite and significant relationship existing during changes in visual and kinesthetic aftereffects favors the hypothesis that aftereffects in various sensory procedures are correlated to a unique type of physiological process. The theories of various authors interpreting the phenomenon of decreases in aftereffects are reviewed.

A65-80085
REMARKS ON CRITICAL FLICKER FUSION FREQUENCY AND ON DARK ADAPTATION AFTER SENSORY DEPRIVATION [RILIEVI SULLA FREQUENZA CRITICA DI FUSIONE E SULL'ADATTAMENTO ALL'OSCURITA' DOPO PRIVAZIONE SENSORIALE].
U. Dorello, P. Bonaiuto, and C. Umiltà (Bologna U., Ist. di Psicologia, Italy; and C.N.R., Gruppo di Ricfrca di Psicologia, Rome, Italy).
Bollettino della Società Italiana di Biologia Sperimentale, vol. 40, Aug. 31, 1964, p. 963–966. 22 refs. In Italian.

Measurements were made of critical flicker fusion frequency (CFF) and dark adaptation in males between 19 and 26 subjected to sensory deprivation experiments for 12 hours, interrupted by a 40-minute rest period. Of the eight subjects examined, four showed no deficiency in CFF, four exhibited only slight changes, two of which had values lower than normal. A table is presented including measurements of each change, calculation of individual and general averages, and statistical values. The results indicate that very slight changes in CFF appear after sensory deprivation under the conditions studied. Dark adaptation studies were conducted on seven subjects. In three of these, adaptation after sensory deprivation reached values higher than those determined during control tests, and in another two subjects a slight predominance of values was observed. On the basis of tabulated calculations of individual averages and statistical values, the capacity for dark adaptation appears to be greater after sensory deprivation.

A65-80086
CIRCULATORY DYNAMICS OF THE CEREBRAL VASCULAR SYSTEM WITH REFERENCE TO LONGITUDINAL GRAVITATION LOADS [DINAMIKA GEMOTSIRKULIATORNYKH PARAMETROV SOSUDISTOI SISTEMY GOLOVNOGO MOZGA PRI PRODOL'NYKH GRAVITATSIONNYKH NAGRUZKAKH].
Iu. E. Moskalenko, O. G. Gazenko, A. A. Shuruburu, I. I. Kas'ian, and O. V. Graunov (USSR, Acad. of Sci., Inst. of Evolutionary Physiol., Leningrad).
Izvestiia Akademii Nauk SSSR, Seriia Biologicheskaia, no. 2, Mar.–Apr. 1964, p. 280–297. 31 refs. In Russian.

The dynamics of cerebral circulation (plethora and intracranial pressure) were investigated on rats, rabbits, cats, and dogs, in relation to linear gravitational loads. Plethora of the brain was recorded by electroplethysmographic methods, and intracranial pressure, by a "tensoelectric" device. Arterial pressure, oxygen tension in the cerebral tissues, and respiratory movements were also recorded. Results show that the sensitivity threshold of the cerebral vascular system lies within the range of 0.2 to 0.5 g, depending on the particular characteristics of the nervous system and on the ecological conditions of the animals. The data suggest that the active regulatory processes of the cerebral vessels, manifested 5 to 10 seconds after exposure, are due to the autoregulatory system of the cerebral vessels (mechanical regulation), while the reactions observed to 15 to 25 seconds after exposure are to be attributed to accumulation of CO_2 in the cerebral tissues (chemical regulation). In its most pronounced form, gravitational stress results in plethora of the cerebrum.

A65-80087
NEURO-EMOTIONAL STRESS OF COSMONAUTS DURING COSMIC FLIGHT [O NERVNO-EMOTSIONAL'NOM NAPRIAZHENII KOSMONAVTOV VO VREMIA KOSMICHESKIKH POLETOV].
V. I. Iazdovskii, G. V. Altukhov, V. E. Belai, A. D. Egorov, and V. I. Kopanev.
Izvestiia Akademii Nauk SSSR, Seriia Biologicheskaia, no. 2, Mar.–Apr. 1964, p. 306–311. 12 refs. In Russian.

Analysis of the dynamics of pulse rate of cosmonauts during cosmic flights has led to the conclusion that the degree of neuroemotional stress depends on the flight pattern and the training and personality characteristics of the cosmonauts. During prolonged weightlessness, the cosmonauts displayed some decrease in their resistance to stress, reflected in pronounced changes of pulse rate.

A65-80088
BLOOD CIRCULATION UNDER CONDITIONS OF WEIGHTLESSNESS [KROVOOBRASHCHENIE V USLOVIIAKH NEVESOMOSTI].
I. I. Kas'ian, V. I. Kopanev, and V. I. Iazdovskii.
Izvestiia Akademii Nauk SSSR, Seriia Biologicheskaia, no. 3, May–Jun. 1964, p. 352–368. 34 refs. In Russian.

Results from previous experimental studies and reviews on the problems of blood circulation in human subjects exposed to conditions of short and prolonged weightlessness are summarized. It is concluded that a man exposed to weightlessness for five days does not show any evidence of disturbance of blood circulation. Direct and indirect effects on the physiological mechanism are discussed. The direct effects comprise a complex of reactions caused by the significant fall of hydrostatic pressure. Among the indirect effects one may count the reactions originating as a result of disturbances of analyzer functions associated with the abnormal demands on spatial orientation.

A65-80089
SENSITIVITY OF VESTIBULAR ANALYZER AND SENSORY REACTIONS IN MAN UNDER CONDITIONS OF SHORT WEIGHTLESSNESS [CHUVSTVITEL'NOST' VESTIBULIARNOGO ANALIZATORA I SENSORNYE REAKTSII CHELOVEKA PRI KRATKOVREMENNOI NEVESOMOSTI].
E. M. Iuganov, I. A. Sidel'nikov, A. I. Gorshkov, and I. I. Kas'ian.
Izvestiia Akademii Nauk SSSR, Seriia Biologicheskaia, no. 3, May–Jun. 1964, p. 369–375. 7 refs. In Russian.

Experimental data point to the conclusion that the character and degree of sensory reactions under conditions of short period of weightlessness can be correlated to individual vestibular sensitivities under such conditions. It has been established that vestibulometric data obtained at sea level make it possible to predict to some extent a person's fitness to work under conditions of short periods of weightlessness.

A65-80090
ON THE USE OF THE POLAROGRAPHIC METHOD IN THE DETERMINATION OF OXYGEN TENSION UNDER THE EFFECT OF HIGH ALTITUDE FLIGHT [PRIMENENIE POLIAROGRAFICHESKOGO METODA OPREDELENIIA NAPRIAZHENIIA KISLORODA V TKANIAKH MOZGA PRI DEISTVII FAKTOROV VYSOTNOGO POLETA].
E. A. Kovalenko, V. L. Popkov, and I. N. Cherniakov.
Izvestiia Akademii Nauk SSSR, Seriia Biologicheskaia, no. 3, May–Jun. 1964, p. 376–387. 41 refs. In Russian.

In the first series of experiments it was found that breathing of gas mixtures containing 5 to 10% CO_2 increased oxygen tension in the brain under hypoxic as well as under normal conditions. After rapid elevation of dogs to an altitude of 12,000 m, without breathing of oxygen, pO_2 fell by one half of its initial level. When oxygen was inhaled, pO_2 fell by one third of its initial level. After rapid elevation to altitudes of 15, 17, and 20 km, pronounced deoxygenation of the brain, in direct ratio to the so-called "time reserve" (30 to 50 sec.), was observed. Effect of hypoxia, such as respiratory arrest and death, were observed simultaneously. At elevations to very high altitudes (36 to 38 km), pO_2 in the brain tissues appeared to be directly related to three factors: altitude, lung pressure, and degree of compensation by means of pressure breathing. In another series of experiments, the effects of head-to-pelvis acceleration (2 to 12 g) on the organism were investigated. Under these conditions, pO_2 decreased (below 4 to 6 g). Acceleration transversal to the body axis (below 10 to 12 g) resulted in a decrease of pO_2 values. The authors conclude that wider use of polarographic methods would have good prospects in high-altitude physiology.

A65-80091
SHORT-TERM MEMORY AND RETROACTIVE INTERFERENCE IN VISUAL PERCEPTION.

Charles W. Eriksen (Ill. U., Urbana; and V. A. Hosp., Danville, Ill.)
Journal of Experimental Psychology, vol. 68, Nov. 1964, p. 423–434. 13 refs. V.A. Hosp., Danville, Ill., supported research.
Grant No. NIH-G-M-1206.

Three experiments were performed on the relation of backward masking effects in visual perception and short-term perceptual memory. In all experiments the first stimulus was a brief presentation of a display consisting of a random pattern of X's and O's arranged in a circular pattern. At predetermined intervals after termination of the display (10 to 700 msec.) an arrow appeared indicating a position on the preceding display and subject reported whether the position had contained an X or O. In none of the experiments was any evidence found of a brief perceptual memory. Experiment I showed impaired performance when indicator followed display within 100 msec. In experiment II elimination of possibility of luminance summation resulted in no significant effect attributable to delay of the indicator. Experiment III indicated marked individual differences in retroactive interference functions occasioned by the delay of the indicator.

A65-80092
MUSCLE-ACTION POTENTIALS AND ESTIMATED PROBABILITY OF SUCCESS.
James C. Diggory (Pa. U., Philadelphia), Sherwin J. Klein, and Malcolm Cohen (Naval Air Eng. Center, Aerospace Crew Equipment Lab., Philadelphia, Pa.)
Journal of Experimental Psychology, vol. 68, Nov. 1964, p. 449–455. 19 refs. Naval Air Eng. Center supported research.

This experiment bears on the question of the conditions under which actual or expected failure will lead to an increase or to a decrease in muscular effort expended on a task. Action potentials (MAP) from the working muscles are taken as the index of effort. Previous reports that MAP increased after failure are interpreted to mean that subjects viewed the second task as a chance to offset the effects of the failure by performing well. But it is supposed that if subject is convinced that achieving success is hopeless under given task conditions then he will reduce his effore, i.e., produce smaller MAP's. Previous experiments had shown that the form and level of (false) performance curves, reported to subjects during a series of trials, produced systematic effects on the trend and during a series of trials, produced systematic effects on the trend and level of their estimated probability of success, P(s). These observations were replicated in the present experiment, with the additional finding that level of MAP is a function of level of P(s). That is, subjects who expected to succeed put out more effort that those who expected to fail.

A65-80093
STUDIES OF THE INFLUENCE OF DIFFERENTIAL VISUAL EXPERIENCE ON FIGURAL AFTEREFFECTS.
E. Mavis Hetherington, Charles H. Koski (Wis. U., Madison), and Herbert L. Pick, Jr. (Minn. U., Minneapolis).
Journal of Experimental Psychology, vol. 68, Nov. 1964, p. 466–469. 5 refs. Wis. Alumni Res. Found. supported research.

Previous work has indicated that homogeneous light stimulation produced by a Ganzfeld after induction of a figural aftereffect paradoxically enhances its magnitude. The present studies attempt to manipulate this enhancement by varying three parameters of the aftereffect inducing situation: the duration of exposure to the Ganzfeld, the presence of the Ganzfeld condition before and after induction of the figural aftereffect, and the brightness relations between figure and ground in the aftereffect inducing stimuli. The results suggest that the enhancement of figural aftereffects by a Ganzfeld is independent of these factors.

A65-80094
CONDITIONING THE HUMAN HEART RATE WITH NOISE AS THE UNCONDITIONED STIMULUS.
George De Leon (Columbia U., New York, N.Y.)
Journal of Experimental Psychology, vol. 68, Nov. 1964, p. 518–520.

An attempt was made to replicate, with light and noise, the heart-rate conditioning findings obtained with tone and shock by Notterman, Schoenfeld, and Bersh (1952). An electroencephalogram was adapted for a cardiograph. With eight human subjects a conditioning procedure was implemented in which a 1-sec. light preceded a 6-sec. noise by an interval of 6 sec. The results showed that after several such pairings the light came to exercise a depressant effect on the heart rate. The characteristics of the conditioned response (CR) in extinction, spontaneous recovery, reconditioning, and a second extinction paralleled those of the CR obtained with tone and shock.

A65-80095
THE RADIOPROTECTING ACTION OF SEVERAL PREPARATIONS.
Hideo Asakura (Tokyo U., Faculty of Med., Dept. of Radiol., Japan).
Nippon Acta Radiologica, vol. 24, Apr. 25, 1964, p. 47–59. 35 refs. In Japanese.

The radioprotecting action (protection and restoration) of Marinamycin, Chondron, Macrobin, and Pydoxal was investigated, using the indicator of 30-day-survival rates of irradiated mice. Male or female mice weighing about 20 g., were used. They received whole-body irradiation of about 700 to 800 r telecobalt γ-rays. The results are as follows: (1) Concerning Marinamycin, the survival rate of controls was 25%, and that of the group administered Marinamycin before and after irradiation, 37.5% and 34.4% respectively; it is supposed that Marinamycin has a slight radioprotecting action. (2) In this study, massive doses of Chondron, Macrobin, and Pydoxal were used and compared to therapeutic doses. No radioprotective effects were observed either before or after irradiation. (3) In this experiment, the effect of the three above mentioned preparations, except Marinamycin, were not evaluated because of the small numbers of animals used. (4) In a clinical study, it was demonstrated that Marinamycin had also a therapeutic effect on leucopenia due to irradiation. The clinical side effects to the liver and kidney proved to be minimal.

A65-80096
BIOCHEMISTRY OF BROWN FAT AND LIVER OF COLD-ACCLIMATED HAMSTERS.
R. R. J. Chaffee, J. R. Allen, Y. Cassuto, and R. E. Smith (Calif. U., Dept. of Physiol., Los Angeles).
American Journal of Physiology, vol. 207, Dec. 1964, p. 1211–1214. 20 refs.
Grants No. NCI-CA-4271-05; DA-49-193-MD-2558; KF-50.

Studies were made of the effects of cold acclimation on the weight, the total protein content, and the enzymatic activity of brown fat of hamsters. For comparison, some enzymatic assays were also conducted on liver preparations. The mass of the brown fat doubled, as did the percent protein, and there was a large increase in its mitochondrial and microsomal content. Brown fat mitochondria of cold-acclimated hamsters show striking increases in respiration associated with both β-hydroxybutyrate and α-glycerophosphate, which indicates that there may be an enhanced capacity to degrade fats. On the other hand there was no change in succinoxidase, and a lowered respiration associated with isocitrate. Thus the mitochondrial catabolic activity involving the citric acid cycle may not be enhanced. Brown fat microsomal reduced nicotinamide adenine dinucleotide phosphate (NADPH) and nicotinamide adenine dinucleotide phosphate (NADH)-cytochrome c reductases were both increased in response to cold exposure, which should be of significance in increasing heat production. Brown fat mitochondria show a respiration rate associated with glycerophosphate and isocitrate which is about 300% to 400% higher than that of liver mitochondria. It is concluded that there is an increase in thermogenic capacity of the brown fat of the hamster during cold acclimation.

A65-80097
THE ORIGIN OF LIFE.
John Keosian (Newark Coll. of Arts and Sci.; and Newark Beth Israel Hosp., N.J.)
New York, Reinhold Publishing Corp., 1964, ix-118 p. refs.

Data on the origin of life on earth and on extraterrestrial bodies are reviewed. The following are included: (1) nature of the problem (including several approaches to the problem such as vitalism, special creation, panspermia, mechanism, and materialism), (2) historical background, (3) Oparin hypothesis, (4) distribution of simple organic compounds, (5) composition of the primordial atmosphere, (6) primary synthesis of organic compounds, (7) some unsettled questions (hot dilute soup, asymmetric synthesis, origin of petroleum, energy considerations, reaction mechanisms, and origin of living things from discrete systems), and (8) review of evidence for and against neobiogenesis (origin of life anew). Selected readings and a combined author and subject index are included.

A65-80098
EFFECTS OF DOUBLE STIMULATION: TEMPORARY INHIBITION OF RESPONSE.
Donald Reynolds (Mich. State U., East Lansing).
Psychological Bulletin, vol. 62, Nov. 1964, p. 333–347. 38 refs.

This paper deals primarily with findings in the area of reaction time, with a lesser focus on dichotic listening studies and stereoscopic perception. The generality of a temporary inhibition of response (TIR) phenomenon, given double stimulation in close temporal contiguity, is posited. Three alternatives are offered: a subject-centered (information and/or "filter" theory), an object-centered (the "expectancy" position), and a response-centered (a competing-response position) explanation. The latter is suggested as most adequately dealing with the data, although the alternatives are not seen as mutually exclusive. A method for the training of prepotent responses is suggested, along with an associated line of research into the TIR phenomenon.

A65-80099
A CONTINUOUS CULTURE APPARATUS FOR THE MICROBIAL UTILIZATION OF HYDROGEN PRODUCED BY ELECTROLYSIS OF WATER IN CLOSED-CYCLE SPACE SYSTEMS.
John F. Foster and John H. Litchfield (Battelle Mem. Inst., Div. of Biosci. Res., Columbus, Ohio).
Biotechnology and Bioengineering, vol. 6, Dec. 1964, p. 441–456. Contract NASr-100(03).

Two sources of oxygen for man in close-cycle space system environments have been considered in previous studies: (1) photosynthesis using algae, and (2) electrolysis of water. The latter system appears to be the most promising from the standpoints of energy and weight requirements and ability of operate in a zero gravity field. The surplus hydrogen produced by the electrolysis of water may be utilized together with waste carbon dioxide, part of the oxygen, and waste urea by bacteria of the genus Hydrogenomonas to produce cellular protein which might be used as a source of food. A continuous culture system for the propagation of hydrogen-fixing bacteria consists of a baffled borosilicate glass culture vessel provided with an impeller, a reservoir vessel for the culture medium, and an overflow vessel for collecting the bacterial cells removed from the culture vessel. Complete feedback control of all parameters affecting growth can be provided by hydrogen, oxygen, and carbon dioxide sensors, and a pH electrode in the culture medium. In addition, total pressure is monitored. Cell density is controlled in the optimum range by means of a photoelectric cell which dictates the amount of fresh medium to be added and the amount of cells to be removed. Operating data indicate that some of the key parameters are the ratio of hydrogen, oxygen, and carbon dioxide in solution. The harvested bacterial substance is high in protein, which contains all the essential amino acids.

A65-80100
MECHANISM OF RAISED RESISTANCE OF RATS TO HYPOXIA IN ACUTE RADIATION INJURY.
D. A. Chetverikov, Svyetlana V. Gasteva, K[illegible]. Ivanov, A. Vatsek, and M. Pospishil (USSR, Acad. of Sci., Pavlov Inst. o[illegible]l., Leningrad; and Czechoslovak Acad. of Sci., Inst. of Biophys., Brno)
Folia Biologica, vol. 10, 1964, p. 386–391. refs.

In rats subjected to whole body irradiation, raised resistance to hypoxia was observed at most of the postirradiation intervals studied up to 96 hours. The maximum effect, found 72 hours after irradiation, is evidently related to a decrease in the metabolic rate, accompanied by lowering of body temperature and of total oxygen consumption, which is specially pronounced during hypoxia in this phase. The basic factor in metabolic changes in the irradiated animals in this phase was found to be disturbance of regulatory functions. The results showed that the participation of other nonspecific resistance mechanisms can also be presumed, particularly at the early postirradiation intervals.

A65-80101
FUNDAMENTAL RESEARCH ON HIGH ENERGY RADIATION SHIELDING.
Hiroji Noda (Inst. of Radiol. Sci., Phys. Div., Chiba, Japan).
Nippon Acta Radiologica, vol. 24, Jul. 25, 1964, p. 387–394. 26 refs. In Japanese.

Shielding effects were investigated using electron beams and 10 to 29 MeV X-rays. The practical ranges of electrons were measured in various materials to examine the atomic number of these materials in regard to range-energy relationships. Ranges generally agreed with calculations that included the effects of multiple scattering of electrons at energies of 10 to 20 MeV. But at energies of above 25 MeV large differences between experimental results and calculations were observed. Intensities and angular distributions during the arrest of the electrons were measured in various materials to investigate the relationship between atomic number and energy. The results show that the bremsstrahlung intensity at a forward direction is generally independent of the atomic number and of the energy of electrons, while the intensity at a 90° direction is related to the atomic number in an exponential function. When a water "phantom" was irradiated by an electron beam, the energy distribution of bremsstrahlung in each direction was obtained by attenuation measurements of a Pb absorber. The energy build-up factor in Al, Fe, Pb was calculated from attenuation measurements of 29 MeV X-rays.

A65-80102
TEMPERATURE DISCRIMINATION IN THE SKIN.
A. Iggo (Edinburgh U., Depts. of Physiol. and Vet. Physiol., Gt. Brit.)
Nature, vol. 204, Oct. 31, 1964, p. 481–483. 9 refs.

Monkeys were anesthetized with chloralose and Nembutal and the afferent fibers were dissected from either the median nerve or the musculocutaneous nerve in the upper arm. Cutaneous temperautres were controlled by circulating water, held at about 0.02° C. by a thermostat, through a closed metal cylinder of 10 mm. diameter, which rested on the skin. All 19 thermoreceptors examined as single units were excited by lowering and inhibited by raising the cutaneous temperature. No receptors excited by small increases in skin temperature were found although in multiple-fiber preparations not examined in detail were some fibers comparable to the heat receptors of the cat. A possible reason for the failure to find sensitive warm receptors is that they are all innervated by non-myelinated axons. A comparison of the thermal sensitivity with the threshold of cold spots in human skin revealed a comparable sensitivity at threshold. None of the receptors could be excited by innocuous mechanical stimulation such as moving hairs, stroking or pressing of the skin.

A65-80103
CHANGES IN THE ELECTROENCEPHALOGRAM AND SKIN GALVANIC RESPONSE IN THE COURSE OF FORMING A TEMPORARY CONNECTION BETWEEN THE MOTOR AND VISUAL ANALYZERS IN MAN [IZMENENIE ELEKTROENTSEFALOGRAMMY I KOZHNO-GAL'VANICHESKOI REAKTSII V PROTSESSE OBRAZOVANIIA VREMENNOI SVIAZI MEZHDU DVIGATEL'NYM I ZRITEL'NYM ANALIZATORAMI U CHELOVEKA].
V. M. Vasil'eva (Moscow U., Dept. of Physiol. of Higher Nervous Activity, USSR).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 14, Sep.–Oct. 1964, p. 755–762. 20 refs. In Russian.

A pairing was made of kinesthesic and photic stimulations in man with a view to forming a temporary connection between the motor and visual analysers. Proprioceptive stimulation was achieved by the movement of the muscles, provoked by stimulation of the ulnar nerve through the skin by threshold impulses of a rectangular current not accompanied by tactile effect. After several pairings of the stimuli, a conditioned EEG response was elaborated: the movements of the muscles resulted in the same depression of the alpha-rhythm in the occipital area as the photic stimulations paired with them. The dynamics of EEG and galvanic skin response changes in the course of formation of such a reaction is characterized by a number of regularities inherent in temporary connections between exteroceptive stimuli.

A65-80104
THE INFLUENCE OF THE APPEARANCE PROBABILITY OF A SIGNAL ON THE PROCESS OF ITS DETECTION [VLIIANIE VEROIATNOSTI POIIAVLENIIA SIGNALA NA PROTSESS EGO OBNARUZHENIIA].
Iui Ven'-chzhao (Moscow U., Imeni, M. V. Lomon Osova, USSR).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 14, Sep.–Oct. 1964, p. 771–780. 18 refs. In Russian.

The results of 70 experiments on five subjects have shown that, with decreased appearance probability of a signal, the probability of its detection in EEG and EMG diminishes. On the other hand, with a decreased appearance probability, the number of spontaneous EEG reactions (alpha-rhythm depression) increases. No such regularity has been found in EMG. In addition, if the appearance probability of the signal decreases, both the latencies and the duration of aftereffect of responses in EEG and EMG increase. Measuring information transmission has shown that the average amount of information at the output diminishes with a decrease in the average amount of information at the input.

N65-80105
INFLUENCE OF ROTATIONAL TRAINING ON MOTOR CONDITIONED REFLEXES IN RATS [VLIIANIE VRASHCHATEL'NOI TRENIROVKI NA DVIGATEL'NYE USLOVNYE REFLEKSY U KRYS].
S. I. Nudman (USSR Acad. of Sci., Pavlov Inst. of Physiol., Lab. of Comp. Ontogenesis of Higher Nervous Activity, Koltushi).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 14, Sep.–Oct. 1964, p. 885–891. 23 refs.

The investigation was aimed at studying the effect of rotatory training on higher nervous activity of white rats. It was found as a result of the experiments that rotation exercises detrimental influence on conditioned activity. This effect was revealed not only in the experiment conducted immediately after rotation, on the same day, but in an experiment made the next day. Rotation acts differently on conditioned reflexes elaborated from various analysers: it has a stronger effect on reflexes from the auditory analyser. It was observed in the course of repeated experiments that the animals became trained to vestibular stimulation.

A65-80106
GOOD INHALATION TOLERANCE OF VERY COLD AIR BY A NORMAL SUBJECT [BONNE TOLERANCE DE L'INHALATION D'AIR TRES FROID PAR LE SUJET NORMAL].
Alain Milhaud, Maurice Cara, and Jean Facquet.
Comptes Rendus des Seances de l'Academie des Sciences, vol. 259, Oct. 19, 1964, p. 2687–2689. 13 refs. In French.

No significant difference was noted in either cardiac or respiratory frequency in 14 human subjects inhaling very cold dry air (from -5° to -100°C.). The cold air was warmed by passage through the bronchi before reaching the lungs. The device for producing and controlling the cold air is diagrammed.

A65-80107
BIOCHEMICAL ASPECTS OF CARBON TETRACHLORIDE POISONING.
Gilberto G. Villela (Inst. Oswaldo Cruz, Biochem. Lab., Rio de Janeiro, Brazil).
Biochemical Pharmacology, vol. 13, 1964, p. 665–676. 109 refs.

A review is presented of the various biochemical and physiological aspects of carbon tetrachloride (CCl_4) poisoning. The sequence of events in the liver after administration of CCl_4 is discussed as stages of diffusion of CCl_4, cytological changes, infiltration, enzyme changes in the liver, electrolyte metabolism changes, centrolobular necrosis, and liver regeneration. The various papers studied in this review indicate new areas of research on how CCl_4 affects cells. The information suggests that cell lipids and mitochondria may be the most susceptible sites of damage.

A65-80108
OCULAR PARALYSES AND APTITUDE OF FLYING PERSONNEL [PARALYSIES OCULAIRES ET APTITUDE AU PERSONNEL NAVIGANT].
G. Perdriel, G. Raynaud, P. Desbordes, and A.-M. Vernier (Centre Principal d'Expertise Med. du Personnel Navigant de l'Aéron., Paris, France).
Revue de Médecine Aéronautique, vol. 3, May–Jun. 1964, p. 7–9. In French.

During the physical examination for selection, existing ocular paralyses are discovered only upon examination of binocular vision, ass diplopia is never present. This finding disqualifies a candidate from flight training or work as a navigator where perfect vision is necessary. The appearance of ocular paralysis in flying personnel during control medical examinations necessitates a careful appraisal with regard to etiology. In 90% of the cases paralysis results from trauma. Diplopia always exists. In most cases a decision of inability to fly is rendered; however, in some cases flying activities have been resumed after medical or surgical treatment.

A65-80109
TEMPERATURE OF EXPIRED AIR, IN A COLD ENVIRONMENT [TEMPERATURE DE L'AIR EXPIRE, EN AMBIANCE FROIDE].
Y. Houdas, J. Martin-Lalande, and J. Colin (Centre d'Essais en Vol, Lab. de Med. Aero-Spatiale, Bretigny-sur-Orge, France).
Revue de Médecine Aéronautique, vol. 3, May–Jun. 1964, p. 11–12. 6 refs. In French.

A series of rapid temperature measurements were made on three subjects in a cold environment (–15°C. to +15°C.). It was demonstrated that the temperature of expired air was a linear function of environmental temperature (or *the temperature of inspiration). On the basis of the environmental temperatures*, immediately before inspiration, preheating of the air was produced by convection (and radiation) upon contact with cloths and integuments. This effect was attained from 10°C. to –15°C.

A65-80110
FUNCTIONAL EXAMINATION OF PRESSURE BREATHING: MEASUREMENT OF THE PULMONARY DIFFUSION CAPACITY [EXPLORATION FUNCTIONNELLE DE LA RESPIRATION EN SURPRESSION: LA MESURE DE LA CAPACITE DE DIFFUSION PULMONAIRE].
C. Jacquemin and P. Varene (Centre d'Essais en Vol, Lab. de Med. Aero-Spatiale, Bretigny-sur-Orge, France).
Revue de Médecine Aéronautique, vol. 3, May–Jun. 1964, p. 12–15. 28 refs. In French.

In order to evaluate the effects of continuous positive pressure breathing (+30 millibars), to which aviation personnel are exposed, a method of measuring pulmonary diffusion capacity for carbon monoxide (DL_{CO}) according to the apnea technique of Forster et al. was used on three male subjects. This method permits the maintenance of total pulmonary volume identical to that of respiration at normal pressure (normal inspiration at the level of vital capacity). Under these conditions the subjects showed no evidence of reduction in DL_{CO}, indicating a decrease of pulmonary capillary volume. This technique may be of value in medical selection and control procedures of flying personnel to evaluate respiratory function.

A65-80111
SOME OBSERVATIONS OF THE SENSITIVITY OF DIFFERENT ORGANS TO HYPOXIA (HISTOAUTORADIOGRAPHIC STUDY) [QUELQUES OBSERVATIONS SUR LA SENSIBILITE DES DIFFERENTS ORGANES A L'HYPOXIE (ETUDE HISTOAUTORADIOGRAPHIQUE)].
R. Loubiere, A. Pfister, A. Rambourg, and J.-P. Dadoune (Centre d'Enseignement et de Rech. de Méd. Aéron., Paris, France).
Revue de Médecine Aéronautique, vol. 3, May–Jun. 1964, p. 17–20. In French.

Mice injected intraperitoneally with DL-methionine in order to study protein synthesis were subjected to prolonged hypoxia (4 hours) at a simulated altitude of 8000 meters. Tissues from the sacrificed animals were studied by histophotometric methods. Four types of reactions to prolonged hypoxia were observed: (1) In the liver, testes, and intestine there was a total decrease of DL-methionine incorporation without any significant difference between the various organ areas. (2) The spleen, kidney, and adrenal gland showed a total decrease of incorporation with notable differences among the regions of the organ. (3) Decreased incorporation was found in most stomach areas, with paradoxical increases in others. (4) The exocrine pancreas exhibited a total increase of DL-methionine incorporation. The results indicate that hypoxia decreases protein anabolism at the level of most tissues.

A65-80112
PHONATION DURING PRESSURE BREATHING [DE LA PHONATION AU COURS DE LA RESPIRATION EN SURPRESSION].
C. Jacquemin, P. Varene, J. Demange, and J. Timbal (Centre d'Essais en Vol, Lab. de Méd. Aérospatiale, Bretigny-sur-Orge, France).
Revue de Médecine Aéronautique, vol. 3, May–Jun. 1964, p. 21–23. 15 refs. In French.

During laboratory experiments, including electromyography of the respiratory apparatus, simultaneous pressure measurements of thoracic and abdominal pressures and phonation, no difference was found between the speech mechanism in normal breathing and pressure breathing. The classical theory is discussed concerning mechanical ventilation during pressure breathing where the conditions favor difficulty in speaking. An inverse hypothesis is presented where indoctrination is intended to normalize base ventilation by retraining the expiratory phase of the speech pathway. It is suggested that training in pressure breathing be divided into two parts: ventilatory inspiration and expiration during speaking.

A65-80113
EFFECT OF ALTITUDE ON URINARY EXCRETION OF CATECHOLAMINES IN MAN [EFFET DE L'ALTITUDE SUR L'EXCRETION URINAIRE DES CATECHOLAMINES CHEZ L'HOMME].
L. Peyrin, J.-F. Cier, and R. Flandrois (Fac. de Méd. de Lyon, Lab. de Physiol., Paris, France).
Revue de Médecine Aéronautique, vol. 2, May–Jun. 1964, p. 25–26. 11 refs. In French.

Urinary excretion of adrenaline was greatly increased in healthy men between 30 and 40 living at an altitude of 3613 meters for 28 days. Noradrenaline excretion was less significant than that of adrenaline. The urinary excretion of catecholamines remained at a high level for the first eight days at altitude indicating signs of adaptation to altitude. It appears that the secretory activity of the medullary portion of the adrenal capsule is stimulated by anoxia. This is a strong stimulation since it persists even after a week of rest. The exact nature of the adrenaline secretion mechanism could not be determined from the results. Many factors are involved, among which are the carotid and aortic chemoreceptor reflexes stimulated by anoxemia.

A65-80114
PROTEIN SYNTHESIS IN THE EXOCRINE PANCREAS DURING HYPOXIA (HISTOAUTORADIOGRAPHIC STUDY) [LA SYNTHÈSE PROTÉIQUE DU PANCRÉAS EXOCRINE EN HYPOXIE (ETUDE HISTOAUTORADIOGRAPHIQUE)].
R. Loubiere, A. Pfister, A. Rambourg, and J.-P. Dadoune.
Revue de Medecine Aeronautique, vol. 3, May–Jun. 1964, p. 29–31. In French.

Mice were exposed to a simulated altitude of 8000 meters, injected with Methionine S^{35} or Phenylalanine H3, and decapitated. Histophotometry of the pancreas revealed that during the phase of enzymatic elaboration, protein synthesis was especially inhibited by hypoxia for the two amino acids, but that the time of inhibition was longer for methionine than for phenylalanine. During the phases of zymogen excretion and late enzyme elaboration nothing changed except for an increase of amino acids in the exocrine pancreas, an increase which attained five times the normal value in the case of phenylalanine. Examination of histoautoradiographic preparations showed that in hypoxia, the initial conditions of elaboration of the zymogen were the same as in normoxia, but during prolonged hypoxia a considerable increase in the acini appeared. This may be explained by an exaggerated activity of protein metabolism and also by blockage of enzyme excretion. A discussion is included of hypoxia and the command mechanism of pancreatic secretion, and hypoxia and enzymatic excretion.

A65-80115
EOSINOPHILIA AND FLYING PERSONNEL [EOSINOPHILIE ET PERSONNEL NAVIGANT].
J. Lavernhe, J. Courillon, and E. Lafontaine (Serv. Méd. d'Air France, Paris).
Revue de Médecine Aéronautique, vol. 3, May–Jun. 1964, p. 32–34. In French.

Eosinophilia appearing in hematological tests of Air France flying personnel during control medical examination was found to be caused by allergies (10%), Anguillula (12.8%), Ankylostoma (10%), Ascaris (7.1%), intestinal Bilharziosis (4.3%), distomatosis (2.8%), filariosis (4.3%), larva migrans (4.3%), Oxyuris (10%), and Taenia (34.3%). Eosinophilia of unknown etiology were found in 359 cases. These eosinophilias regressed in 85% of the cases within 3 months. Eosinophilia appearing in flying personnel necessitates accurate etiological diagnosis. With adequate treatment and laboratory tests the subject is returned to flight duty. The importance of blood examinations during periodic control medical examinations is stressed, especially for personnel residing in tropical countries.

A65-80116
HYPOXIC POLYCYTHEMIA STUDY OF A NEO-HEMOGLOBIN [POLYCYTHEMIE HYPOXIQUE RECHERCHE D'UNE NEOHEMOGLOBINE].
M. M.-V. Strumza and C. Atger (Fac. de Méd., Lab. de Biol. Aéron., Paris, France).
Revue de Médecine Aéronautique, vol. 3, May-Jun. 1964, p. 35-36. 9 refs. In French.

Prolonged and severe intermittent hypoxia in the rat involves polycythemia with increases in the hemoglobin level. These reactions reach their maximum value in two or three weeks. In spite of the persistence of hypoxia, hematological values decrease and ultimately return to normal. Using the technique of electrophoresis on starch gel, a "neohemoglobin" with characteristics different from normal hemoglobin was demonstrated during hypoxic polycythemia.

A65-80117
METHODS OF EXAMINATION OF THE BRONCHI DURING TRANSVERSE ACCELERATIONS [LES METHODES D'EXPLORATION DES BRONCHES AU COURS DES ACCELERATIONS TRANSVERSES].
P. Varene and C. Jacquemin (Centre d'Essais en Vol., Travail du Lab. de Méd. Aerospatiale, Bretigny-sur-Orge, France).
Revue de Médecine Aéronautique, vol. 3, May-Jun. 1964, p. 37-39. 17 refs. In French.

Transverse accelerations cause respiratory disorders and limit the tolerance to forces of inertia affecting astronauts during launch and reentry of artificial satellites. A review of the literature is presented of the following respiratory function tests, which may be used to solve the problem of tracheobronchial behavior during transverse accelerations: (1) volume-time diagram, (2) pressure-flow diagram, (3) pressure-volume diagram, (4) flow-volume diagram (registration of direct and indirect volume-flow curves), (5) measurement of anatomical dead space, and (6) radiophysiological methods.

A65-80118
THE ACTION OF FLUPHENAZIME (MOTIDEN) ON REACTION TIME AND THE TOTAL RESPONSE TIME [ACTION DU FLUPHÉNAZINE (MOTIDEN) SUR LE TEMPS DE RÉACTION ET LE TEMPS DE RESPONSE TOTAL].
N. Seris and R. Auffret.
Revue de Médecine Aéronautique, vol. 3, May-Jun. 1964, p 40-46. 11 refs. In French.

Measurements were made of 675 reaction times and 632 total response times of 12 subjects exposed to visual stimulation during simulated flight tests. The subjects (a) ingested no substance, (b) ingested a placebo, or (c) ingested a tablet of fluphenazine (Motiden). No difference in performance was found under the three conditions studied. The average reaction time was 0.33 seconds and total response time, 0.67 seconds. Included are representative graphs of the results.

A65-80119
THERMAL PROTECTION FROM JUMPING AT HIGH ALTITUDE [PROTECTION THERMIQUE LORS DU SAUT A HAUTE ALTITUDE].
Jean Colin and Yvon Houdas (Centre d'Essais en Vol, Lab. de Med. Aerospatiale, Bretigny-sur-Orge, France).
Revue de Médecine Aéronautique, vol. 3, May-Jun. 1964, p. 47-49. 8 refs. In French.

Measurements were made of cutaneous temperatures of subjects exposed to a temperature of -46°C. in the laboratory while wearing a new type of warm underclothing (C.E.P. 832). This garment is composed of cotton containing heat-resistant elements distributed regularly at the skin level. Preliminary results appear to be encouraging; however several modifications must be made for the clothing to afford better protection against cold. This garment is to protect parachutists from extreme cold exposure while jumping from aircraft at very high altitude (20 km.).

A65-80120
THE APPLICATION OF PLETHYSMOGRAPHY TO THE STUDY OF BREATHING APPARATUS (DE L'APPLICATION DE LA PLETHYSMOGRAPHIE A L'ETUDE DES EQUIPEMENTS RESPIRATOIRES).
J. Tombal, P. Varene, J. Demange, and C. Jacquemin (Centre d'Essais en vol, Lab. de Med. Aerospatiale, Bretigny-sur-Orge, France).
Revue de Medecine Aeronautique, vol. 3, May-Jun. 1964, p. 50-53. 15 refs. In French.

The plethysmographic technique was used to measure the mechanical characteristics of oxygen masks and helmets of pressurized suits. Measurements were made of pulmonary volume and airway passage resistance during respiration under experimental conditions and tabulated. Plethysomography was shown to be advantageous in testing the subject together with his respiratory equipment.

A65-80121
DETECTION OF EPILEPSY IN FLYING PERSONNEL CANDIDATES [DETECTION DE L'EPILEPSIE CHEZ LES CANDIDATS AU P.N.].
Gilbert Soussen (Centre Principal d'Expertise Méd. du Personnel Navigant de l'Aéron., Paris, France).
Revue de Médecine Aéronautique, vol. 3, May-Jun. 1964, p. 54. In French.

Electroencephalography (EEG) is of great value in screening confirmed and suspected cases of epilepsy during the medical evaluation of flying personnel. In addition to EEG, medical officers take into consideration clinical and other factors prior to rejecting an applicant. Diagnosis of epilepsy may be complicated by the different physiological aspects of EEG possible in normal man.

A65-80122
ANAEROBIC GLYCOLYSIS AS A PATHWAY FOR PROTEIN SYNTHESIS IN THE EXOCRINE PANCREAS DURING HYPOXIA [LA GLYCOLYSE ANAEROBIE COMME VOIE DE LA SYNTHÈSE PROTÉIQUE DU PANCRÉAS EXOCRINE EN HYPOXIE].
P. L'Hermite, R. Loubiere, A. Pfister, and A. Rambourg.
Revue de Médecine Aéronautique, vol. 3, May-Jun. 1964, p. 55-58. 50 refs. In French.

Ten male mice exposed to a simulated altitude of 8000 meters in a decompression chamber for 3 hours were decapitated and their liver and pancreatic acid contents compared with 10 control animals. The results showed that the pancreas was capable of continuing important protein synthesis during hypoxia, thereby permitting an increase in anaerobic glycolysis. Increase in the pancreatic lactic acid content was more significant than that found in the liver. This increase persisted even after the animal's death, with values that the normal pancreas was incapable of attaining.

A65-80123
MEDICO-PHYSIOLOGICAL ASPECTS OF COMMERCIAL SUPERSONIC FLIGHT [ASPECTS MEDICO-PHYSIOLOGIQUES DU VOL COMMERCIAL SUPERSONIQUE].
J. Lavernhe.
Revue de Médecine Aéronautique, vol. 3, May-Jun. 1964, p. 63-67. 12 refs. In French.

The problems confronting man during commercial supersonic flight (Mach 2 and 3) are related primarily to altitude and speed. The factors related to altitude include (1) atmospheric depression which causes expansion of body gases, anoxia, and aeroembolism; (2) ozone toxicity; (3) ionizing radiation from cosmic and proton rays and artificial radioactive sprays; and (4) visual problems. Certain indirect consequences of speed include heating of the outer parts of the aircraft, noise, supersonic boom, and time changes. The psychological problems affecting the aircrew as well as the passengers are discussed.

A65-80124
DISORDERS OF VENTRICULAR REPOLARIZATION OF UNDETERMINED ORIGIN--DIAGNOSTIC PROBLEMS [ATYPIES DE LA REPOLARIZATION VENTRICULAIRE D'ORIGINE INDETERMINEE--PROBLEMES DIAGNOSTIQUES].
F. Plas, J. Robion, J. Sepetjian, and P. Vesual.
Revue de Medecine Aeronautique, vol. 3, May-Jun. 1964, p. 59-60. In French.

Forty-one out of 1500 electrocardiographic tracings examined during periodic medical examinations of civil and military personnel presented disorders of the T-wave manifested by ventricular repolarization. These disorders were of unknown origin. Included is a list of diagnotic tests to either precede or follow electroencephalography which are aimed at repairing these atypical findings. During selection examinations when repolarization abnormalities are patent and not corrected by specific tests, the medical officer must render the subject unfit for flight duty. When the abnormality can be corrected, temporary unfitness is declared pending upon subsequent medical examination in several months. During control examination where the subject is usually older (between 40 to 60 years of age) a decision of unfit for flight is rendered where coronary disorders are probable. A decision of fitness or temporary fitness is rendered when no organic disorder is clinically found and the abnormality can be corrected by practical tests.

A65-80125
PRESENT ASPECTS OF OCCUPATIONAL DEAFNESS IN MAINTENANCE CREW OF FRENCH AIR FORCE WORKING AT JET AIRCRAFT BASES [ASPECTS ACTUELS DE LA SURDITE PROFESSIONNELLE CHEZ LES MECANICIENS DE PISTE DE L'ARMEE DE L'AIR TRAVAILLANT DANS LES BASES D'AVIONS A REACTION].
J. Bastien, G. Nicolas, G. Cauvin, and J. Robion (Centre Principal d'Expertise Med. du Personnel Navigant de l'Aeron., Paris, France).
Revue de Medecine Aeronautique, vol. 3, May-Jun. 1964, p. 61-62. In French.

Two investigations were made within a 16 month period of 1547 ground crew mechanics in various specialties working with various types of jet aircraft in order to assess the incidence of hearing disorders. The subjects were

subjected to interrogation, clinical examination and audiometry. Sixty percent of the persons examined showed no disorder of the hearing apparatus. Thirty percent had slight hearing disorders, and 3.5% revealed marked alterations of hearing perception. Concerning individual protection, 870 mechanics used antinoise helmets, 133 various types of earplugs, and 551 used no protection. During the second examination 618 mechanics were examined. Of these, 485 revealed no change in hearing, 133 (21.5%) exhibited hearing problems. The importance is stressed of annual audiometric control for most mechanics, and every six months for those especially sensitive to noise.

A65-80126
PROBLEMS POSED BY CERTAIN DISORDERS OF VENTRICULAR REPOLARIZATION IN THE RECRUITMENT AND CONTROL OF FLYING PERSONNEL [PROBLEMES POSES PAR CERTAINES ATYPIES DE LA REPOLARISATION VENTRICULAIRE DANS LE RECRUTEMENT ET LA SURVEILLANCE DU PERSONNEL NAVIGANT].
A. Mathivat (Paris, Hospital, France).
Revue de Médecine Aéronautique, vol. 3, May–Jun. 1964, p. 69–71. In French.

During selection and control examinations, 59 out of 73 persons presented atypical ventricular repolarization of the T-wave and ST-segment of the electrocardiogram. No heart disease was found in these persons during clinical or cardiological examination. A battery of tests (Master test, potassium or ergotamine tartrate overloading, and hyperpnea test) were used to possibly discriminate these findings with abnormalities of ischemic origin. The diagnostic problems facing the medical officer in rejecting or accepting recruits with atypical ventricular repolarization of undetermined origin or in rendering flying personnel unfit for duty are discussed. Factors possibly capable of modifying ventricular repolarization may be related to neurovegetative instability of the subject, emotional stress, hyperventilation, or potassium and calcium ionic imbalance.

A65-80127
THE PHYSIOPATHOLOGY OF EQUILIBRIUM IN THE AVIATOR [LA PHYSIOPATHOLOGIE DE L'EQUILIBRE CHEZ L'AVIATEUR].
P. Pialoux.
Revue de Médecine Aéronautique, vol. 3, May–Jun. 1964, p. 72–77. In French.

A review is presented of equilibrium in the aviator which includes the following topics: (1) anatomy of the vestibular apparatus; (2) physiology of man on the ground and during flight; (3) physiopathology of the vestibular apparatus during flight (airsickness, vertigo, nystagmus, Coriolis effect, vestibular illusion, effects of anoxia, decompression, cold, noise, etc.); (4) correction of the factors causing vestibular disorders and adaptation of the pilot; and (5) vestibular apparatus during weightlessness.

A65-80128
BIOLOGICAL RHYTHMS.
Alain Reinberg (Natl. Center for Sci. Res., Paris, France) and Jean Ghata (Central Lab. for Functional Exploration, Paris, France).
New York, Walker and Company, 1964, *viii+138 p. 26 refs.*

Results of research in the field of biological rhythms are presented and discussed. The following are included: (1) elementary rhythmical activity in living matter (including respiration, pulsatile vacuoles, heart, neuro-motor systems, general interpretation, and physical models); (2) circadian rhythms (in plant biology, in animal biology, systems, concepts); (3) rhythms considerably longer than a day (cyclical behavior of social insects, selenian rhythms, sexual cycles of polyestrous vertebrates, and control of sexual cycles of mammals); (4) annual rhythms (dormancy, periodicity and thermoperiodicity in plant biology, annual sexual rhythms, other annual rhythms of animals, and annual rhythms in man); and (5) circadian rhythms in man (including waking-sleeping, temperature variations, blood pressure, pulse, basal metabolism, renal function and urinary excretion, endocrine activity, physiopathological interest, and accident rate at work). A bibliography and combined author and subject index are included.

A65-80129
SPACE CABIN LANDING IMPACT VECTOR EFFECTS ON HUMAN PHYSIOLOGY.
John P. Stapp and Ellis R. Taylor (Holloman AFB, N. Mex.)
Aerospace Medicine, vol. 35, Dec. 1964, p. 1117–1133. 33 refs.

Fifty-eight human volunteers in 146 experiments endured impact forces simulating space cabin landing impacts following parachute descent. Impact forces were experienced in 16 body positions in combination of pitch and yaw, and seven configurations of onset (1000, 1500, and 2000 g/sec.), magnitude (10, 15, 20, and 25 g) and durations (60 to 130 milliseconds). All body positions and impact configurations were within voluntary tolerance limits except the forward facing 45° reclining position at 25.4 g measured on the sled with onset of 1000 g per sec. and 60 millisecond duration, in which compression of soft tissues around the 6th, 7th, and 8th thoracic vertebrae caused pain and stiffness for 60 days. Bradycardia immediately post impact was triggered by headward impact vectors resulting in hydraulic pressure stimulation of carotid sinuses, dropping heart rate by as much as 90 beats per min. for 10 to 30 sec. Gastric motility changes related to pitch or yaw angles of 40° or more from the line of motion. No significant changes in blood or urine were recorded. Head fixation, automatic retraction of harness before impact, and energy attenuation to keep impact force below 20 g magnitudes and above 60 millisecond pulse duration are recommended.

A65-80130
MANAGEMENT OF PSYCHIATRIC PATIENTS DURING AIR EVACUATION: A STUDY OF THREE COMMONLY USED DRUGS.
Don E. Flinn, Bryce O. Hartman, and Bernard E. Flaherty.
Aerospace Medicine, vol. 35, Dec. 1964, p. 1133–1140. 11 refs.

Past and present problems in the air evacuation of psychiatric patients were reviewed. The sedation of these patients has to be sufficient to prevent disturbed in-flight behavior without producing respiratory distress or nursing problems associated with care for a semicomatose patient. In this respect tranquilizing drugs widely used by air evacuation personnel in recent years offer many advantages over the sedatives. A study is reported that compares two phenothiazine tranquilizers (chlorpromazine and prochlorperazine) with amobarbital in actual air evacuation operations, including 55 flights and a total of 97 patients. Phenothiazines were shown on nurses' ratings to be somewhat superior in manageability of this group of patients, classified as 1B. Each group exhibited some symptoms, which were apparently side effects of the drug. If it were not for the double blind nature of the experiment most of the symptoms could have been controlled.

A65-80131
HUMAN LOCOMOTION IN SUBGRAVITY.
R. Margaria and G. A. Cavagna (Milan U., Ist. di Fisiol. Umana, Italy).
Aerospace Medicine, vol. 35, Dec. 1964, p. 1140–1146. 8 refs. In Italian.
Natl. Res. Council supported research.

The validity of experimental models simulating subgravity on earth is discussed. In walking at g = 1, kinetic and potential energy levels are in phase opposition: muscular energy is utilized substantially to lift the body (increase of potential energy), while forward acceleration is obtained mainly through the transformation of potential into kinetic energy. The shift from walking to running takes place at a critical speed of 8.5 km./hr. Under subgravity conditions, less potential energy is available to sustain the forward acceleration of the body, because the lifting of the body requires less energy. Hence, the critical speed of transition from walking to running will be correspondingly lower. Thus, on the moon (0.16 g) walking would be almost impossible. Because of the lower weight of the subject, the vertical component of the force may be too low to maintain the adherence of the foot on the ground and prevent skidding. A maximal speed of running of about 5 km./hr. can be achieved, if the ground is covered by a deep layer of dust. On hard soil the speed would be 13 km./hr. By utilization of the vertical component through jumping, a more efficient way of locomotion could be attained. The possible utilization of the elastic energy of the contracted muscle is discussed. When running under 1-g conditions on earth, 40% of the work is attributable to this type of energy. Since work performed against the forces of gravity is considerably less on the moon than on earth, the energy demands of speed maintenance per distance covered and for a given speed value is much less.

A65-80132
EFFECT OF OXYGEN ON RADIATION RESISTANCE OF MICE.
F. B. Benjamin and L. Peyser (Republic Aviation Corp., Life Sci. and Space Environ. Lab., Farmingdale, L.I., N.Y.)
Aerospace Medicine, vol. 35, Dec. 1964, p. 1147–1149. 12 refs.

Mice exposed to ionizing radiation (750 r and 1100 r) in an environment of 5 psi (260 mm Hg) of pure oxygen show a decrease in survival time. This is considered to be due to a toxic effect of oxygen. Increasing the metabolic rate of mice by means of exercise during exposure to radiation (1100 r and 1200 r) decreases survival time. Results do not indicate whether this is due to increased intensity of radiation damage or due to change of onset of clinical effects.

A65-80133
SOME CHALLENGES TO THE AEROSPACE MEDICAL ASSOCIATION—FROM A LIGHT ATTACK PILOT.
Robert R. King, Jr. (Naval Air Station, Lemoore, Calif.)
Aerospace Medicine, vol. 35, Dec. 1964, p. 1151–1154.

A number of problems shared by light attack-aircraft pilots of the U.S. Navy and by the fighter-bomber pilots of the U.S. Air Force Tactical Air Command are outlined and discussed. The following are included: (1) combat effectiveness (as related to cockpit size, pilot fatigue, navigation, and target identification); (2) pilot efficiency (with respect to optimum work hours, optimum training periods, and at-sea deployment schedules); (3) flight safety as related to target hypnosis, light reflections, external lighting, and cockpit design); (4) pilot comfort (with respect to oxygen masks and flight gloves); and (5) survival (in terms of equipment size and standardization). These problems compose only a partial listing of the difficulties which challenge the pilots. Other problem areas are mentioned briefly.

A65-80134
A TEST PILOT'S VIEWPOINT OF AEROSPACE BIOENGINEERING AS APPLIED TO CURRENT COMMERCIAL TRANSPORTS.
James R. Gannett.
Aerospace Medicine, vol. 35, Dec. 1964, p. 1154–1155.

The design and development of the supersonic transport is one of the biggest challenges facing the aviation industry today. This aircraft will be heavier and faster than present-day commercial transport and will be expected to have all-weather landing capability. The areas of particular importance to the flight crew member and the human or bioengineers are the cockpit of flight-deck displays, the various controls, and the aircraft's handling qualities. Examples of items needing improvement in these areas in today's aircraft are presented and discussed. Pilots who have been through one of the test pilot's schools and who take their evaluation work seriously are usually consistent on items such as handling qualities. But in the area of instrumentation and flight-deck layouts, pilots are in dire need of a basic set of principles such as a guide to help in the design and evaluation phases. It is suggested that the evaluation pilot should acquaint himself with human engineering so that he, along with the human engineer, can develop a set of common guidelines, principles, checklists, etc., for use in flight-deck design.

A65-80135
LIFE SCIENCE REQUIREMENTS FOR DYNA-SOAR AND SIMILAR PROGRAMS.
James W. Wood (Edwards Flight Test Center, Calif.)
Aerospace Medicine, vol. 35, Dec. 1964, p. 1156–1157.

Descriptions are presented of pilots' participation in the early stages of the design of the X-20 aircraft. Initially their task was in the areas of cockpit design and simulator flying. As the design of the vehicle progressed, they became involved with the systems of the vehicle itself. Such systems as a two-axis sidearm controller, pressure suits, escape systems, and medical monitoring are included. It is emphasized that early pilot participation with human engineering and aeromedical personnel is essential to satisfactory cockpit and crew protection design. It is suggested that the experience gained on the X-20 and similar systems is directly applicable to design of any future aircraft or space vehicle.

A65-80136
AEROSPACE MEDICAL AND BIOENGINEERING CONSIDERATIONS IN LIFTING-BODY AND RESEARCH-AIRCRAFT OPERATIONS.
Milton O. Thompson (NASA, Flight Res. Center, Edwards, Calif.)
Aerospace Medicine, vol. 35, Dec. 1964, p. 1157–1160.

Bioengineering aspects (cockpit design, protective equipment, escape system, medical monitoring, and crew selection and evaluation) of the M-2 Lifting Reentry Vehicles are discussed. There are no medical or bioengineering problems unique to the lifting body vehicle. The flight environment will not approach any boundaries or limits of pilot endurance or performance, since the foreseeable missions are earth orbital, rendezvous, and return. To properly use the hypersonic and subsonic lifting capability, the pilot must be a part of the primary control loop. Consideration of pilot control requirements in cockpit design and visibility will enable the pilot to accomplish the entire reentry, approach, and landing with consistent reliability.

A65-80137
MANNED SPACE FLIGHT—LOGICAL SEQUEL TO MANNED AIRCRAFT.
Frank Borman.
Aerospace Medicine, vol. 35, Dec. 1964, p. 1160–1161.

Problems in the manned spacecraft program developed in part because of a fundamental difference in point of view between most crew members and a majority of the medical and human engineering personnel. Crew members have considered space flight as a logical sequence to flight in manned aircraft. Some medical personnel, on the other hand, have looked upon manned space flight as an adventure into an entirely new realm. These divergent attitudes have led to discussions of considerable length on subjects as diversified as attitude controllers, annunciator panels lighting time and lettering legibility schedules, and monkey flights. These examples are minor in nature and have already been solved. Nevertheless, the fact that they require resolving at all illustrates the need for a greater awareness of the pilot's peculiarities on the part of the medical and engineering stafffs responsible for contributions to the design of vehicles. The engineering test pilot, or astronaut, should be brought into the vehicle design at its earliest stage.

A65-80138
AEROSPACE MEDICINE AND BIOENGINEERING: A TEST PILOT'S VIEWPOINT.
Frank H. Austin, Jr.
Aerospace Medicine, vol. 35, Dec. 1964, p. 1161–1162.

Experiences of a flight surgeon and test pilot are presented as they relate to human engineering and aeromedical contributions in cockpit design, protective equipment, escape systems, medical monitoring, and selection and evaluation techniques. Although accident fatality losses are extremely low for test-pilot activities, areas of improvement in the above-mentioned equipment and procedures are still needed. Some of the reasons for crashes with loss of pilot and aircraft occurring at present are the following: (1) human errors in aircraft maintenance and servicing; (2) mechanical failure of escape systems, particularly ejection seats; (3) pilot error during landing, and (4) accidents while flying under instrument and night conditions. It is suggested that those working in the field should give appropriate attention to the realistic test or operational flight conditions to be met by safety and survival equipment.

A65-80139
LOGISTICS CONSIDERATIONS DERIVED FROM VARIATIONS IN OPERATOR OUTPUT CHARACTERISTICS.
I. Streimer and B. Wendrow (North Am. Aviation, Inc., Space and Inform. Systems Div., Downey, Calif.).
Aerospace Medicine, vol. 35, Dec. 1964, p. 1163–1166. 35 refs.

Logistics considerations of future space systems deal with (a) fixed expendables requirements, i.e. materials requisite to vehicle control during all phases of flight, and (b) variable expendables covering largely life support requirements reflecting interactions between mission work requirements and worker output characteristics. The present lack of knowledge of operator capability and expendables requirements in manned space systems renders any estimations of system capability, size, cost, and weight suspect. Because of the lengthy lead time requirements, it is imperative that simulator programs be initiated which are designed to gather quantitative data descriptive of worker output characteristics in reduced tension and/or pressure-suited environments.

A65-80140
SKIN TEMPERATURE RESPONSES TO OPTICALLY FILTERED INTENSE THERMAL RADIATION.
W. C. Kaufman and J. C. Pittman, Jr. (Aerospace Med. Div., Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
Aerospace Medicine, vol. 35, Dec. 1964, p. 1167–1171. 16 refs.

The thermal energy produced by tungsten filament quartz lamps is sufficiently close to that of nuclear detonations and intense fires to allow laboratory studies of some physiological responses to such catastrophes. In 125 experiments, the skin temperature changes of the dorsum of the hands of 6 subjects were measured radiometrically and with surface and intradermal thermocouples during exposure to intense thermal radiation. Irradiance levels ranged from 0.06 to 0.6 cal/cm^2 sec. Energy was unfiltered, filtered by plate glass, filtered by plexiglass, or filtered by laminated plate glass (aircraft windshield). Laminated glass showed the greatest attenuation, allowing 1/3 the temperature change produced by unfiltered energy. Plexiglass attenuated the skin temperature response by 1/2. Measurements of time-to-tolerance for ink-blackened and natural skin indicate that natural skin reflects or passes an amount of plexiglass-filtered energy sufficient to significantly reduce the temperature response when compared to that produced by unfiltered energy. These differences are due to the interrelation of spectral characteristics of the filtered radiant energy and skin and can combine in extreme cases in such a way that black skin may be burned while white skin is not.

A65-80141
THE ROLE OF ACETYLCHOLINE AND RELATED DRUGS IN ACCELERATION IN STRESS TOLERANCE.
Grover J. D. Schock (USAF Acad., Colo.)
Aerospace Medicine, vol. 35, Dec. 1964, p. 1172–1175. 17 refs.

An investigation was conducted to determine the role(s) of various drugs in acceleration stress. Apparently weight has no influence on the mean tolerance time of the rat when subjected to 20 g measured at heart level. Repeated centrifugation produces equivocal results; some animals show improved performance, others less tolerance, and a third group no change in mean tolerance time. Of the drugs tested, the following appear to offer a limited beneficial effect on mean tolerance time: DMAE (dimethylaminoethanol), and Lucidril (ester of dimethylaminoethanol and p-chlorophenoxyacetic acid). The Na salts of p-chlorophenoxyacetic acid and 2, 4, dichlorophenoxyacetic acid, acetylcholine chloride, Pyribenzamine, and Phenergan do not significantly affect mean tolerance time. Methamphetamine is deleterious to the tolerance of the rat to 20 g. Lucidril seems to lower mortality rates to 20 g while the Na salt of 2, 4, dichlorophenoxyacetic acid and methamphetamine increase the mortality rates.

A65-80142
OBSERVATIONS ON ACUTE AND CHRONIC OXYGEN POISONING.
George H. Kydd (US Naval Air Develop. Center, Aviation Med. Acceleration Lab., Johnsville, Pa.)
Aerospace Medicine, vol. 35, 1964, p. 1176–1179. 13 refs.

In an effort to discover the relationship between the occurrence of convulsions (acute effects) caused by oxygen at high pressure (OHP), and paralysis (chronic effects), susceptible rats have been repeatedly exposed to OHP under conditions that would tend to lessen the tendency toward the

occurrence of convulsions. One group was lightly anaesthetized (10 mg/kg. Nembutal) and the other exposed for a short time to maximum pressure and slowly decompressed. Of the anesthetized animals, two developed paralysis without having exhibited any previous acute (convulsive) effects while four developed paralysis with only slight acute effects. All of the slowly decompressed rats convulsed and only two showed paralysis. These observations indicate that paralysis and convulsions are not necessarily associated symptoms of oxygen toxicity.

A65-80143
THE CORNUCOPIA TWO-GAS ATMOSPHERE SYSTEM FOR MAN IN SPACE.
R. G. Bartlett, Jr. and C. J. Swet (Johns Hopkins U., Appl. Phys. Lab., Silver Spring, Md.)
Aerospace Medicine, vol. 35, Dec. 1964, p. 1179–1183.

Cornucopia is the name given to a novel concept for extending the utility of storable rocket bipropellants to include life support and other essential services in the space environment. The fundamental concept may be embodied in either the hydrogen peroxide and hydrazine system or the nitrogen tetroxide and hydrazine system. The Cornucopia process could provide equivalent service (2-gas atmosphere for 28 man days, and 17.5 kw. days of electrical power) plus a continuous purge 9 times greater than the metabolic oxygen usage rate, with a net gain in overall spacecraft performance. The concept could be exploited to fullest advantage for missions which are of sufficient duration to require earth-storable propellants and a two-gas atmosphere, but which cannot justify fully regenerative life support or a nuclear power source. Lunar or planetary bases might profitably employ some version of the Cornucopia concept on an interim basis, before initiating permanent nuclear powerstations or closed ecological systems. Extravehicular life-support and protective devices might also use this concept to advantage, particularly if some "flying belt" feature is required. Possible use of Cornucopia reactants for two-gas replenishment of very high performance and high altitude aircraft is discussed.

A65-80144
PROBLEMS IN AIR TRAFFIC MANAGEMENT. VI. INTERACTION OF TRAINING-ENTRY AGE WITH INTELLECTUAL AND PERSONALITY CHARACTRERISTICS OF AIR TRAFFIC CONTROL SPECIALISTS.
David K. Trites (FAA, Civil Aeromed. Res. Inst., Oklahoma City, Okla.)
Aerospace Medicine, vol. 35, Dec. 1964, p. 1184–1194. 16 refs.
Contract FA/AC-4-730.

Examination of the relationship between age at entry into Air Traffic Control Specialist (ATCS) training and scores on aptitude and personality tests of over 900 Enroute and Terminal ATCS trainees showed that older trainees scored (a) lower on tests of immediate memory and nonverbal abstract reasoning, (b) higher on arithmetic and verbal ability, and (c) higher or lower on speeded aptitude tests, depending on the type of the test. In the personality area the older trainees were more intellectually efficient, responsible, tolerant, etc. than their younger classmates. Average test scores were the lowest for training failure group, next lowest for pass-but-separated within the year group, and highest for pass-and-retained group. The pass-separated group was significantly poorer in rapid, accurate handling of arithmetic, and in nonverbal abstract reasoning. The higher training failure rate of the older individuals is partially due to inferior aptitudes for nonverbal abstract reasoning, memory for new material, and inability to work at the required speed. The battery of tests for selection of ATCS trainees measures those aptitudes shown to be related to actual pass-fail data. As a group, ATCS trainees seem to present an essentially normal picture of their personalities.

A65-80145
EFFECTS OF FOUR WEEKS OF ABSOLUTE BED REST ON CIRCULATORY FUNCTIONS IN MAN.
Perry B. Miller, Robert L. Johnson, and Lawrence E. Lamb.
Aerospace Medicine, vol. 35, Dec. 1964, p. 1194–1200. 5 refs.

Various effects of 4 weeks of absolute bedrest on the circulatory system were studied in 12 healthy male volunteers. Postural tolerance varied from day to day before and after bedrest. Repeated tilt-table testing allowed a more accurate appraisal of changes in postural tolerance caused by bedrest. Postural syncope on the tilt table was more frequent after bedrest. Forty-two percent of the subjects, however, did not faint during repeated testing after bedrest. A comparison of the highest orthostatic heart rates recorded during each tilt-table test without an antigravity suit before and after bedrest showed a distinctly higher range of orthostatic heart rates after bedrest in each subject studied. When an antigravity suit was worn during tilt-table testing after bedrest, postural syncope occurred on one occasion only. The relation of these studies to proposed flights in the Manned Orbiting Laboratory is discussed.

A65-80146
DECOMPRESSION SICKNESS TREATED WITH COMPRESSION TO 2–6 ATMOSPHERES ABSOLUTE.
M. W. Goodman (US Naval Station, Naval Expti. Diving Unit, Washington, D.C.)
Aerospace Medicine, vol. 35, Dec. 1964, p. 1204–1212. 26 refs.

Eight heretofore unreported cases of altitude decompression sickness treated by compression to greater than atmospheric pressures are presented. Briefly reviewed are six cases from the literature. The significance of this experience is considered with respect to the bubble embolus hypothesis of etiology and pathogenesis, and in regard to the overcompression modality applied to severe dysbarism not relieved by descent. The use of minimal compression magnitudes with oxygen inhalation is suggested.

A65-80147
THE EVALUATION OF PHYSIOLOGICAL SYNCOPE IN AVIATION PERSONNEL.
Laurence H. Blackburn, Jr. (US Naval School of Aviation Med., Aviation Med. Center, Pensacola, Fla.)
Aerospace Medicine, vol. 35, Dec. 1964, p. 1212–1216. 23 refs.

Evaluation of syncope in aviation personnel frequently fails to consider physiological acts. The incidence and causes of these types of syncope are discussed, and the experience with syncope at the Naval School of Aviation Medicine in 1962 is analyzed. Suggestions are made concerning the evaluation of syncope, and general principles for the proper disposition of syncopal aviators are developed. Recommendations are made to enable flight surgeons to play a more adequate role in the evaluation and prevention of syncope.

A65-80148
OCULAR MOTILITY AND FLYING SAFETY.
W. L. Erdbrink and H. S. Trostle (US Naval School of Aviation Med., Aviation Med. Center, Ophthalmol. Dept., Pensacola, Fla.)
Aerospace Medicine, vol. 35, Dec. 1964, p. 1221–1225. 10 refs.

Flying proficiency and safety still dictate the necessity of single binocular vision with depth perception associated with a "normal" range of heterophoria. The flight candidate who does not meet these requirements should not be permitted to enter training. However, the student pilot with satisfactory flying proficiency or the designated aviator with successful performance should be individually evaluated and every effort made to keep them flying. When there is no history of diplopia, the proved absence of diplopia, supression of a deviating eye in certain fields of gaze or diplopia beyond a useful range of binocular eye movements (25° to 30° from fixation), the individual should be retained in a flight status. The presence of suppression or diplopia in certain fields of gaze within 25° to 30° from fixation is not considered to be compatible with flying safety. A group of case reports is presented illustrating some ocular motility problems seen in flying personnel that relate to flying safety.

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